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**Foreign Currency Risk Management Practices in
U.S. Multinationals**

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Abstract

In order to manage currency exchange rate risks, multinational corporations often use currency derivatives such as forward and option contracts, as well as currency swaps. This paper is an attempt to better understand the use of such foreign exchange derivatives (FXD) and its benefits to U.S. multinational corporations (MNCs). The paper is an extension to a study conducted by Makar and Huffman (1997) examining how U.S. MNCs used foreign exchange derivatives in the 1990 to 1994 period. We conclude that the results from the original study are reaffirmed for the more recent period (1995-2000). We observe a positive relationship between the notional amounts of foreign exchange derivatives used and the extent of foreign involvement by MNCs. Furthermore, the results indicate that the use of FXD may be sensitive industry membership and effects of time across firms.

I. Introduction

As the world of business becomes increasingly global, more and more companies are establishing themselves as multinational corporations (MNCs). In their attempts to introduce new products and services, become market leaders and maintain profitability in foreign markets, these MNCs face a variety of challenges. One such challenge faced by MNCs throughout their dealing in foreign markets is fluctuations in currency exchange rates. Movements in exchange rates can cause instability in profit margins as well as significant losses to an MNC's bottom line. For example, Dhanani (2000) states that by going global MNCs come into contact with new types of risks and they incur costs such as higher insurance premiums and expensive security measures that they would normally avoid. In dealing with, and settling these costs, MNCs often have to interact with foreign governments and businesses/partners in their respective foreign currencies. Furthermore, when dealing in foreign currencies, any sort of currency exchange rate fluctuations can affect the firm's expected future cash flows.

These currency exchange rate risks are generally categorized into three types: translation or accounting risk, transaction risk, and economic risk. Often firms consolidate the financial statements of their foreign subsidiaries with that of the home country. In order to do this, firms must first restate the financial statements of these subsidiaries from foreign currency to that of the home/parent currency. Translation risk is the result of this restatement of a firm's foreign currency denominated accounts, where the exchange rate used causes changes in the value documented in the parent company's financial statements. In essence, translation risk is the effect exchange rates have on the figures shown on the parent company's consolidated balance sheet. Transaction risk, on the other hand, is the extent to which a given exchange rate will change the value of foreign-currency-denominated transactions, which have already been entered

into by MNCs. In other words, when a business contract is entered into, with the agreement that payment will be settled at a future date, the exchange rates that exist on the date the contract is entered into and the date that the contract is settled, may be different. As a result, the cash that is received on the date of settlement may be different from what was expected when the contract was entered into. Consequently, the cash flow to the firm is directly affected. Finally, economic risk is the extent to which the value of the firm will change due to a change in the exchange rate. According to Dhanani (2000), economic risk is the effect of long-term exchange rate movements on a firm's future expected cash flows and is hard to identify because the cash flows linked to the risk are not certain to materialize.

In order to minimize, if not prevent, these risks, MNCs often use financial instruments or derivatives such as forward and option contracts, as well as currency swaps. This paper is an attempt to better understand the use of such foreign exchange derivatives (FXD) and its benefits to U.S. Multinational Corporations. It is an extension to the study conducted by Makar and Huffman (1997) examining the use of FXD by U.S. MNCs during the period 1990-1994. This paper examines the use of FXD by US MNCs in the more recent period 1995-2000. Furthermore, it also investigates the significance of FXD use within various industries and across time.

The effect of exchange rate changes on the operations, cash flows and market values of MNCs is well documented. Several studies on MNCs, hedging, and exchange rate risk have stressed the fact that as MNCs expand their involvement throughout the world, the higher the probability that they will face exchange rate fluctuations/volatility in their operations. In turn, they face the possibility of negative effects on their cash flows. To safeguard the company's overall interests, cash flows, and equity, the extensive use of various hedging techniques by most

companies has been widely recognized. In a survey, Mathur (1982) finds that most companies institute a hedging program to reduce the negative effects of foreign exchange rate changes on their cash flows and reported earnings. He also finds that a formal foreign exchange management policy is more common among larger firms. Bartov, Bodnar and Kaul (1996) find a relationship between exchange rate variability and stock return volatility, and attribute this to foreign currency transactions. They also find that MNCs that do not use hedging strategies are more vulnerable to losses due to exchange rate fluctuations. Choi and Prasad (1996) also find a link between exchange rate risk and declines in cash flows and market values.

