Equality in the Foreign Exchange Exposure of IT and FMCG Sector Firms

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Abstract

This paper explores the firm level exchange rate exposure of information technology (IT) and the fast moving consumer goods (FMCG) sectors using Capital market approach to measure firm level Foreign Exchange Exposure (FXE) with the monthly stock returns of constituent firms of the two sectoral indices from the Bombay Stock Exchange. The return on 6-currency trade weighted Real Effective Exchange Rate (REER) and the monthly returns on the respective sectoral indices from Jan 2006 to Dec 2017 are used as independent variables. A study of the average exposures of the two industries were found to range between -1.69 to 2.97 with the IT firms having more volatility in the exposure rates than the FMCG firms. The results indicate that exposure of all firms within their respective sectors move in uniform direction during the study period. The tests of equality and ANOVA analysis reveal that there is strong equality in the mean and variance of exchange rate exposure of the firms in the two industrial sectors studied.

Keywords: *Exchange Rate Exposure, Capital Market Approach, Ordinary Least Squares, Tests of Equality*

1. Introduction

When firms operate in the global markets, it is evident that they face risks of international nature whether or not they directly interact with global factors. Foreign exchange exposure is the possibility of decrease in the value of the firm or their future cash flows due to changes in the exchange rates. Both domestic and multinational firms face exchange rate risk either directly through their involvement in the foreign currency or indirectly due to their competition with international firms (Chiang & Yu 2005; Jain & Prakash 2016). There have been research on the impact of changes in the exchange rate on the performance of individual firms (O'Brien 2010; Asaolu 2011), industries and even nations (Horst et al. 2007). Management and investors are interested in understanding the sector wise performance of firms and the factors that affect the return pattern from them. Risk is a detrimental factor in the expected return, so understanding the behavior of various financial and non financial risks and the firms' exposure to them would be beneficial to decision makers.

Firms in different industry would face varying level of exposure to the exchange rate. Empirical studies have explored the industry level exchange rate exposures in different context (Doukas et al. 2003; Olugbode et al. 2014). There are evidences of differing levels of exposure in firms of different industries. Studies have shown that the level of multinationality of firms have no significant impact on the level of FX exposure faced by them, neither do they cause such exposures (Sayed & Jayapal 2017). Therefore, both multinationals and domestic firms can face exposure to the exchange rate as reiterated in empirical studies (Aggarwal & Harper 2010). However, studies have found significance of multinationality on the exchange rate exposures of the firms and have strongly contended that multinationality of the firms in an important determinant of exchange rate exposure (Manisha et al. 2011; Fraser & Pantzalis 2004). It is thus the intention of this paper to explore the firms having higher multinational orientation and measure their exposures in comparing between industries. In this paper we estimate the exchange rate exposure of firms in two industrial sectors and make a comparative analysis of the measured values. This would help understand the underlying factors that affect the firms' exposure to the exchange rate risks when they operate in the open economy.

1.1 Research Objectives:

1. Measuring the firm level exchange rate exposure of sampled companies of the constituents of two sectoral indices (BSE S&P Information Technology and BSE S&P Fast Moving Consumer Goods)
2. Study the level of exposure faced by firms between the selected sectors.

1.2 Research Hypothesis
H0: The mean and the variance of the exchange rate exposure faced by IT and FMCG sector firms are not equal.

2. Review of Literature

Foreign exchange risk is considered to be more dynamic as there has been mixed results from empirical research about their measurement and impact. Until recently there has been no consensus on the factors affecting the exchange rate exposure of firms, their measurement and even management of such risks. Research have indicated that stock returns can be effected by varied factors such as firm size, industry, foreign operations etc. there have been evidences that weather also plays a role in the determination of the stock price (Kathiravan et al. 2018). Similarly the exchange rate exposure of the firms has been studied empirically and studies have exerted efforts to identify factors that influence the level of exposure to firms, industries and countries. Studies on firm level exposure have provided mixed results that many researcher call this as a puzzle and there has been an ongoing research efforts towards solving this puzzle (Kang et al. 2015) as different studies would provide conflicting results for the level of exposure measured (Bartram et al. 2010) or the determinants affecting the exposure.

2.1 Exchange Rate Exposure

The positive correlation between risk exposure and cost of risk management indicates the importance of measuring various risks or the level of exposure that could be faced by firms, industries or nations. Among all types of risks managers have been interested in, financial risks faced by the firms are considered more important as they directly affect the value of the firms in multitude ways. Financial risks could be interest rate risk, inflation risk or exchange rate risk. Each one of these risks are measurable in terms of its impact on the organization's earnings, growth and performance (Strike 2012). Among the three risks exchange rate exposure is considered more dynamic as they affect firms which directly deal with foreign currency and the ones who do not directly deal in the foreign currency (Krapl & O'Brien 2015).

