

Firm-level Exchange Rate Exposure and Equity Returns: Indian Perspective

*Amit Kumar Singh** and *Annu Aggarwal***

Exchange rate movements can have far-reaching implications for a firm's equity return. The research question of identifying firm-specific determinants that make firms more responsive to exchange rate movements has rarely been examined in extant literature. This paper employs a two-stage regression specification on pooled data (Akay and Cifter, 2014) on 187 Indian non-financial firms and presents a comprehensive analysis of exchange rate exposure and its firm-specific determinants assimilating firm-level exposure, viz. transaction, translation, economic, and real operating exposure. Results exhibited that rupee depreciation will make firms highly sensitive to exchange rate movements, resulting in a fall in their equity returns. Furthermore, firm-level results exhibit that the influence of firm-specific factors on exchange rate exposure is more pronounced. Moreover, the author found evidence of a significant fall in exposure for firms having high foreign receipts vis-à-vis firms having high foreign payment bills. The balance sheet exposure arising on account of accounting reconciliation in non-current and current liabilities and assets reveals a positive and momentous effect on foreign exchange exposure. Similarly, firms with higher market value are exposed more. The influence of macroeconomic indicators has a considerable impact on firm-specific exchange rate exposure. Results offer insights for policymakers, businesses, and the general public.

Keywords: Exchange Rate Exposure, Firm-level, Real Operating Exposure, Inflation Factor, Foreign Receipts, Exchange Rate Factor, Market Value, Translation Exposure.

1. Introduction

AS businesses get interconnected worldwide, fluctuations in exchange rates have been anticipated as a predominant force of uncertainty to a firm's costs, revenues, cash flows and market value. Foreign exchange risk

* Professor, Faculty of Commerce and Business, University of Delhi.

** Assistant Professor, Hindu College, University of Delhi.

Singh, A.K. and Aggarwal, A. (2024), Firm-level Exchange Rate Exposure and Equity Returns: Indian Perspective, *FOCUS WTO*, Vol. 26 No. 2, April-June, pp. 31-47. http://publication.iift.ac.in/focuswto_archive.asp

originating in the global business environment is believed to have a substantial impact on a firm's equity returns. Exchange rate changes lead to 'exposure'; in turn altering a firm's equity returns if diversified efficiently and effectively by making use of distinct means of management of foreign exchange risk (Shiller, 1995).

The literature had defined exchange rate exposure as the "responsiveness of a firm's equity returns to exchange rate changes" (Adler and Dumas, 1984). Exchange rate variations cause macroeconomic uncertainty exerting influence on firms' equity returns via transaction, economic, translation, or real operating exposure. Jorion (1990, 1991); Amihud (1994); Allayannis and Ofek (2001); He and Ng (1998); Dominguez and Tesar, (2006) and Dranev and Babushkin (2014) concentrated on developing countries and documented that firm-level factors cause movements in the exchange rate. Very few studies (Dominguez and Tesar, 2001; Muller and Verschoor, 2006; Cheu and Cook, 2008; Lin, 2011) have concentrated on emerging nations, though; they examined firm-specific determinants of exposure but empirical findings haven't been as reliable/powerful as anticipated formed on theoretical argument (Williamson, 2001).

Exchange rate exposure as referred to by Murthy, Singh & Aggarwal, (2022) in their work, is described as "Transaction exposure as short-term risk of loss occurring from a change in exchange rate during a business transaction" expressed through Foreign Receipts and Foreign Payments. Translation exposure estimates the potential impact of exchange rate movements on consolidated financial statements. It is proxied by current and non-current; liabilities and assets in our model. Economic exposure measures the long-term impact on firm value proxied by market value. Real operating exposure measures the effect of substantial variations in the exchange rate and inflation on a firm's revenue and cost flows. Adler and Dumas (1984) approximate Operating cash flows as the Market value of the firm.

Foreign exchange exposure and its firm-specific determinants estimation have become more prevalent since the flexible exchange rate regime. Though considerable work was executed, counting the remarkable input of Jorion (1990), He and Ng (1998); Dominguez and Tesar, (2001); Doukas *et al.* (2003); Bartram and Bodnar (2007) and Dranev and Babushkin (2014), but insignificant outcomes has encouraged researchers to probe onto heterogeneous characteristics of firms causing exposure exchange rate in India.

This paper adds to existing literature in the following ways. Exchange rate movements can have far-reaching implications for a firm's equity return in emerging markets. This paper estimates exchange rate exposure and its firm-specific determinants assimilating firm-level exposure viz. transaction, economic, translation and real operating exposure. Moreover, most extant studies have centered on developed countries (like the US, UK and Japan) and very few studies are there in the Indian context.

