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Abstract: This paper aims to develop understanding of the time varying relationship between exchange rate changes and the value of the firm. For this purpose, the paper examines the firm-level exchange rate exposure and its determinants for a sample of 651 Indian firms in the environment of recent global financial crisis of 2008. Using a two-factor arbitrage pricing theory model, the evidences presented in the paper suggest that firms are more exposed to the exchange rate changes in terms of prevalence and magnitude after the onset of the financial crisis. However, there is a lack of evidence that hedging is more effective in reducing exposure during the crisis/post-crisis period as opposed to the pre-crisis period. **The study has important implications for firms indicating that managers should devise more effective risk management activities during crisis period.**

Keywords: Exchange rate exposure, financial crisis, India, Time-varying

Time Varying Exchange Rate Exposure and Hedging - Impact Of Global Financial Crisis

1. INTRODUCTION

Financial theory suggests that the cash flows of the firm are sensitive to unanticipated changes in exchange rates (Hekman, 1983, 1985; Shapiro, 1975). The extent to which the value of the firm is affected by unexpected changes in exchange rates is known as exchange rate exposure of a firm (Adler & Dumas, 1984). The examination of exchange exposure is not only important for firms that involve in international transactions but also for domestic firms (Aggarwal & Harper, 2010). In spite of the extensive research, empirical findings are not able to detect the significant relationship between exchange rate changes and firm value. The weak empirical evidence on the relationship between exchange rates and the value of the firm gives rise to the 'exposure puzzle' (M. Bartram & Bodnar, 2007). One of the explanations of this puzzle provided by empirical studies is the time varying property of exposure (Allayannis & Ihrig, 2001; Glaum, Brunner, & Himmel, 2000; Jorion, 1990; Koutmos & Knif, 2002; Williamson, 2001). The exchange rate exposure of firms may change over time due to changes in the level of exports, imports and firms' competition situation. The changes in the foreign currency denominated assets, liabilities and hedging activities may also change the exposure. In addition to the firm specific factors, exogenous factors such as exchange rate regime, policy switch and financial crisis may have significant impact on the level of exposure.

A few studies have analysed the exchange rate exposure around various financial crises. While most of the studies find that financial crisis causes higher exchange rate exposure to firms, evidence in the post-crisis period is contrasting. On the one hand, Aquino (2005) and Verschoor & Muller (2007) report a significant decrease in the number of firms having currency exposure in the post-crisis period, few other studies reveal higher exposure (Al-shboul & Anwar, 2014; Bacha, Mohamad, Raihan, & Mohd, 2013; Kiymaz, 2003; Mozumder, Vita, Kyaw, & Larkin, 2015; Ye, Hutson, & Muckley, 2014). The understanding of how firms' stock returns respond to the exchange rate changes during crisis period is important for better management of risk hedging activities under unseen circumstances. The existing literature has consensus that hedging activities reduce exposure (Allayannis & Ofek, 2001). However, the literature is silent about the time variation of this relationship and how effective is hedging in the duration of financial crisis. It is, therefore, pertinent for firms to know whether the impact of hedging activities on exposure varies in crisis periods.

In an attempt to explain the exposure puzzle and to further increase our understanding of the time varying relationship between exchange rates and stock prices (value of the firm), this paper investigates the level of exchange rate exposure at individual firm level in the environment of recent global financial crisis of 2008. The paper examines the variation in exchange rate exposure during three sub-periods- pre crisis period, ongoing crisis period and post crisis period taking a case of 651 Indian firms during April 2001 to March 2013. The factors that determine exchange exposure during various sub-periods are also explored. Examining exchange rate exposure for Indian firms around financial crisis of 2008 provides a natural experiment as these firms face huge losses during crisis by using currency derivatives (Rajwade, 2010). The study contributes to the extant literature, which attributes the exposure puzzle to the time varying property of exposure by providing evidence that exchange rate exposure varies across various sub-periods. Firms are more exposed to the exchange rates after the onset of the financial crisis of 2008. Hedging activities of firms are not effective in reducing exchange rate exposure during the crisis and post crisis period. The findings have important theoretical and managerial applications. The study has theoretical significance in terms of adding to the theoretical literature that explains time variation in exposure due to changes in the macroeconomic environment. The study is useful for managers indicating that firms should devise more effective risk management activities during crisis period.

