

COMBINED USE OF FOREIGN CURRENCY DERIVATIVES AND FOREIGN CURRENCY DENOMINATED DEBT ON FOREIGN EXCHANGE EXPOSURE

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Abstract:

This study examines the combined use of two financial hedging strategies on foreign exchange exposure of Indian nonfinancial firms. A sample of 69 Indian non financial firms is examined by this study for a period from 2006 to 2012. A two stage cross sectional regression frame work is used to test the main hypothesis of foreign exchange rate exposure that can be effectively hedged by combined use of FCD and FDD. The study has found statistically significant evidence that the combined use of foreign currency derivatives and foreign denominated debt are effective hedging tools for reducing currency exposure of Indian nonfinancial firms.

Key words: foreign exchange risk, foreign exchange exposure, hedging, foreign currency derivatives, foreign denominated debts

I. INTRODUCTION

This article tries to consider the foreign exchange exposure management of Indian corporate firm with financial hedging strategies. Financial hedging refers to use of financial instruments to manage the exchange rate risk. Foreign currency derivatives and foreign currency denominated debt are most popular financial hedging instruments for managing exchange rate exposure.

The hypothesis that the financial hedging will reduce the foreign currency exposure. It was supported by several studies particularly by the use of either foreign currency derivatives or foreign currency denominated debt.

Earlier literatures reported that the testing of above hypothesis of the effectiveness of hedging strategy on foreign exchange exposure differs from country to country. Hence the researcher wants to explore an Indian evidence, whether these notions of combined use of financial hedging strategy (FCD and FDD) is effective to hedge foreign exchange exposure.

This study examines the combined use of two instruments (FCD and FDD) which proves to be effective in reducing exchange rate exposure of Indian firms. A cross sectional regression methodology was used to test the research issues mentioned above. This study reported that the strong evidence to the notion of combined use of foreign currency derivatives and foreign currency denominated debt can be effectively reducing foreign exchange exposure. The rest of this paper is as follows. Next section demonstrates the earlier studies related to the research issue discussed. The third section demonstrates the data and sample selection procedures. The fourth section describes methodology of the study. The fifth section deals with the result and discussion and last section concludes the study.

II. REVIEW OF LITERATURE

Several researchers (Aabo, 2006; Allayannis, Ihrig, & Weston, 2001; Allayannis & Ofek, 2001; Chiang & Lin, 2005; Elliott, Huffman, & Makar, 2003; Junior, 2011; Monshi, Ismail, & Shaharuddin, 2011) conducted studies on foreign exchange exposure using financial instruments of foreign currency derivatives and foreign currency denominated debts individually and combining both instruments. Some researchers investigated whether these two instruments are complement or substitute to each other for managing exchange rate risk (Aabo, 2006; Chiang & Lin, 2005; Clark & Judge, 2009; Elliott et al., 2003; Judge, 2003; Monshi et al., 2011). We can classify earlier researches into four categories; firstly researchers who studied the exposure management by use of foreign currency derivatives alone (Al-Shboul & Alison, 2009; Anderson, Makar, & Huffman, 2004; Géczy, Minton, & Schrand, 1997; Hagelin, 2003; Menon & Viswanathan, 2005). Secondly researchers (Karlsson & Palm, 2012; Kedia & Mozumdar, 2003; Keloharju & Niskanen, 2001; Hoa Nguyen & Faff, 2006) who examined the effectiveness of FDD to manage currency exposure. Thirdly researchers who examined the effectiveness of combined use of both hedging strategies, FCD and FDD (Chiang & Lin, 2005, 2007; Clark & Judge, 2009; Elliott et al., 2003; Judge, 2003; Monshi et al., 2011). Finally, many researchers who examined whether these two hedging strategies are substitute or complement for each other for currency risk management (Tom Aabo, 2006; Chiang & Lin, 2005; Clark & Judge, 2009; Elliott et al., 2003; Judge, 2003a; Monshi et al., 2011).

This paper address the third issue mentioned above that the many researchers who tried to explore the combined use of these two instruments (Chiang & Lin, 2005, 2007; Clark & Judge, 2009; Elliott et al., 2003; Judge, 2003; Monshi et al., 2011). The summary of these studies are briefly mentioned here

Allayannis & Ofek (2001) examined a sample of 378 US non-financial firms and reported that use of both foreign currency derivative and foreign currency denominated debt are effectively reduces the foreign exchange rate exposure. Similar result was reported by **Elliott, Huffman & Makar (2003)** with a sample of 88 US multinationals.

Chiang & Lin (2005) concluded their study that the Taiwan firms used foreign currency denominated debt for raising fund and they used foreign currency derivatives for hedging purpose. **Clark & Mefteh (2011)** examined a sample of 176 large French firms, they reported that the effectiveness of combined use of financial instruments (FCD and FDD) to manage foreign currency exposure.