A review of prior studies emphasizes relevant studies pertinent to exchange rate exposure and equity returns of firms. The data section provides an in-depth understanding of data. The methodology section tells the estimation model deployed in this study. The result section confers about the empirical findings. The conclusion dwells on the summary policy and managerial implications. The last section pinpoints the constraints and scope for future researchers.

2. Literature Review

Literature endeavours to explore the evidence of exchange rate fluctuations affecting stock returns because of its ambiguity. Empirical evidence supported momentous exchange rate exposure to firms returns using different samples and methodologies (Jorion (1990); He and Ng (1998); Dominguez and Tesar, (2001); Doukas *et al.* (2003); Bartram and Bodnar (2007), Dranev and Babushkin (2014), Anisak and Mohamad (2019) and Molele and Petersen (2020). Nevertheless, Jorion (1991); Loudon (1993); Bondar and Gentry (1993); Amihud (1994); Bartov and Bodnar (1994); Khoo (1994), Griffin and Stulz (2001), Koutmos and Martin (2003), Goldberg (2004) and Bartram (2004) advanced several rationalizations for weak linkage/ failure to detect significant association between exchange rate and stock returns.

In the context of US firms, Jorion (1990); Choi and Prasad (1995); Chow *et al.* (1997) and Du (2009) confirmed significant exposure to exchange rate changes. Jorion (1990) and Choi and Prasad (1995) reported that the depreciation of domestic currency exerts a greater influence on firms having foreign operations and vice versa. Chow *et al.* (1997) evidenced that foreign exchange exposure relates to firm size. Aggarwal and Harper (2010) demonstrated the significant impact of exchange rate movements on the operating flows of domestic firms.

Seminal work evidenced effective exchange rate exposure; and reported nearly 25 per cent of Japanese firms are significantly exposed and yen depreciation causes a fall in the firm's return (He and Ng, 1998; Chow & Chen, 1998). Williamson (2001); Dominguez and Tesar (2006) and Hutson and O'Driscoll (2010) demonstrated that exposure differs across industries and sizes and correlates with the level of a firm's foreign operations and competition. Chow and Chen (1998) recognized exposure determinants and found that yen depreciation hurt industries having higher import ratios *vis-à-vis* export ratios.

Dranev and Babushkin (2014) experienced an asymmetric impact of exchange-rate risk based on export sales ratio, percentage of foreign debt, industrial sector, and size of BRIC nations. Anisak and Mohamad (2019) reported that the Japanese yen, the Great Britain pound and Malaysian ringgit have a significant impact on Indonesian firms' stock returns. Molele and Petersen (2020) adapted the augmented-market model (Jorion, 1990) and combined size, value, momentum, investment and profitability risk

controlling for idiosyncratic risk and estimated the exposure levels between 6.5 and 12 per cent for listed nonfinancial South African firms.

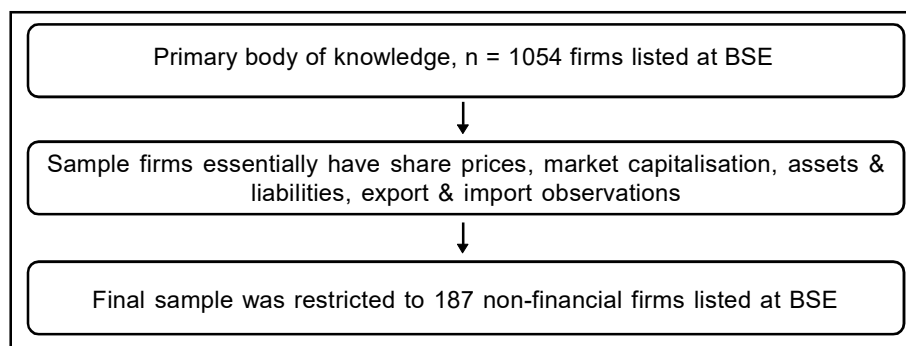
Sikarwar (2023) provided evidence of a substantial increase in exposure to the exchange rate amid COVID-19; however, firms having efficient asset utilization or considerable operating profit margins remain less exposed. Even the hedging tools reacted adversely during stressful times. Hutson and O'Driscoll (2010) employed a trade-weighted index to estimate the exchange rate exposure coefficient. However, De Jong *et al.* (2006) and Murthy, Singh & Aggarwal (2022), recognized that "trade-weighted exchange rate may lack power if the nature of exchange rate does not correspond to the exchange rate included in the basket." This study employs nominal exchange rate (₹ / \$, notably Indian company's trades are expressed in US Dollars) to investigate the vulnerability of stock returns to exchange rate changes and firm-specific exposure viz. transaction, translation, economic and real operating exposure of non-financial firms from 2001-02 to 2020-21.