Following introduction, this paper is organized as follows: The theoretical background and review of empirical evidence is presented in section 2, followed in section 3 by a description of the methodology used in this study for measuring exchange rate exposure. The empirical results are presented in section 4. Section 6 and 7 mention findings and conclusions.

2. THEORETICAL BACKGROUND AND EMPIRICAL EVIDENCE

Exchange rate exposure refers to the extent to which the value of the firm is affected by unexpected changes in exchange rates (Adler & Dumas, 1984). The exchange rate exposure is theoretically classified into three broad categories (Eun & Resnick, 2014). The first is *Transaction Exposure*, which is defined as the sensitivity of “realised” domestic currency values of the firm’s contractual cash flows denominated in foreign currencies to unexpected exchange rates. The second is *Economic Exposure*, which is defined as the extent to which future cash flows are affected by unanticipated changes in exchange rates. The third is *Translation Exposure*, which refers to the potential that the firm’s consolidated financial statements can be affected by changes in exchange rates. Theoretically, all firms, domestic and

international, are exposed to exchange rate risk. However, empirical evidence finds mixed results. While some studies report strong evidence of exposure (Bacha et al., 2013; Choi & Prasad, 1995; Kiyamaz, 2003), a large number of studies reveal only small number of firms significantly affected by exchange rate changes (Chue & Cook, 2008; Jorion, 1990; Lin, 2011; Muller & Verschoor, 2007). One of the reasons of this inconclusiveness attributed by existing literature is the time varying property of exposure. Some studies report that exposure changes over time due to changes in the level of exports, imports and firms' competition situation (Glaum et al., 2000; Williamson, 2001). While other studies attribute this nature of exposure to the effect of exogenous factors like exchange rate regime (Parsley & Popper, 2006a), policy switch (Bacha et al., 2013) and financial crisis (Lin, 2011; Verschoor & Muller, 2007; Ye et al., 2014).

Financial crisis is one of the major external factors that can affect the volatility of exchange rates and stock returns of firms. Several studies report that financial crisis has a significant impact on the level of exchange rate risk and hedging policies of a firm. Studies conclude that firms face higher exposure during the period of crisis, which is not surprising considering the episodic volatility of exchange rates. However, studies mostly report firm's internal financial and hedging policies as a cause of higher exposure during crisis period. For example, Yip & Nguyen, (2012) report a significant increase in the level of exposure of Australian firms during the global financial crisis of 2008 but interestingly do not find any substantial increase in the proportion of firms that use hedging instruments. Lin (2011) investigates the exchange rate exposure of six emerging markets including India and reports that higher exposure during the crisis period of 2008 can be attributed to firm level factors like exports and foreign assets. Rossi (2011) also finds that firm's hedging and financial policies lead to higher exposure during crisis periods for Brazilian firms. O.I. Bacha et al. (2013) find that the Malaysian firms face higher exposure during Asian crisis period, which reduced remarkably in the post crisis period. Therefore during crisis period volatile exchange rates increase firms' exposure as firms are not well hedged in advance to tackle the sudden situation.