Monshi, Ismail & Shaharuddin (2011) investigated with Malaysian non financial firms external hedging strategies, FCD and FDD They found that the use of these two hedging strategies together and separately can effectively manage exposure.

III. DATA AND SAMPLE FIRMS

The sample firms of this study sourced from the major index of India, S&P CNX 200 index from the National Stock Exchange of India Ltd. (NSE). Only such firms which disclosed details about their foreign sales, the use foreign currency derivatives and foreign currency denominated debt in their annual report are included in the sample. Then the financial institutions were omitted because most of them are traders of these financial instruments and they may not be used these FCD and FDD for risk management. Finally there were 69 firms which satisfied the above sample selection criteria.

The data collected for the study takes a span of six years from April 2006 to March 2012. The reason to limit the period into six years is the guidelines made by the Institute of Chartered Accounts of India (ICAI) on December 2005. According to the guidelines issued by the Institute of Chartered Accountants of India (ICAI), all enterprises have to disclose category-wise quantitative data regarding derivative instruments like futures and options outstanding with the enterprise on the balance sheet for periods ending on or after March 31, 2006.

This study uses three variables for financial hedging strategies. FCDA, FDDT and INTERACTION. FCDA is the average year end notional amount of foreign currency derivatives divided by average total assets of each firms for the study period. FDDT is the average year end amount of foreign currency denominated debt divided by average total debt of each firms for the study period. INTERACTION variable is calculated by multiplying both financial hedging strategy FCDA and FDDT of each firm for the study period. The yearend amount of foreign currency derivatives and foreign currency denominated debt are gathered from annual report of each sample firm and annual foreign sales data were collected from the database of CMIE Prowess for the period from 2006 to 2012. Foreign currency derivatives include foreign currency future, foreign currency option, foreign currency swap and foreign currency forward. Most of the companies are not segregated with such classification instead they reported summation of all these derivative products. Hence this study has used FCD as total of these four derivative instruments. Foreign currency denominated debt includes foreign currency borrowing, euro convertible bonds and external commercial borrowings. Stock return data of each firm and market portfolio index of CNX S&P200 index were collected from NSE website. Foreign exchange rate of INR versus USD collected from Business Beacon database of CMIE.

IV. METHODOLOGY

The purpose of this paper is to examine the combined effect of financial hedging strategies (FCD and FDD) to manage foreign currency exposure of Indian corporate firms. For addressing the issue, this study used a two stage cross sectional regression. In the first stage the foreign exchange exposure of each firm is estimated by Jorion's (1990) two factor model. Then the absolute value of exposure coefficient of each firm is regressed with hedging strategy variables in the second stage cross sectional regression.

First Stage: Estimation of Foreign Exchange Rate Exposure

Followed by earlier studies the two factor model of foreign exchange rate exposure is used in the first stage frame work. The specification of two factor model is as follows

$$R_{it} = \beta_{0i} + \beta_{1i} R_{mt} + \beta_{2i} R_{xt} + \epsilon_{it} \dots\dots\dots (1)$$

Where R_{it} is the changes in rate of return on the i th firm's common stock in period t , R_{mt} is the change in rate of market return of S&P CNX 200 index to control the macroeconomic factors; R_{xt} is the change in bilateral foreign exchange rate, measured as the home currency price of the foreign currency for period t (Indian rupee against US dollar) and ϵ_{it} is the error term

In regression equation (1), β_{21} represents the foreign exchange rate exposure. The foreign exchange rate exposure measures the percentage change in the rate of return on a firm's common stock against a percentage change in the exchange rate. We expect an exporter or a firm with revenues from operations abroad to be adversely affected by an exchange rate appreciation (appreciation of Indian rupee against US dollar), the return on its stock (value of firm) should decrease, thus producing a positive exchange rate exposure and depreciation of Indian rupee should benefit to export firm and

shows a negative exchange rate exposure. However, if a firm is an importer, then an appreciation of the Indian rupee should benefit to that firm (i.e., the return on its stock should increase), producing a negative exchange rate exposure and depreciation of Indian rupee against US dollar should be unfavorable to its stock return, hence showing a positive exchange rate exposure.

Second Stage: Cross Sectional Regression

Combined use of FCD and FDD on Foreign Exchange Exposure

Once the foreign exchange exposure of sample firms is estimated, the absolute value of such exposure of each firm is regressed with the combined hedging strategy variables in the second stage (cross sectional regression). The hypothesis is that the combined use of FCD and FDD reduces the foreign exchange exposure. There are two models which were used to test the hypothesis. In the first model we add both financial hedging strategy of FCD and FDD separately as independent variables. On the other hand, in the second model instead of using two financial hedging variables we use an INTERACTION variable, which is calculated by multiplying these two financial hedging strategies FCDA and FDDT.