3. Data

The study uses annual firm-level data and prominent macro-economic variables namely nominal exchange rate and inflation covering 20 years period from Jan 2001-02 to 2020-21 obtained from the Prowess IQ database, RBI database and SEBI website. The author decided to consider non-financial firms because of the intricacies involved in foreign risk management practices used by financial firms.

Figure 1 shows the procedure for constructing the final sample of firms.

FIGURE 1
CRITERION FOR SAMPLE SELECTION



Source: Murthy, Singh & Aggarwal (2022)

Extant studies recommended using market index (i.e. yearly index returns of S&P BSE 500) to reduce noise in the model. The data-set variable description is annexure in Table 1.

TABLE 1
THE DATASET-VARIABLE DESCRIPTION

Category	Variables	Operationalization	Symbols	Source
Foreign Exchange Market	Nominal Exchange Rate	Exchange Rate of Indian Rupee vis-à-vis the US dollar (Year-end Average)	ER_x	Statistics from Financial Market, website of RBI (www.rbi.org.in)
Stock Market	S&P BSE 500 Index Returns	It is an index of S&P BSE 500 (year-end adjusted price)	R_m	www.bseindia.com
Firm-Specific	Individual Firms Stock Returns	A return is the gain or loss of a security in a particular period. The firm's return has been computed by applying the following formula: $R_{i,t} = \ln(P_{i,t}/P_{i,t-1})$	$R_{i,t}$	Prowess IQ
Transaction Exposure	Foreign Receipts	Foreign Receipts = Export of goods + Export of services + Deemed Export + Foreign earnings in the form of dividend, interest and other forex earnings	FR	Prowess IQ
	Foreign Payments	Foreign Payments = Imports for raw materials + Import of stores and spares + Import of finished goods + Foreign spending in the form of interest, dividend, traveling, royalty & technical know-how and other services.	FP	Prowess IQ
Translation Exposure	Current Assets & Liabilities	Current Assets & Liabilities = Current Assets + Current Liabilities	CAL	Prowess IQ
	Non-Current Assets & Liabilities	Non-Current Assets & Liabilities = Non-Current Assets + Non-Current Liabilities	NCAL	Prowess IQ

Category	Variables	Operationalization	Symbols	Source
Economic Exposure	Market Value	Market Value = Market Capitalization + Forfeited equity capital + Paid up preference capital (net of forfeited preference capital) + Money received against convertible share warrants + Non-Current Liabilities	MV	Prowess IQ
Real Operating Exposure	Adjusted Cash Flows	Adjusted Cash Flows are cash flows from operations adjusted for substantial changes in exchange rate together with rates of inflation.	ACF	Prowess IQ, Handbook of Statistics on Indian Economy, website of RBI (www.rbi.org.in),
Foreign Exchange Market	Exchange Rate Factor	Exchange Rate of Indian Rupee vis-à-vis the US dollar (Annual-End of year rate)	ERF	Handbook of Statistics on Indian Economy, website of RBI (www.rbi.org.in),
Macro-economic Variable	Inflation (WPI) Factor	Inflation happens either when prices go up or the value of money goes down (Base: 2011-12=100)	INFF	Handbook of Statistics on Indian Economy, website of RBI (www.rbi.org.in),

Source: Murthy, Singh & Aggarwal (2022).

4. Methodology

In line with the empirical literature on the estimation of exchange-rate exposure (e.g., Jorion, 1990; 1991; Bodnar and Gentry, 1993; Williamson, 2001; Koutmos and Martin, 2003; Pan & Liu, 2012), this study recommending to extends basic market model, not the CAPM and interested in the value and sign of exchange rate exposure coefficient. As advocated by the Market model, firms expected returns exclusively decided by the market. If this holds, then the coefficient of the exchange rate should be zero; nevertheless, if the exchange rate exposure coefficient is non-zero and statistically significant, it becomes essential to approximate exchange rate exposure by extending the market model. We implemented a two-stage double log regression specification (Akay and Cifter, 2014) which is non-linear thereby, need not test for multi-collinearity. The first equation estimates the firm's exposure coefficient (beta) for different firms' while the second equation takes exchange rate betas as a dependent variable instead of a strictly exogenous variable (i.e. nominal exchange rate) for estimating the determinants of firm-specific exposure.

$$LR_{it} = \beta_{oi} + \beta_{m,it}LR_{m,t} + \beta_{x,it}LER_{x,t} + \epsilon_{it} \quad \dots \text{Eq (1)}$$

$\beta_{m,it}$ and $\beta_{x,it}$ denote responsiveness of the firm's equity returns to market movements and exchange rate movements respectively.