The studies, which analyse the exchange rate exposure around the financial crises, specifically in the post crisis period, provide contrasting results. Kiyamaz (2003) finds exchange rate exposure of turkish firms for the period of 1991 to 1998 and argues that the exposure is lower in post crisis period as firms begin giving more attention to their level of exposure. Al-shboul and Anwar (2014) also report lower exposure in the post crisis period (February 2009-November 2011) and attributed this to the introduction of some strict regulatory policies by

Canada government after crisis. Ye et al. (2014) examine foreign exchange exposure of 20 emerging countries including India and find that firms face higher exposure during ongoing crisis period (January 2008-December 2008) as compared to pre-crisis period. They argue that a reduction in exposure in the post crisis period might be a result of improved hedging activities conducted by firms after the crisis. Mozumder et al. (2015) determine exchange rate exposure of European firms around financial crisis of 2008 and report higher exposure during crisis period. They find that the exposure was lower in pre-crisis and post crisis period, which might indicate that during crisis firms, were not able to hedge properly due to liquidity constraints. Some other studies present the opposite findings. For example, Aquino (2005) finds that the Philippine firms' stock returns were significantly affected by the exchange rate changes in the post Asian crisis period as investors start demanding extra return for firm's higher exchange rate risk. Verschoor & Muller (2007) also observed higher exposure for US multinationals in the post-Asian crisis period and mention that firms did not increase their hedging activities after crisis. This indicates that firms face higher exposure in the post crisis period due to either higher cost of capital or inadequate hedging activities. Firms that are able to incorporate improved and effective hedging activities may face lower exposure in the post crisis period.

The aforementioned studies indicate that the evidence on the impact of exchange rate changes on the value of the firm, specifically around the financial crisis, is contrasting. Therefore, it is pertinent for firms to understand how stock price reacts to the exchange rate changes in the event of external shocks like financial crisis.

Secondly, it has been well established by the literature that hedging reduces exchange rate exposure. However, little attention has been given in the literature to the time variation of the relationship between hedging and exposure. The effectiveness of hedging in reducing exposure specifically during the financial crisis has not been investigated. This study addresses these research gaps by examining two research questions. First, how do stock returns of firms react to changes in exchange rates around the financial crisis? Second, how effective is hedging activities of firms in reducing exposure around crisis period?

3. RESEARCH METHODOLOGY

3.1 Measuring Foreign Exchange Exposure

The exchange rate exposure of firms for full sample period is estimated by the approach suggested by Jorion (1990)ⁱ as follows:

$$R_{it} = \beta_{0i} + \beta_{mi} \cdot R_{mt} + \beta_{si} \cdot R_{st} + \varepsilon_{it} \quad (1)$$

where R_{it} is the monthly stock return of firm i in period t ; R_{mt} is the monthly return on the market portfolio in period t ; R_{st} is the monthly percentage change in the trade-weighted exchange rate index, measured as units of foreign currency per one Indian Rupee in period. The increase in the value of R_{st} indicates an appreciation of Indian Rupee against a basket of foreign currencies. The coefficients β_{mi} and β_{si} represent a measure of sensitivity of stock return of firm, i , to market risk and exchange risk; ε_{it} is the disturbance term. The value obtained for β_{si} for different firms can be interpreted as a level of exposure to exchange rates indicating the extent to which the stock return responds to a 1% change in the exchange rateⁱⁱ. A positive coefficient means that firm's stock return increases when the Indian rupee is appreciated against the basket of other currencies. Equation (1) is estimated by ordinary least square (OLS) correcting for standard errors by Newey & West (1987) methodⁱⁱⁱ. The robustness of the exposure estimates is examined on the basis of alternative exchange rate index and market portfolio return.

In India, the 1997 Report of the Committee on Capital Account Convertibility recommended a phased implementation of capital account convertibility to be completed by the year 1999-2000. Considering the fact that capital flows have substantial influence on exchange rate, the full time period of this study is April 2001 to March 2013.