Studies by Mathur (1982), Bodnar, Hayt, Marston and Smithson (1995), and Phillips (1995), among others, have also shown that firms are increasingly using derivatives to manage their exchange rate risks. Using a sample of firms in the 1990 to 1994 period, Makar and Huffman (1997) find that the amount of foreign exchange derivatives used by U.S. MNCs is positively associated with the degree of foreign currency exposure. In this paper, we test the validity of this association for U.S. MNCs for the 1995 to 2000 period.

The rest of the paper is organized as follows: Section two discusses the data and methodology used in collecting and analyzing the data. The results of the multiple-regression analysis are discussed in section three, followed by concluding discussions on the relevance of the study in section four.

II. Methodology and Data

This paper examines U.S. MNCs' foreign currency risk management practices from 1995 through 2000.¹ It is an attempt to better understand the use of FXD and its benefits to U.S.

¹ We limit our study to the 1995 to 2000 period for two reasons. First, Makar and Huffman (1997) have already analyzed FXD use by U.S. MNCs in the 1990 to 1994 period. Second, FASB has halted the use of notional amounts

MNCs. The primary variable being investigated is the notional amounts of foreign exchange derivatives used by them. In addition, influences if any, from various industry memberships and passage of time are examined.

The sample for this study is made up of 20 U.S. MNCs that used foreign exchange derivatives from 1995 through 2000.² The companies selected were chosen from the Forbes Global 2000 list. In order to be included in the sample, the company should have disclosed information about its use of currency derivatives in its annual report. Further, companies operating in the petroleum refining or related industries were excluded.³ Firm-specific data used in the analysis, such as total assets, notional amounts of FXDs and foreign sales, was obtained from company annual reports. The notional amounts of FXDs are intended to measure the company's extent of involvement in transactions that have off-balance-sheet risk. This can also be viewed as transactions conducted by foreign subsidiaries, which are not immediately recorded on the balance sheet. The two main variables in the analysis are: FXDA, the notional amount of foreign exchange derivatives deflated (i.e. divided) by the total (consolidated) assets of the company, and, FSA, the foreign sales deflated by the consolidated assets of the company.

As of June 1990, the Financial Accounting Standards Board (FASB) had required U.S. MNCs to provide information regarding FXD. In SFAS No. 105, the FASB requires companies to disclose the notional amount of FXD. Notional amounts are intended to measure the company's involvement in transactions that have off-balance-sheet risk (Makar and Huffman (1997)).

in the disclosure of FXD use since 2000. Comparable measures of notional amounts of derivatives used by firms are not easily obtainable for the subsequent years.

² Given the relatively small size of the sample, the results of this paper should not be generalized across all types of firms and all time periods.

³ Oil prices are generally set in US dollars and the foreign currency risk exposure faced by the firms in this industry are fundamentally different from those faced by other industries.

Following Makar and Huffman (1997), we develop and test three hypotheses that shed light on FXD use by US MNCs. The first hypothesis tests the relationship between FXD use and level of foreign involvement by MNCs.

H₀₁: There is a significant and positive relationship between the use of foreign exchange derivatives and exposure to changes in exchange rates faced by U.S. MNCs.

The regression model used to test this hypothesis is:

$$\ln(\text{FXDA}_{it}) = \alpha + \beta_1 \ln(\text{FSA}_{it}) + \epsilon_{it}$$

where FXDA_{it} is the notional amount of foreign exchange derivatives deflated by the total assets for company i in year t ; and FSA_{it} is the foreign sales deflated by total assets for company i in year t . The natural logarithmic transformations were used in the model to account for nonlinear relationships between the two variables. Hypothesis H_{01} implies that as foreign currency exposure increases, the use of foreign exchange derivatives by MNCs will also increase. The model uses the relative level of foreign sales to test the hypothesis. The expectation is that as the foreign currency exposure variable, FSA, changes, these differences will also explain the variations in notional amounts of FXD.