Then, we regressed exchange rate betas for estimating firm-specific determinants of exposure viz. transaction, translation, economic and real operating exposure representing foreign involvement of firms.

$$\beta_{x,it} = \beta_{oi} + \beta_{1,it}LFR_{it} + \beta_2LogFP_{it} + \beta_3LCAL_{it} + \beta_4LNCAL_{it} + \beta_5LMV_{it} + \beta_6LACF_{it} + \mu_{it} \quad \dots \text{Eq(2)}$$

The pooled regression results in equations (1) and (2) can produce biased estimators if not amended for the econometric problem of stationarity. Levin, Lin and Chu test statistic was calculated for all variables of Equation (1) and Equation (2) to test the existence of unit-root in the data set.

Pooled ordinary least square (POLS)

Pooled ordinary least square (POLS) regression is used if firms in the data set are more or less the same concerning intercept and coefficient. Then, to examine the appropriateness of POLS, we ran the Breusch-Pagan test as stated below:

$$H_0: \text{"POLS is more appropriate than FEM/REM."}$$

If the p-value comes less than 0.05, then we can go for a fixed/random effect model.

Hausman Test

Secondly, we exercised panel regression, using a random effect model and tested Hausman statistics investigating the presence of fixed effects or

random effects in the data. The null hypothesis for the Hausman test is stated below:

H_0 : "Random effect and fixed effect estimators do not differ substantially and the preferred model is random effect."

If the p-value is less than 0.05, then we can go for a fixed effect model.

Test for Autocorrelation

The Durin-Watson statistic tests for autocorrelation. "A value of 2 implies that there is no first-order autocorrelation (either positive or negative) in data. As the value approaches 0, it implies positive autocorrelation and as it approaches 4, it implies negative autocorrelation."

This paper intends to elucidate for firms returns arising on account of exchange rate variations and then, analyze firm-level determinants of foreign exchange exposure.

5. Empirical Results

Table 2 provides the result of the Levin, Lin and Chu test indicating the rejection of the unit root hypothesis at a 1 per cent significance level for all the variables of interest.

TABLE 2
UNIT ROOT RESULT FOR EXPOSURE ESTIMATION EQUATION

Financial Variables	#Levin, Lin and Chu test statistic (with intercept)
LFR	-15.8744 *** (0.0000)
LMR	-47.2658 *** (0.0000)
Exposure	#Levin, Lin and Chu test statistic (with trend and intercept)
LNER	-28.6625 *** (0.0000)

Note: Parentheses indicate p-value. *** indicates rejection of unit root at 1 per cent significance.

Source: Author's estimate.

Table 3 shows that the Breusch-Pagan test statistic is statistically significant for cross-section and for time effects indicating that the POLS (panel ordinary least square) model is not appropriate and we should proceed for random or fixed effects model.

TABLE 3
LAGRANGE MULTIPLIER RESULT FOR RANDOM EFFECTS

	Cross-section	Time	Both
Breusch-Pagan Statistic	31.35982***	40718.29***	40749.65***

Note: ***, ** and * specify significance of 1 per cent, 5 per cent and 10 per cent respectively.

Source: Author's estimate.

Table 4 reports that the statistic for the Jarque-Bera test is 910.64 (0.000) substantiates the normality.

TABLE 4
NORMALITY TEST: JARQUE-BERA

Jarque-Bera	910.6404	Prob.	0.0000
-------------	----------	-------	--------

Source: Author's estimate.

The Hausman statistic reports insignificance, confirming that random effect and fixed effect estimators do not differ substantially and the random effect model will be preferred. Hence, the random effect model is used for estimating the exchange rate exposure coefficient for non-financial firms under study.

TABLE 5
ESTIMATES OF FIRM EXPOSURE

	β_0	$\beta_{M, it}$	$\beta_{X, it}$	N	F-stat	R ²	Hausman ^a
All firms	1.3259*** (5.906)	-0.1206*** (-5.559)	-0.267*** (-4.485)	3366	22.58***	0.1832	0.9754 (RE)
Durbin-Watson stat	2.053126						

^aHausman indicate test p-values.