To examine the effect of financial crisis, the full sample period is divided into three sub-periods i.e. pre-crisis period (April 2001- March 2007), ongoing crisis period (April 2007-March 2009) and post crisis period (April 2009-March 2013). The sub-periods are based on the time-varying performance of global and emerging markets (Ye et al., 2014). The period-by-period exposure is determined by using interactive time dummies following prior studies (Parsley and Popper, 2006; Ye et al., 2014):

$$R_{it} = \beta_{0i} + \beta_{mi} \cdot R_{mt} + \sum_{n=1}^3 \beta_{si,n} \cdot D_{n,t} R_{st} + \varepsilon_{it} \quad (2)$$

where $D_{n,t}$ is a time dummy variable: D1= 1, April 2001- March 2007; = 0, otherwise; D2 = 1, April 2007-March 2009; = 0, otherwise; D3= 1, April 2009-March 2013; =0, otherwise.

3.2 Determinants of Exposure

The study uses cross-sectional regression model to examine the determinants of exposure during crisis period. These characteristics include firm's net export sales scaled by total sales, size, hedging activities and industry. Several studies have found a strong positive relation between firm's foreign exchange exposure and its foreign involvement (Choi & Prasad, 1995; Dominguez & Tesar, 2006; He & Ng, 1998; Jorion, 1990). The absolute value of net trade or net exports (i.e. $|\text{exports}-\text{imports}|$ scaled by total sales) is used to proxy for firm's involvement in international activities. The firms with higher value of $|\text{exports}-\text{imports}|$ are more involved in international trade and thus are expected to have higher exchange rate exposure. A firm may reduce its exchange rate exposure by engaging in financial hedging. To measure financial hedging, a foreign currency derivative usage dummy is used that assigns a value of one if the firm uses foreign currency derivatives or zero otherwise. These data were hand-collected from the firms' annual reports. Previous studies have detected conventional negative relationship between currency derivative usage and foreign exchange exposure (Allayannis & Ofek, 2001). Natural logarithm of firm's total assets is used for possible firm's size effects on exchange rate exposure. It is well established by literature that small firms tend to be more exposed to exchange rate risk than large firms (Bodnar & Wong, 2003; Chang, Hsin, & Shiah-Hou, 2013; Chow, Lee, & Solt, 1997; Dominguez & Tesar, 2006). Larger firms are more likely to hedge exchange exposure because of their economies of scale and therefore face lower exposure. Several studies have found that exchange rate movements affect industries differentially. Industries differ in terms of pass through and markups (Allayannis & Ihrig, 2001; Bodnar, Dumas, & Marston, 2002), competitive structure (Marston, 2001) or industry concentration (Bartram & Karolyi, 2006) and hence may face different levels of exposure. Also, firms in some industries with a greater quantity of international transactions are more likely to hedge and have different levels of exposure (Dominguez & Tesar, 2006). The industry categories for this study follow the industrial categorization codes of (NIC) National Industrial Classification (see Table 4). Industry effect is controlled using dummies in all specifications of cross-sectional regressions.

Based on previous literature, the following cross-sectional regression model is estimated. The standard errors are corrected for heteroskedasticity by the method suggested by White (1980).

$$|\beta_{si}| = \gamma + \gamma_1 |\text{Net_EXP}|/TS_i + \gamma_2 \text{SIZE}_i + \gamma_3 \text{HEDGE}_i + \sum_{k=1}^{18} \gamma_5^k \text{INDDUM}_i^k + \mu_i \quad (3)$$

where $|\beta_{si}|$ is the absolute value of foreign exchange rate exposure coefficient of firm i estimated from equation (1). Following prior literature which argues that firm-level traits can assist only in explaining the magnitude rather than the direction of the exchange rate exposure (Aggarwal & Harper, 2010; Aysun & Guldi, 2011; S. M. Bartram, 2004; Choi & Prasad, 1995; Doukas, Hall, & Lang, 2001; Faff & Marshall, 2005), the absolute value of exposure coefficient is taken as a dependent variable. All independent variables are operationalized by taking the average of year-end figures for the sample period of 12 years, i.e. March 2002-March 2013. $|\text{Net_EXP}|/TS_i$ denotes absolute value of net exports sales scaled by total sales for firm i , SIZE_i is the logarithm of the firm's total assets, HEDGE_i is the dummy variable having value 1 if the firm i uses currency derivatives for hedging purposes, zero otherwise, and INDDUM_i^k are 18 industries dummies with Chemical, Plastic and Petroleum industry as the reference category for dummy variables. μ_i , the error terms, are assumed to be normally distributed. Data for currency derivative usage is hand collected from the annual reports of firms.