As indicated previously, this study also seeks to determine whether the use of foreign exchange derivatives is sensitive to industry membership. In other words, the study seeks to determine whether being a member of a particular industry increases or decreases the frequency and amount of use of FXDs by MNCs. Industry norms may dictate the level of FXD use by firms. Hence, the second hypothesis tested is:

H₀₂: There is no significant and positive relationship between the use of foreign exchange derivatives and the industry group to which a firm belongs, if evidence demonstrates a statistically significant and positive coefficient on the foreign exchange exposure variable (FSA).

The rationale behind this hypothesis is that if a statistically significant and positive coefficient exists on the foreign currency exposure variable (FSA), this suggests that the dependant variable, FXD, is robust, or insensitive, to industry effects. This conjecture will be tested using a model that includes dummy variables representing various industries in addition to FSA. The model tested is :

$$\ln(\text{FXDA}_{it}) = \alpha + \beta_1 \ln(\text{FSA}_{it}) + \beta_2 \text{SIC}_{1it} + \beta_3 \text{SIC}_{2it} + \dots + \beta_{11} \text{SIC}_{10it} + \epsilon_{it}$$

where, SIC_{it} are the dummy variables representing the various industries.

Finally, in order to ensure that all possible alternatives are considered, it then becomes necessary to also examine the differences in company specific use of FXD over time. In other words, it becomes important to test for time effects on the use of FXD by firms. Based on the conclusions from previous studies, it can be presumed that foreign currency exposure has a significant and positive relationship with the use of FXD. In turn, it also requires consideration that due to the impact of this relationship, other factors such as time may not have significant effects on a firm's use of FXD. The third hypothesis tested is:

H₀₃: There is no significant and positive relationship between the use of foreign exchange derivatives and the passage of time across firms, if evidence demonstrates a statistically significant and positive coefficient on the foreign exchange exposure variable (FSA).

The model tested is:

$$\ln(\text{FXDA}_{it}) = \alpha + \beta_1 \ln(\text{FSA}_{it}) + \beta_2 \text{Year}_{1995i} + \beta_3 \text{Year}_{1996i} + \dots + \beta_7 \text{Year}_{2000i} + \epsilon_{it}$$

where, Year_i is a dummy variable representing each year in the study period. The expectation is that the dummy variables will allow the intercept to change over time and across firms.

However, because the intercept is changing, this will not reflect a significant effect of time on the

use of FXD. Rather, the FSA will be seen as maintaining the significant and positive relationship with FXD use by firms.

While the results that were generated will help in understanding the use of FXD by U.S. MNCs, it is also important to be aware of external factors that may affect the accuracy of the data collected and analyzed. In many situations, companies disclose FXD use in a variety of footnotes to the financial statements, and footnotes are frequently not cross-referenced making it difficult to know if all FXD disclosures have been identified (Goldberg and Tritschler (1995)). As a result, it is important to note that to the extent that some companies may not fully disclose their FXD use, the information that was collected for analysis may be skewed to a certain extent. Furthermore, as only 20 corporations were used in this study, the results cannot be assumed to represent all U.S. MNCs.

III. Results

The sample of 20 firms used to test the hypotheses pertaining to the use of FXD by U.S. MNCs represent eleven different industry groups including Manufacturing, Tobacco, Paper and Allied Products, Chemicals, Rubber and Plastics, Stone and Glass, Electronic and Electric Equipment, Instruments, Communications, and Durable Goods. Table 1 presents descriptive statistics for the sample of firms. It shows that the sample firms are fairly large, with mean consolidated assets of \$31,888.91 million, and mean foreign sales of \$ 6,929.75 million. Table 1 also shows that the FXD amounts used by the sample firms average 14.33% of consolidated assets. The average value of the FSAs for the sample firms is 45.10% of the consolidated assets.