Note: Parentheses indicates t-statistics. ***, ** and * specify significance of 1 per cent, 5 per cent and 10 per cent respectively.

Source: Author's estimate.

Table 5 shows a significant relationship between the explanatory variables and the explained variable. About 18 per cent variation in equity returns is explained. Durbin-Watson stat of 2.05 shows that there is no problem with autocorrelation and the F-stat of 22.58 shows that the overall model is good. Results demonstrate a significant and negative effect of market risk (systemic risk) on a firm's equity returns. Precisely, 1 per cent surge in market risk will significantly reduce the firm's equity returns by 0.1206 per cent. The exposure coefficient ($\beta_{X, it}$) indicates the adverse and significant influence of rupee

depreciation on Indian non-financial equity returns. More specifically, a 1 per cent increase in the exchange rate risk significantly reduces a firm's equity returns by 0.267 per cent (Murthy, Singh & Aggarwal, 2022). These firms may be facing exchange rate exposure concerning transactions or translation or economic or operating effects. Results pointed out that significant effects were explained by other variables not included in this paper (Murthy, Singh & Aggarwal, 2022).

Exchange Rate Exposure and its Determinants

In the previous section, we have estimated foreign exchange exposure but the variation may vary from firm to firm, so it becomes pertinent to identify firm-specific factors causing exchange rate exposure. This section would allow us to understand, which factor would increase or decrease the overall exposure of a firm with changes in exchange rate.

TABLE 6
PANEL UNIT ROOT TEST FOR DETERMINANTS OF EXPOSURE

Financial Variables	#Levin, Lin and Chu test statistic (with intercept)
LFR	-14.0432 *** (0.0000)
LFP	-13.5911 *** (0.0000)
LCAL	-12.6837 *** (0.0000)
LNCAL	-8.6871 *** (0.0000)
LMV	-10.8472 *** (0.0000)
LACF	-10.0945 *** (0.0000)
Exposure	#Levin, Lin and Chu test statistic
LEXP	-22.8562 *** (0.0000)

Note: Parentheses indicates p-value. *** specify significance at 10 level.

Source: Author's estimate.

In this stage, we regressed the exposure coefficient to firm-level and macroeconomic indicators.

As shown in Table 6, the Levin–Lin–Chu test statistic is statistically significant for all financial as well as exposure variables, specifying rejection of

the null hypothesis. It can be stated at the outset that the data series employed is stationary at level i.e. I(0).

TABLE 7
LAGRANGE MULTIPLIER TESTS FOR RANDOM EFFECTS

	Cross-section	Time	Both
Breusch-Pagan	31.35982 *** (0.0000)	40718.29 *** (0.0000)	40749.65 *** (0.0000)

Source: Author's estimate.

As reported in Table 7, the Breusch-Pagan test statistic is statistically significant for cross-section and time effects indicating that the panel ordinary least square model is not appropriate and we should proceed for random or fixed effects model.

TABLE 8
EXCHANGE RATE EXPOSURE ESTIMATES

Dependent Variable: EXP		
	Estimations	All firms
Constant	C	2.6753 *** (87.243)
Transaction exposure	FR	-0.0808 * (-3.3240)
	FP	0.1506 *** (3.7612)
Translation exposure	CAL	0.1074 *** (20.9340)
	NCAL	0.0225 *** (3.4375)
Economic Exposure	MV	0.716 *** (28.5096)
Real Operating Exposure	ACF	-0.7374 *** (-29.2716)
		3366
		24.3147 ***
	R ²	0.5954
	Hausman ^a	0.0000 (FE)
Durbin-Watson stat	2.4347	

^aHausman indicate test p-values.

Note: Parentheses indicate t-statistics. ***, ** and * specify significance of 1 per cent, 5 per cent and 10 per cent respectively.

Source: Author's estimate.

Table 8 portrays the results of multivariate panel regression conducted to estimate determinants of firm-level exchange rate exposure as described in Eq (2). The Hausman statistic is statistically significant confirming that the random effect and the fixed effect estimators differ substantially and the fixed effect model will be preferred. Hence, FEM is applied for estimating the exposure determinants for non-financial firms. The f-statistic reveals that the model is effective and free from autocorrelation as the Durbin-Watson stat is 2.43.