First models: both FCD and FDD in one specification

$$|\beta_{2i}| = \alpha_0 + \alpha_1 FCDA_i + \alpha_2 FDDT_i + \alpha_3 FSTS_i + \epsilon_i \dots\dots\dots (2)$$

Second models: INTERACTION variable in specification

$$|\beta_{2i}| = \alpha_0 + \alpha_1 INTERACTION_i + \alpha_2 FSTS_i + \epsilon_i \dots\dots\dots (3)$$

Where $|\beta_{2i}|$, is the absolute value of the foreign exchange rate exposure coefficient for firm i , estimated by equation (1) over the period from April 2006 to March 2012. $FCDA_i$ is the notional amount of foreign currency derivatives divided by total asset for firm. $FDDT_i$ is the notional amount of foreign currency denominated debt divided by total debt for firm. $FSTS_i$ is the foreign sales divided by total sales of firm. ϵ_i is the error term

We are expecting a statistically significant and negative sign for financial hedging strategy variables; it indicates the effectiveness of hedging..

V. RESULTS AND DISCUSSION

The estimated results of various models discussed in the methodology part are presented here and discussed in details. This section is broadly classified into two parts; firstly, the estimated result of exposure of each firms are discussed. Secondly, the result of combined effect of FCD and FDD use on foreign exchange exposure of firms was discussed.

The summary statistics of estimated foreign exchange rate exposure of combined users of financial hedging strategies are presented in table.1.

Table 1

SUMMARY STATISTICS OF FOREIGN EXCHANGE RATE EXPOSURE

Statistics	β_{2i} (exposure coefficient)
Mean	-0.17659
Median	-0.154
Maximum	1.92
Minimum	-5.117
Std. Dev.	1.111506
No. of positive exposure	29
No. of Negative exposure	40
No. of significant exposure at 1% level	2(both -ve)
No. of significant exposure at 5% level	4(two each of +ve & -ve)
No. of significant exposure at 10% level	3(two +ve & 1 -ve)
% of significant cases	13.04
No of observation(firms)	69
<i>This table presents the summary statistics of foreign exchange exposure coefficient (β_{2i}) estimated in eq(1)</i>	

Table No:1 shows the summary statistics of estimated first stage regression results of 69 Indian non-financial firms which uses both FCD and FDD to manage foreign exchange exposure. The table furnishes that out of sixty nine, 40 firms having negative exposure and remaining 29 firms has positive exposure. Out of 69 firms only nine firms showing significant exposure at different level. It comes to only 13.04% of total sample firms. There are two firms with highly significant exposure at one percent level with negative sign. Four firms comprising two each shows both sign of exposure at five percent level of significance. Three firms shows relatively weak significance at ten percent level out of which two firms shows positive sign and remaining one negative sign of exposure.

Our study results are consistent with earlier studies, especially in USA in terms of percentage of firms having statistically significant exposure. Researchers found a weak evidence of foreign exchange rate exposure as a result of foreign exchange rate fluctuations. Present study reported that only 13.04% firms have significant exposure at different levels of significance. Previous studies like Jorion (1990), reported 5%, Pitamani et al (2004) 8%, Fraser & Pantzalis (2004) 12% and Choi & Prasad (1995) evidenced 15% of firms in their respective sample studies in USA. However some of the studies outside the USA reported relatively higher number of percentage of firms in their samples in different countries. For example, Solano (2000) in Spain reported 21%; Luo, Visaltanachoti & Kesayan (2006) in

New Zealand evidenced 19%, Kiyamaz (2003) in Turkey reported relatively highest percentage (47%). Junior (2011) in Brazil reported 25%, Clark & Mefteh (2010) in France reported 23%, and Kangaraja & Sikarwar (2011) in India reported 16% of firms have significant foreign exchange rate exposure.

The reasons for the weak evidences of foreign exchange exposure vary from firms to firms and country to country. Several researchers documented that one of the possible reason for low exposure is that the corporate firms themselves reduce its exposure by employing various hedging strategies like financial, natural and operational hedging strategies. The financial hedging is the most documented hedging strategy by earlier researchers. Foreign currency derivatives and foreign currency denominated debt are two important financial hedging strategies. The individual effectiveness of these two hedging strategy were discussed in fifth chapter. Hence this chapter focuses on the combined use of FCD and FDD for managing foreign currency risk. Further this study also analyses the two hedging strategies are substitute or complements to each other for hedging risk.