<<< Insert Table 1 Here >>>

Table 2 summarizes the results of the Ordinary Least Squares (OLS) regression that was conducted to test hypothesis H_{01} . The estimated model is statistically significant with an F-value of 19.95. The results support the hypothesis that there is a significant and positive relationship between the use of foreign exchange derivatives and exposure to changes in exchange rates faced by U.S. MNCs. The estimated coefficient on the independent variable (lnFSA) is 0.32505 and is statistically significant, suggesting that for this sample of 20 U.S. MNCs, the use of FXD increases by about 0.33% for every one percent increase in relative level of foreign sales.

<<< Insert Table 2 Here >>>

Table 3 shows OLS regression results for the sensitivity analysis of industry effects as conjectured in hypothesis H_{02} . The model was used to test the effects of industry, along with the level of foreign sales. The model includes ten dummy variables to account for the various industries.⁴ The results are contrary to what was expected, as well as in comparison to the results from the Table 2. The expectation was that there would be no significant and positive relationship between the use of foreign exchange derivatives and the industry group to which a firm belongs, if evidence demonstrates a statistically significant and positive coefficient on the foreign exchange exposure variable (FSA). Based on the results from previous studies and from Table 2, the lnFSA was expected to demonstrate a significant and positive coefficient. However, we find the estimated coefficient of the lnFSA to be negative and statistically significant. This starkly contradicts previous studies and requires additional consideration with regard to external variables not accounted for by the model, and affecting the outcome of this study. Further, some of the industry variables (SIC_{it}) were statistically significant suggesting that industry membership can be an important variable. That is, the use of FXDs is not the same across

⁴ The final industry dummy variable is captured in the intercept estimate.

industries. Perhaps, the industry effects are contaminating the effect of FSA on FXD use by our sample of firms.

<<< Insert Table 3 Here >>>

Table 4 presents the results of the covariance analysis to test the hypothesis H_{03} . The results do not fully support the hypothesis, nor does it contradict it. The expectation was that there would be no significant and positive relationship between the use of foreign exchange derivatives and the passage of time even across firms, if evidence demonstrates a statistically significant and positive coefficient on the foreign exchange exposure variable (FSA). The results of the study, consistent with expectations, show a positive and significant foreign exchange exposure variable (lnFSA). The estimated coefficient of the independent variable (lnFSA) is 1.10746 and statistically significant. This suggests that for this sample of 20 U.S. MNCs, the use of FXD increases by about 1.11% for every one percent increase in relative level of foreign sales. These results are in line with previous studies confirming that the use of FXD does indeed increase with the increase in foreign sales. However, the results pertaining to the effects of time on the use of FXD by firms, contradict our *a priori* expectations. We find that the coefficient for the Year1995 dummy variable is positive and marginally significant, and the coefficients for the Year1997 and Year1998 dummy variables are positive and statistically significant. This shows that after accounting for the level of foreign sales, the use of FXDs by the firms is higher during these years. A plausible explanation for this is the heightened sensitivity and response on the part of the firms to the financial crises in Asia, Russia and Brazil in 1997 and 1998. Firms could have increased their use of FXDs to protect their revenues from the countries that were severely affected by the crises.

<<< Insert Table 4 Here >>>

The overall outcome of this study suggests, as expected, that FXD use is positively associated with foreign currency exposure. However, it contradicts expectations based on previous studies that membership in a particular industry group does not affect FXD use. The results of the study show that under certain conditions, industry group membership may affect the level of foreign exposure and use of FXD by firms. Furthermore, the study revealed indications that time may play a role in the extent to which FXD is used by firms. The variables that account for such conditions are beyond the scope of this study and were not tested through these models.

IV. Discussion and Conclusions

This study examined the foreign currency risk management practices of U.S. MNCs through their use of foreign exchange derivatives (FXD). Hypotheses were developed and tested to explain the differences in the notional amounts of FXD used in comparison to the changes in foreign currency exposure. The values of the variables for FXD and foreign currency exposure (FSA) were calculated using the notional amounts of FXD as disclosed in company annual reports, under the guidelines of the SFAS No. 105.

The Statement of Financial Accounting Standards (SFAS) No. 105 adopted by the Financial Accounting Standards Board (FASB) has required U.S. MNCs to disclose the notional amount of FXDs used by them. This ruling was in effect starting in 1990 and continued till 2000. The intent of the ruling was to measure a firm's involvement in transactions that have off-balance sheet risk. The amount of FXDs used by MNCs and their exposure to foreign exchange rate risk provides some insight into U.S. MNCs' risk management practices.