Nearly 59.54 per cent variation in exposure is explained by firm-level explanatory variables. The interesting fact is that missing factors have a strong, positive and significant effect on exchange rate exposure (Murthy, Singh & Aggarwal, 2022).

Transaction exposure has a significant influence on a firm's foreign exchange exposure. The foreign receipts coefficient is negative (-0.0808) and statistically significant at 10 per cent, however, foreign payments have a positive (0.1506) and statistically significant influence on exposure. Results indicate that firms having high foreign receipts will be exposed less than firms having high foreign payment bills. Furthermore, exposure will also depend upon the elasticity of exports and imports. If exports are elastic, then rupee depreciation will make exports more competitive proportionately, exports rise, foreign receipts will rise and exposure will diminish *vis-à-vis* imports. Provided the imports are inelastic, the import bill will rise with the increase in exchange rate resulting in a firm's foreign exchange exposure.

The coefficients for translation risk representing accounting adjustments in non-current (0.0225) and current (0.1074) assets and liabilities exert a significant effect on exchange rate exposure. In particular, if translation risk in terms of current assets and liabilities goes up by 1 per cent, the exposure will rise by 0.107 per cent for a firm, whereas if non-current assets and liabilities go up by 1 per cent, the exposure will rise by 0.022 per cent (Murthy, Singh & Aggarwal, 2022).

Results stated economic and operating risks are most pertinent. As reported in Table 6, the coefficient of market value (0.716) is significant and explains the simple rule that large firms are more exposed in comparison to smaller firms (Allayanis & Ofek, 2001; Jay & Prasad, 1995).

The results demonstrate that real operating risk has a negative (-0.7374) and statistically significant (0.000) impact on firms' exchange rate exposure. This makes sense as adjusted cash flows are calculated as a proxy of market value adjusted for namely exchange rate and inflation factor which are systematic and beyond the control and can hurt the firm's exposure. We have observed that the change in inflation is more than the exchange rate fluctuations during the study period. More specifically, 1 per cent fall in adjusted cash flows will significantly increase a firm's exposure by 0.7374 percent (Murthy, Singh & Aggarwal, 2022).

Findings suggest that the magnitude of exposure may vary depending upon the firm's nature of operations, level of current as well as non-current assets and liabilities, market value, etc. Moreover, the macroeconomic factors also affect exchange rate exposure significantly.

6. Conclusion and Research Implications

Unlike prior studies, this paper documents differential associations between exchange rate exposure and firm-specific transaction, translation, economic and operating exposure. We estimated the exposure coefficient and its firm-specific determinants by employing two-stage double-log panel regressions (Akay and Cifter, 2014) for non-financial firms from 2001-02 to 2020-21.

Furthermore, the influence of market risk on equity return was found to be negative and statistically significant. In line with expectations, the Exposure coefficient ($\beta_{x,it}$) is found negative and statistically significant specifying that rupee depreciation exerts a negative influence on the stock returns of Indian non-financial firms. Furthermore, firm-level analysis reveals noticeable effects of firm-specific variables on exchange rate exposure. Results provide evidence of a substantial fall in exposure for firms having high foreign receipts *vis-à-vis* firms having high foreign payment bills. The balance sheet exposure arising on account of accounting adjustments in non-current and current liabilities and assets is statistically significant. Similarly, firms having higher market value exert greater influence on the firm's exposure. The study finds that macroeconomic indicators adversely influence firm-specific exchange rate exposure.

This paper develops a new outlook, a new approach and a new dimension devising a framework examining exposure of four types of firm's equity returns. Results clearly stated that exchange rate variations matter and result in exposure to firm returns.

Moreover, the study provides insights into a growing body of empirical literature estimating the association of exchange rate risk and stock returns besides being felicitous for policymakers, businesses and the general public.

7. Research Limitations

In addition, however, there are too many limitations on the dataset used for this study.

1. First the sample size was reduced due to limited data available, more specifically, on sources of securities prices, market capitalization, foreign receipts and foreign payments.
2. Data does not allow us to assess for hedging activities. Therefore, if possible, future research can include data on various tools of hedging.

Conflict of Interest

The author declares that they have no conflict of interest.