3.3 Data and Sample

The sample of firms for the study is primarily sourced from Centre for monitoring the Indian economy (CMIE) Prowess database. Similar to previous studies, we exclude financial firms from sample firms because derivative usage for financial firms is often business related. The non-financial firms, which are listed on Bombay Stock Exchange (BSE), are 4308. The non-financial listed firms that report international transactions (exports or imports) in each of the years of sample period are 1255, out of which 651 firms have no missing stock return data. Therefore, the final sample consists of 651 firms.

For estimating firms' exposure coefficients at first stage, monthly data was obtained. The market portfolio monthly returns are calculated from BSE Sensitive Index (Sensex) of 30 firms. The index value is available on the website of the Bombay stock exchange^{iv}. 36 countries nominal effective exchange rate index (36 NEER; Base: 1985=100) published in Reserve Bank of India (RBI) monthly bulletin is used for the purpose of calculating monthly exchange rate changes^v. The monthly stock returns^{vi} of firms are obtained from CMIE prowess database.

4. EMPIRICAL RESULTS AND DISCUSSION

Table I reports the summary of the exposure estimates from regression equation (1). We can see that significant exposure to exchange rate risk is exhibited by approximately 66.6% (434/651) of the sample firms. The average value of exchange rate exposure coefficients is 1.317 indicating that a 1 percent appreciation of Indian rupee causes almost 1.32 percent gain in the firms' stock returns. These results are similar to those of previous studies on emerging markets which report more than half of their sample firms with significant exposure (Bacha et al., 2013; Kiyamaz, 2003; Parsley & Popper, 2006b; Tsai, Chiang, Tsai, & Liou, 2014; Ye et al., 2014). Table II shows that the exchange rate exposure coefficient estimates are robust to alternative measures of exchange rate index (Real Effective Exchange Rate i.e. 36 REER) rate and market portfolio index (BSE S&P 500 index).

(Insert Table I about here)

(Insert Table II about here)

Table III presents a summary of exchange rate exposure coefficients of firms for different sub-periods. The prevalence and magnitude of exposure varies across sub-periods. A closer examination reveals that crisis was possibly the underlying reason for significant exposure for full sample period. Specifically, the average absolute significant exposure is highest in the crisis period (2.665) which further reduced a little in the post crisis period (2.113). The average exposure is lowest in the pre-crisis period (1.883). The prevalence of exposure found to be slightly different. Only 28.7% firms are significantly exposed to exchange rate risk during pre-crisis period, which increased slightly to 29.3% in the crisis period. This figure increased drastically in the post-crisis period to 61%.

(Insert Table III about here)

The findings indicate that the financial crisis of 2008 caused higher exchange rate exposure for firms, as there was a substantial increase in the average magnitude of exposure, although proportion of firms exposed did not increase. This evidence is consistent with the theoretical arguments and empirical studies (Bacha et al., 2013; Lin, 2011; Rossi, 2011; Yip & Nguyen, 2012) which suggests that higher exchange rate volatility during crisis period affect the stock returns of firms. In the post crisis period, more firms are significantly exposed to exchange rate risk but the average value of significant exposure coefficients is reduced. The reason may be that firms that faced higher exposure during crisis are able to reduce it by improved

hedging activities. Also the high prevalence of exchange rate exposure may be because investors of more firms started worrying about the adverse impact of exchange rate changes and demand higher rate of return. These findings are consistent with Ye et al. (2014) which find same results for 20 emerging markets including India.