The study confirmed that the use of FXD among U.S. MNCs is positively correlated with their level of foreign currency exposure. As firms face higher levels of foreign currency

exposure, they use more FXD to hedge against the exposure. Furthermore, this substantiates the findings of previous studies by Makar and Huffmann (1997), Mathur (1982), Bodnar, Hayt, Marston and Smithson (1995), Bartov, Bodnar and Kaul (1996) and Phillips (1995). These results are relevant for firms that increase their foreign involvement. As their level of foreign involvement increases, the rate at which foreign earnings affects their cash flow and reported earnings will also increase due to a higher level of foreign currency exposure. In turn, firms will increase their use of FXD to hedge against the negative effects of currency risk directly related to their operations.

With regard to testing the industry effects, this study contradicts the expectation that industry membership should have no effect on the use of FXDs. While Makar and Huffman (1997) found that the use of FXDs was not sensitive to industry membership, we find that industry specific use of FXDs exists after accounting for the level of currency exposure. We also find that for our study period, the use of FXDs is not uniform across time. Specifically, we find that the use of FXDs increased in 1997 and 1998. This could be explained by the Asian financial crises and the severe structural problems faced by Russia and Brazil in those years.

References

- Bartov, E., G. M. Bodnar and A. Kaul (1996), "Exchange Rate Variability and the Riskiness of U.S. Multinational Firms: Evidence from the breakdown of the Bretton Woods System," *Journal of Financial Economics*, Vol. 42, No. 1, pp. 105-132.
- Bodnar, G. M., G. S. Hayt, R. C. Marston and C. W. Smithson (1995), "Wharton Survey of Derivatives Usage by U.S. Non-Financial Firms," *Financial Management*, Vol. 24, No. 2, pp. 104-114.
- Choi, J. J., and A. M. Prasad (1995), "Exchange Risk Sensitivity and its Determinants: A Firm and Industry Analysis of U.S. Multinationals," *Financial Management*, Vol. 24, No. 3, pp. 77-88.
- Dhanani, A. (2000), "Risky Business," *Financial Management (CIMA)*, pp. 30-31, Nov.
- Goldberg, S.R. and C.A. Tritzler (1995), "Financial Reporting for Foreign Exchange Derivatives," *Accounting Horizons*, Vol. 9, No. 2, pp. 1-15.
- Makar, S. D. and S. P. Huffman (1997), "Foreign Currency Risk Management Practices in U.S. Multinationals," *Journal of Applied Business Research*, Vol. 13, No. 2, pp. 73-86.
- Mathur, I. (1982), "Managing Foreign Exchange Risk Profitably," *Columbia Journal of World Business*, Vol. 17, No. 4, pp. 23-30.
- Phillips, A. L. (1995), "1995 Derivatives Practices and Instruments Survey," *Financial Management*, Vol. 24, No. 2, pp. 115-125.
- www.fasb.org/st/#fas125
- www.nysscpa.org/cpajournal/old/12826667.htm

Table 1			
Descriptive Statistics			
<u>Disclosed Amounts</u>	<u>Mean^a</u>	<u>Median^a</u>	<u>Std. Deviation^a</u>
Consolidated Assets	31888.9125	31005.4464	6900.4488
Notional Amount of FXD	4314.8130	4617.7502	1568.1760
Foreign Sales	6929.7490	6799.6545	1249.4680
Relative Amount of FXD ^b	1.318968	1.1759	0.5517
<u>Model Variables^c</u>	<u>Mean</u>	<u>Median</u>	<u>Std. Deviation</u>
FXDA	0.1433	0.1441	.0501
FSA	0.4510	0.4430	0.0654
^a - Computed for 1995-2000 sample period, in millions of dollars. ^b - Each company's notional amount of FXD divided by its foreign sales during the same period. ^c - Variables used in models H ₀₁ through H ₀₃ where FXDA is each company's notional amount of foreign exchange derivatives (FXD) deflated by its consolidated assets during the same period; and FSA is each company's foreign sales deflated by its consolidated assets for the same period.			