REFERENCES

1. Adler, M. and Dumas, B. (1984), Exposure to Currency Risk: Definition and Measurement, *Financial Management*, 13(2), pp. 41-50.
2. Aggarwal, R. and Harper, J.T. (2010), Foreign Exchange Exposure of Domestic Corporations, *Global Business Review*, 29(8), pp. 1619-1636.
3. Akay, G. H. and Cifter, A. (2014), Exchange Rate Exposure at the Firm and Industry Levels: Evidence from Turkey, *Economic Modelling*, 43, pp. 426-434.
4. Allayannis, G. and Ofek, E. (2001), Exchange Rate Exposure, Hedging, and the use of Foreign Currency Derivatives, *Journal of International Money and Finance*, 20(2), pp. 273-296.
5. Amihud, Y. (1994), Evidence on Exchange Rates and Valuation of Equity Shares, Chapter 1, in Y. Amihud and R.M. Levich (eds.), *Exchange Rates and Corporate Performance*, New York: Irwin Professional Publishing.
6. Anisak, N. and Mohamad, A. (2019), Foreign Exchange Exposure of Indonesian Listed Firms, *Global Business Review*, 21(5), pp. 1-19.
7. Bartov, E., Bodnar, G.M. (1994), Firm Valuation, Earnings Expectations, and the Exchange Rate Exposure Effect, *Journal of Finance*, 49(5), pp. 1755-1786.
8. Bartram, S.M. and Bodnar, G.M. (2007), The Exchange Rate Exposure Puzzle, *Managerial Finance*, 33(9), pp. 642-666.
9. Bodnar, G.M. and Gentry, W.M. (1993), Exchange-rate Exposure and Industry Characteristics: Evidence from Canada, Japan and the US *Journal of International Money and Finance*, 12(1), pp. 29-45.
10. Choi, J.J., Prasad, A.M. (1995), Exchange Risk Sensitivity and its Determinants: A Firm and Industry Analysis of US Multinationals, *Financial Management*, 24(3), pp. 77-88.
11. Chow, E.H. and Chen, H.L. (1998), The Determinants of Foreign Exchange Rate Exposure: Evidence on Japanese Firms, *Pacific-Basin Financial Journal*, 6 (1-2), pp. 153-174.
12. Chow, E.H., Lee, W.Y. and Solt, M.E. (1997), The Economic Exposure of US Multinational Firms, *The Journal of Financial Research*, 20(2), pp. 191-210.
13. Chue, T. K. and David Cook, D. (2008), Emerging Market Exchange Rate Exposure, *Journal of Banking & Finance*, 32(7), pp. 1349-1362.

14. Dominguez, K.M.E. and Tesar, L.L. (2006), Exchange Rate Exposure, *Journal of International Economics*, 68(1), pp. 188-218.
15. Dominguez, K.M.E., Tesar, L.L. (2001), A Reexamination of Exchange-Rate Exposure, *American Economic Review*, 91(2), pp. 396-399.
16. Doukas, J.A., Hall, P.H. and Lang, L.H.P. (2003), Exchange Rate Exposure at the Firm and Industry Level, *Financial Markets, Institutions and Instruments*, 12(5), pp. 291-347.
17. Dranev, Y., Babushkin, M. (2014), Asymmetric Exchange-rate Exposure in BRIC Countries, *Financial Economics Working Paper*, National Research University, Higher School of Economics.
18. Du, D. (2009), Does Exchange Rate Risk Matter for Asset Pricing, *Working Paper Series* (10-01), Northern Arizona University, pp. pp. 1-20.
19. Goldberg, L.S. (2004), Industry-Specific Exchange Rates for the United States, *Federal Reserve Bank of New York Economic Policy Review*, 10(1), pp. 1-16.
20. Griffin, J.M., and Stulz R.M. (2001), International Competition and Exchange Rate Shocks: A Cross-Country Industry Analysis of Stock Returns, *The Review of Financial Studies*, 14(1), pp. 215-241.
21. He, J., L. Ng. (1998), The Foreign Exchange Exposure of Japanese Multinational Corporations, *Journal of Finance*, 53(2), pp. 733-753.
22. Hutson, E. and Stevenson, S. (2010), Openness, Hedging Incentives and Foreign Exchange Exposure: A Firm-Level Multi-Country Study, *Journal of International Business Studies*, 41(1), pp. 105-122.
23. Jamal, A. and Bhat, M.A. (2022), COVID-19 Pandemic and Exchange Rate Movements: Evidence from Six Major COVID-19 Hot Spots, *Future Business Journal*, 8(1), pp. 1-17.
24. Jay, J.C., and Prasad, A.I. (1995), Exchange Risk Sensitivity and its Determinants: A Firm and Industry Analysis of US Multinationals, *Financial Management*, 24, pp. 77-88.
25. Jorion, P. (1990), The Exchange Rate Exposure of US Multinationals, *Journal of Business*, 63(3), pp. 331-345.
26. Jorion, P. (1991), The Pricing of Exchange Rate Risk in the Stock Market, *Journal of Financial and Quantitative Analysis*, 26(3), pp. 363-376.
27. Khoo, A., (1994), Estimation of Foreign Exchange Exposure: An Application to Mining Companies in Australia, *Journal of International Money and Finance*, 13(3), pp. 342-363.