The sign of the exposure coefficients are somewhat consistent in various sub-periods. The findings indicating that, on average, firms gain from the appreciation of domestic currency. This result is not surprising and consistent with the prior literature on emerging markets (Chue & Cook, 2008; Dominguez & Tesar, 2006; Muller & Verschoor, 2007; Tsai et al., 2014; Ye et al., 2014). These findings can be attributed to the reliance of Indian firms on imports for the production and exports to the other markets. Additionally, the heavy short-term capital inflow and outflow to India in recent years may be the other possible reason behind this phenomenon. Following the literature (Aggarwal & Harper, 2010; Aysun & Guldi, 2011; S. M. Bartram, 2004; Choi & Prasad, 1995; Doukas et al., 2001; Faff & Marshall, 2005), this study is not particularly concerned about the direction of exchange rate effects on equity returns but rather the extent of exposure in an absolute sense.

Table IV present the factors that affect exchange rate exposure during various sub-periods. In the pre-crisis period, $|Net_EXP|/TS$ is significantly positively related to exposure, which is consistent with the expectation. Firms with larger size have lower exposure as they might be able to use more effective hedging instruments. The variable *HEDGE* is significant only in the pre-crisis period indicating that firms were able to reduce their exposure by hedging. During the crisis and in the post crisis period, hedging is not able to reduce exposure significantly. Interestingly, firms with larger size are more exposed to exchange rate risk in post crisis period. This indicates that after the onset of crisis firms face higher exposure and hedging is not effective in reducing the exposure. This might be a reason behind the findings that more firms are exposed to the exchange rate risk in the post crisis period.

(Insert Table IV about here)

5. DISCUSSION AND IMPLICATIONS

This study investigates the exchange rate exposure and its determinants for a sample of 651 Indian firms in the environment of financial crisis of 2008. The study finds that more firms are exposed to the exchange rate changes after the onset of the financial crisis and hedging activities of firms are not effective in reducing exposure. These findings have theoretical and

practical implications. In terms of theoretical significance, the results contribute to the extant literature, which attributes the insignificant empirical findings to the time varying nature of exposure. In terms of practical significance, the findings explore the currency exposure of firms in the event of financial crisis, which is helpful for investors and policy makers for decision-making. The findings are very important for managers to manage their firms' exchange rate exposure by devising appropriate hedging policies accordingly. Firms should improve their hedging and other risk management activities to manage their currency exposure during any unseen circumstances like crisis.

The findings have important practical implications specifically for Indian firms, given the fact that Indian firms faced substantial losses during the crisis of 2008 because of the use of currency derivatives. Firms face higher exposure during the crisis; however, the exposure can be reduced in the post crisis period by improving on the usage of currency derivatives. An integrated risk management system including financial and operating hedging might help firms to recover from high losses due to crisis. The investors price the exchange rate risk into the stock market after the financial crisis and expect higher rate of return from firms, which might affect the firm value. The firms should incorporate the long-term natural or operational hedging strategy, besides the usage of currency derivatives.

6. CONCLUSION

This study re-examines the time varying relationship between exchange rate changes and the value of the firm. For this purpose, the exchange rate exposure of 651 Indian firms are estimated for three sub-periods around the financial crisis of 2008. The effect of hedging on exchange exposure in various sub-periods is also explored which has not been got much attention in the literature. The study concludes that firms are more exposed to exchange rate changes in the ongoing crisis period and in the post crisis period as compared to pre-crisis period. Also, the hedging activities of firms are ineffective in reducing the exposure after the onset of crisis. The findings have important theoretical and managerial implications. Firms should focus to improve their hedging policies to bring down the level of foreign exchange exposure. Unlisted firms are not a part of our study due to the adoption of market-based definition of exposure. The future research may focus on the exposure of unlisted firms taking their earnings and cash flows as a proxy for firm value. The future research might also explore other possible firm and country level determinants of exposure during the period of crisis.