Result of Combined use of FCD and FDD on Foreign Exchange Exposure

Once the foreign exchange exposure of each firm is estimated by equation (1), then the absolute value of exposure coefficient used as dependent variable in the second stage regression where, the effect of the combined use of financial hedging strategies (FCD and FDD) on foreign exchange exposure is tested. The descriptive statistics of variables used in second stage regression are presented in Table.2

Table 2

DESCRIPTIVE STATISTICS OF COMBINED USER FIRMS

Variables	Mean	Median	Std. Deviation	Minimum	Maximum
Abs exposure	0.778	0.630	0.808	0.004	5.118
FCDA	0.166	0.087	0.231	0.000967	1.129
FDDT	0.378	0.375	0.240	0.000235	1.000
INTERACTION	0.059	0.029	0.085	2.27e-07	0.553
FSTS	0.245	0.103	0.265	3.49e-.05	0.955
<i>This table provides descriptive statistics of variables used in the second stage regression (eq(2 &3))</i>					

The exploratory data analysis of variables used in second stage regression are displayed in table 2. It presents the mean, median, minimum, maximum and standard deviation of variables used in the second stage regression. The average use of foreign currency derivatives of sample firm is 16.6 % of total asset and the use of foreign currency denominated debt is 37.8 % of total debt. An average foreign sale of sample firms comes to 24.5% of total sales.

Table 3

COMBINED USE OF FCD AND FDD ON FOREIGN EXCHANGE EXPOSURE

Variables	Model 2	Model 3
Intercept	1.013***	0.698***
FCDA	-0.663*	-
FDDT	-0.815***	-
Interactions	-	-1.331**
FSTS	0.634**	0.372
Adj.R square	0.091	0.039
F value	3.27**	2.37*
Observation	69	69
D.W	2.01	2.17
<i>This table provides estimated results of various cross sectional regression(equation2 &3)</i>		
<i>***, ** and * indicates level of significance at 1%, 5% and 10% respectively.</i>		

Table 3 presents the estimated results of different models of combined use of foreign currency derivatives and foreign currency denominated debt to manage foreign currency risk exposure.

From the Table 3, Model .2., we can observe that both FCDA (-0.663, $p < 0.10$) and FDDT (-0.815, $p < 0.01$) variables shows negative coefficients with statistical significance. It indicates that the combined uses of financial hedging strategies (FCD and FDD) are effective to reduce foreign currency risk exposure. The foreign sales to total sales displayed a positive and significant (0.634, $p < 0.05$) coefficient with exposure. It indicates that the more the foreign involvement of a firm will lead to more foreign currency exposure.

From the table we can see that , the coefficient of foreign currency derivatives and foreign currency denominated debt show the negative coefficient. It indicates that there is a negative relationship between combined use of financial hedging strategy and foreign exchange rate exposure. The negative and significant coefficient indicates the use of foreign currency derivatives and foreign currency denominated debt together significantly reduces or hedge foreign exchange rate exposure. The variable FSTS in the table is positive as we expected. The foreign involvement is the main contributing factor of foreign exchange rate exposure.

In models 3 researcher has use INTERACTION (multiplication of FCDA with FDDT) variable instead of using both variables (FCDA and FDDT) separately along with hedging incentive variables to analyses whether these combined use of hedging strategy is effective to mitigate the foreign currency risk exposure. We can observe that hedging variable, INTERACTION variable shows negative

coefficients (-1.331) with significant ($p < 0.05$) relation with exposure. It indicates that the combined use of financial hedging strategies (INTERACTION) is effective to reduce foreign currency risk exposure. The FSTS displayed a positive (0.372) and insignificant ($p > 0.05$) relation with exposure. The positive sign indicates, the more the foreign involvement of a firm will lead to more foreign currency exposure.

From the table we can see, in the models the coefficient of hedging variable INTERACTION shows the negative coefficient. It indicates that there is a negative relationship between combined use of financial hedging strategy and foreign exchange rate exposure. This shows that the use of foreign currency derivatives and foreign currency denominated debt together significantly reduce or hedge foreign exchange rate exposure.

VI. CONCLUSION

This paper studied the combined use of foreign currency derivatives and foreign currency denominated debt on foreign exchange exposure of 69 Indian non financial firms. A two stage cross sectional regression methodology is used to test the combined use of financial hedging instrument.

The result of combined use of foreign currency derivatives and foreign currency denominated debt on foreign exchange exposure shows a negative and significant relationship. Hence the hypothesis that there is a significant evidence for the combined use of foreign currency derivatives and foreign currency denominated debt to effectively reduce the foreign exchange rate exposure is accepted.

This study gives an insight in to the various players of foreign exchange market like financial managers and regulators. Financial managers of corporate firms get a success story of effective management of foreign exchange exposure. Regulators can observe from this study that the currency derivative instruments and foreign debt are effective products to reduce foreign exchange exposure and they will make policies in such a way and they will help the corporate firms.

The main delimitation of this study and scope for further study is that this study concentrates only short term exposure management of financial hedging like currency derivative and foreign currency denominated debts. But there are a number of other short term and long term exposure management instruments like natural hedging strategies and other operational hedging strategies for managing foreign exchange risk of corporate firms. So a further study can be focused on this area.

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