28. Koutmos, G. and Martin, A., D. (2003), Asymmetric Exchange Rate Exposure: Theory and Evidence, *Journal of International Money and Finance* 22(3), pp. 365-383.
29. Lin, C.H. (2011), Exchange Rate Exposure in the Asian Emerging Markets, *Journal of Multinational Financial Management*, 21(4), pp. 224-238.
30. Molele, M.H. and Petersen, J.M. (2020), Emerging Market Currency Risk Exposure: Evidence from South Africa, *Journal of Risk Finance*, 21(2), pp. 159-179.
31. Muller, A., and Verschoor, W.F.C. (2006). European Foreign Exchange Risk Exposure. *European Financial Management*, 12(2), 195-220.
32. Pan, M.S. and Liu, Y.A. (2012), Exchange Rate Exposure: Evidence from Industry-Specific Exchange Rates, *International Research Journal of Finance and Economics*, 84, pp. 121-132.
33. Shiller, R.J. (1995), Aggregate Income Risks and Hedging Mechanisms, *Quarterly Review of Economics and Finance*, 35 (2), pp. 119-152. DOI:10.1016/1062-9769(95)90018-7.
34. Sikarwar, E. (2023), Determinants of Foreign Exchange Rate Exposure during the COVID-19 Crisis: A Multi-country evidence, *Applied Economics*, 55 (34), pp. 3931-3949.
35. Williamson, R. (2001), Exchange Rate Exposure and Competition: Evidence from the Automotive Industry, *Journal of Financial Economics*, 59(3), pp. 441-475.
36. Bhanu Murthy, K.V., Singh, A.K. and Aggarwal, A. (2022), Exchange Rate Movements and Stock Returns of Select Companies in India [Doctoral Thesis submitted to Shodhganga Repository]. The University of Delhi. https://shodhganga.inflibnet.ac.in/simple-search?location=%2F&query=Exchange%5C+Rate%5C+Movements%5C+and%5C+Stock%5C+Returns%5C+of%5C+Select%5C+Companies%5C+in%5C+India&rpp=10&sort_by=score&order=desc

LIST OF ABBREVIATIONS

- CAPM : Capital Asset Pricing Model
BLUE : Best Linear Unbiased Estimators
MM : Market Model
GLMM : Generalized Linear Market Model
FDI : Foreign Direct Inflows to India
FDI : Foreign Direct Inflows to India

ARDL	: Autoregressive Distributed Lag
PFER	: Predicted Foreign Exchange Rate
RFR	: Risk Free Return
GP	: Gold Prices
ISR	: Return on International Equity
SEBI	: Securities Exchange Board of India
RBI	: Reserve Bank of India
R_{moil}	: S&P BSE Oil & Gas Index Stock Returns
R_{mcm}	: S&P BSE Basic Materials Index Stock Returns
R_{mchem}	: S&P BSE Basic Materials Index Stock Returns
$R_{mpharma}$: S&P BSE Healthcare Index Stock Returns
R_{mauto}	: S&P BSE Auto Index Stock Returns
R_{mfood}	: S&P BSE Fast Moving Consumer Goods Index Stock Returns
R_{it}	: Individual Firms Stock Returns
R_m	: General Market Index
FR	: Foreign Receipts
FP	: Foreign Payments
CAL	: Current Assets and Liabilities
NCAL	: Non-Current Assets and Liabilities
MV	: Market Value of Firm
ACF	: Adjusted Cash Flows
ERF	: Exchange Rate Factor
INFF	: Inflation Factor
LACF	: Log of Adjusted Cash Flows
LCAL	: Log of Current Assets and Liabilities
LFP	: Log of Foreign Payments
LFR	: Log of Foreign Receipts
LMV	: Log of Market Value of Firm
LNCAL	: Log of Non-Current Assets and Liabilities
$\text{Log}R_{it}$: Log Return of i^{th} Firm
LR_{msec}	: Log Return from sectoral Index
TSE	: Transaction Exposure
TLE	: Translation Exposure
ROE	: Real Operating Exposure
ENE	: Economic Exposure
LR	: Likelihood Ratio