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Tables

Table I

Summary of exchange rate exposure coefficients

No. of firms with significant exposure	434
% of sample firms with significant exposure	66.6%
No. of firms with positive significant exposure (10% level)	434
No. of firms with negative significant exposure (10% level)	0
Average value of significant exposure coefficients	1.668
Average value of exposure coefficients of all firms	1.317
Minimum	0.562
Maximum	4.491
Standard deviation	0.623

Table II

Robustness of exposure coefficients

	Exposure to REER	Exposure to NEER with alternative market index
No of firms with significant exposure	423	437
% of firms with significant exposure	65%	67%
No of Firms with positive significant Exposure (10% level)	423	437
No of Firms with negative significant Exposure (10% level)	0	0
Average value of all exposure coefficients	1.253	1.316
Average value of significant exposure coefficients	1.616	1.663
Minimum	-0.974	-1.297
Maximum	3.883	4.490
Standard deviation.	0.759	0.779

Table III

	Sub-period Analysis		
	Pre-crisis period (April 2001- December 2007)	Crisis period (January 2008- March 2009)	Post crisis period (April 2009- March 2013)
No of firms with significant exposure	187	191	398
% of firms with significant exposure	28.7%	29.3%	61.1%
No of Firms with positive significant Exposure (10% level)	178	185	397
No of Firms with negative significant Exposure (10% level)	9	6	1
Average value of all exposure coefficients	0.866	1.334	1.574
Average value of significant exposure coefficients	1.883	2.655	2.113
Minimum	-5.167	-5.969	-1.782
Maximum	4.569	13.366	5.663
S.D.	0.6544	0.7532	0.7413

Table IV
Cross sectional analysis

Variables	Pre-crisis period	During crisis period	Post-crisis period
Constant	2.984*** (8.08)	2.232*** (6.822)	1.399*** (6.053)
Net exports to Total Sales	0.665* (1.910)	0.108* (1.696)	0.102 (0.501)
Size	-0.165*** (-4.005)	-0.048* (1.523)	0.005^ (1.217)
Hedge	-0.151* (-1.535)	-0.09 (-0.751)	-0.072 (-0.876)
Industry Dummies	YES	YES	YES
Adjusted R- Square	0.213	0.11	0.147
F-statistics	3.397***	2.335**	2.365***
No. of Observations	651	651	651

White heteroskedasticity-consistent standard errors are used. Numbers in the parentheses under the coefficients are the associated t-statistics. ***, **, * and ^ indicates statistical significance at 1%, 5%, 10% and 15% respectively

Notes

ⁱ The similar methodology has been adopted by numerous other studies (Choi and Prasad,1995; He and Ng, 1998; Dominguez and Tesar, 2006; Hutson and Stevenson, 2010; Ye et al., 2014)

ⁱⁱ In equation (1), β_{si} cannot be interpreted as 'total exposure' but rather the exposure of stock over and above that of the market portfolio i.e. residual exposure. In order to eliminate the effect of exchange rates from market portfolio, orthogonalization procedure was employed as suggested in the literature (Priestley and Odegaard, 2007; Kiyamaz, 2003)

ⁱⁱⁱ The estimation through OLS and using adjusted robust errors is cited as a common practice in finance studies for time series models (Chow et al., 1997; Petersen, 2008).

^{iv} www.bseindia.com

^v Examining exposure to the trade weighted exchange rate index is a standard practice followed by literature (Jorion, 1991; Choi and Prasad, 1995; Bodnar and Gentry, 1993; Dominguez and Tesar, 2001).

^{vi} The stock returns of all firms, exchange rate changes and market portfolio returns are checked by Augmented Dickey Fuller (ADF) unit root test and found to be stationary

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Research

Foreign exchange exposure, corporate governance, banking

Publications

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