Table 2		
Results of Ordinary Least Squares Regression: Primary Analysis^a		
<u>Primary Analysis</u>	<u>Estimate</u>	<u>t-value</u>
Intercept	-2.13471 ^{***}	-14.81
ln(FSA)	0.32505 ^{***}	4.47
Adjusted R ²	0.1374	
F-Statistic	19.95 ^{***}	
^a - The ordinary least squares (OLS) regression analysis pertains to the model expressed in equation (1): $\ln(\text{FXDA}_{it}) = \alpha + \beta_1 \ln(\text{FSA}_{it}) \text{ } C_{it}$ where FXDA _{it} is the notional amount of foreign exchange derivatives deflated by consolidated assets for company i in year t; and FSA _{it} is foreign sales deflated by consolidated assets for company i in year t. ^{***} - Significant at a one-sided 0.01 level. ^{**} - Significant at a one-sided 0.05 level. [*] - Significant at a one-sided 0.10 level.		

Table 3			
Results of Ordinary Least Squares Regression: Sensitivity Analysis^a			
<u>Sensitivity Analysis</u>	<u>SIC Code^b</u>	<u>Estimate</u>	<u>t-value</u>
Intercept		-4.23906 ^{***}	-9.76
ln(FSA)		-0.69384 ^{**}	-2.34
SIC36	36XX	-0.36214	-0.53
SIC28	28XX	0.76470 ^{***}	3.12
SIC20	20XX	0.36378 ^{**}	2.09
SIC26	26XX	0.34690 ^{***}	2.61
SIC30	30XX	0.57712 ^{***}	5.54
SIC48	48XX	0.04517	0.38
SIC32	32XX	-0.01548	-0.15
SIC39	39XX	0.24485 ^{***}	3.16
SIC21	21XX	-0.63433 ^{**}	-2.56
SIC38	38XX	0.16360 ^{**}	2.55
Adjusted R ²		0.3961	
F-Statistic		8.10 ^{***}	
^a - Industry sensitivity analysis via equation (2): $\ln(\text{FXDA}_{it}) = \alpha + \beta_1 \ln(\text{FSA}_{it}) + \beta_2 \text{SIC}_{1it} + \beta_3 \text{SIC}_{2it} + \dots + \beta_{11} \text{SIC}_{10it} + \epsilon_{it}$ where SIC _{jit} is coded as 1 for company i in year t operating in industry group j (j=1-10, as defined by the two-digit SIC code), and as 0 otherwise. ^b - The two-digit SIC codes pertain to the dummy variables in equation (2) sensitivity analysis. ^{***} - Significant at a one-sided 0.01 level. ^{**} - Significant at a one-sided 0.05 level. [*] - Significant at a one-sided 0.10 level.			

Table 4		
Results of Ordinary Least Squares Regression: Covariance Analysis^a		
Covariance Analysis	Estimate	t-value
Intercept	-4.17636 ^{***}	-11.97
ln(FSA)	1.10746 ^{***}	3.18
yr95	0.39522 [*]	1.84
yr96	0.16214	0.76
yr97	0.44665 ^{**}	2.10
yr98	0.47242 ^{**}	2.26
yr99	0.34133	1.64
Adjusted R ²	0.7591	
F-Statistic	16.00 ^{***}	
^a - Covariance analysis results pertain to OLS estimations of the model expressed in equation (3): $\ln(\text{FXDA}_{it}) = \alpha + \beta_1 \ln(\text{FSA}_{it}) + \beta_2 \text{Year}_{1995i} + \beta_3 \text{Year}_{1996i} + \dots + \beta_7 \text{Year}_{2000i} + \epsilon_{it}$ FXDA _{it} is the notional amount of foreign exchange derivatives deflated by consolidated assets for company i in year t; FSA _{it} is foreign sales deflated by consolidated assets for company i in year t; YEAR _{it} is coded as 1 in year t for firm i (t = 1990-1993) and as 0 otherwise; and *** - Significant at a one-sided 0.01 level. ** - Significant at a one-sided 0.05 level. * - Significant at a one-sided 0.10 level.		