Exchange rate exposure has been classified as transaction, translation and economic exposures (Hagelin & Pramborg 2006; Martin & Mauer 2003). There have been studies to understand measure and manage each one of these exposures. Transaction exposure refers to the possibility of loss in the expected cash flow from transactions which mature in the future due to changes in the exchange rate. Such exposures could be precisely measured if the exchange rates can be accurately predicted. Translation exposure is the possibility of losses when the company restates its financial statements in different currencies, that is from the countries of operation to the countries of reporting. Measuring and managing translation exposure could be a matter of managerial decision on the timeline for the translation or the accounting conventions in different countries and will not impact firm's cash flows. So this type of exposure would not trouble the managers. Economic exposure is the possible disturbance to the cash flow of the firm in the long term (Prasad & Suprabha 2015). It is the most difficult exposure to measure and manage as it could be determined by the political and economic factors in different countries of operation and their changes over time. Firms and managers would be more concerned to measure this type of exposure so they could take necessary actions and decisions to protect from such exposures. Transaction exposure is the short term impact on the cash flow and economic exposure is the long terms impact. Capital Market approach and Cash flow approach are the two popular methods to measure these exposures at firm level (Martin & Mauer 2005).

2.2 Exchange Rate Exposure of Firms

Measuring exchange rate exposure is an important step in understanding this dynamic factor which may affect the firm value or performance overtime. Understanding the determinants of the exchange rate and investigating the effect of these factors is valuable for the firms as they look into this aspect of financial risks (Prasad & Suprabha 2015). Studies have used regression model with varying number of independent variables identified as factors affecting exposure like the return on stock value, Market to book value, size of the firm etc (Huffman et al. 2010; Chang et al. 2013; Bartram & Bodnar 2009) this is popularly called the capital market approach. Traditionally a single factor with either the return of stock value or size has been the variable used in the measure and recently a three factor model has become popular (Adler & Dumas 1984). The studies using multiple factors do not in any way justify that their method is superior to the traditional one factor model. The cash flow approach to measuring exchange rate exposure, uses fundamental data for

individual companies to measure the elasticity of exchange rate exposure of each firm. Practically this is considered to be a more superior method of measuring exposure as it provides an insight on how the exchange rate would affect the financial performance.

2.3 Sector wise comparison of firms

Firm level and industry level exposure study were conducted by many researchers, who illustrated varied findings from their studies. In his paper Tang demonstrated that manufacturing industry was not much sensitive to the exchange rate changes but the firms in the industry were significantly affected by real exchange rates (Tang 2015). In a working paper taking a large sample of firms in the global automotive industry of 16 countries, (Bartram & Bodnar 2009) insist that exposure could vary across industries and so a diverse sample should be considered while studying exchange rate exposure. Study of a banking sector performance and effect of exchange rate exposure (Wong et al. 2009) shows definite influence of industry on the exposure effect of the companies. This study is motivated by these studies to analyze the exchange rate exposure of the firms and to find if such exposure varies across industries.

.3. Data and Sample

The data for this empirical study is collected for the BSE S&P IT and the BSE S&P FMCG sectors. In the absence of hedging against such risks, multinational companies are assumed to have higher exchange rate risks than other firms.

Table 1: Study of BSE S&P sectoral indices on the number of multinational firms among the constituents

BSE S&P Sectoral Indices	Total no. Companies	No. of MNCs	% of MNCs
S&P BSE Information Technology	59	54	92%
S&P BSE Fast Moving Consumer Goods	80	69	86%
S&P BSE Finance	110	88	80%
S&P BSE Healthcare	67	53	79%
S&P BSE OIL & GAS	11	8	73%
S&P BSE POWER	18	13	72%
S&P BSE Telecom	17	12	71%
S&P BSE BANKEX	10	7	70%
S&P BSE REALTY	10	7	70%
S&P BSE AUTO	16	11	69%
S&P BSE Energy	25	17	68%
S&P BSE Industrials	225	138	61%
S&P BSE Basic Materials	171	82	48%

The constituents of each sectoral index were evaluated on the bases of their foreign dealings in the form of exports, imports and earning in foreign currency to classify them as multinationals. The two sectors having the highest percentage of multinational firms were selected for the sectoral study as they could result in a better measurement of the exchange rate exposure as multinational firms directly deal with the foreign currency.

The monthly closing prices of 59 constituent companies of the Information Technology sector and 80 constituent companies of Fast Moving Consumer goods sector from January 2006 to December 2017 were considered for the stock returns. As per the availability of the monthly closing prices of the constituent firms the final sample for IT sector was 37 and FMCG was 59 firms. The closing monthly prices of these two indices were considered to calculate the market returns for the same duration. These data were collected from the BSE archive. The 6-factor trade weighted Real effective exchange rate (REER) returns were calculated for compatibility with the data sourced from the RBI historical archive. There was considerable volatility found in all three return series for the study period which motivated an enquiry into its impact on the firm and their exposure to this volatility.
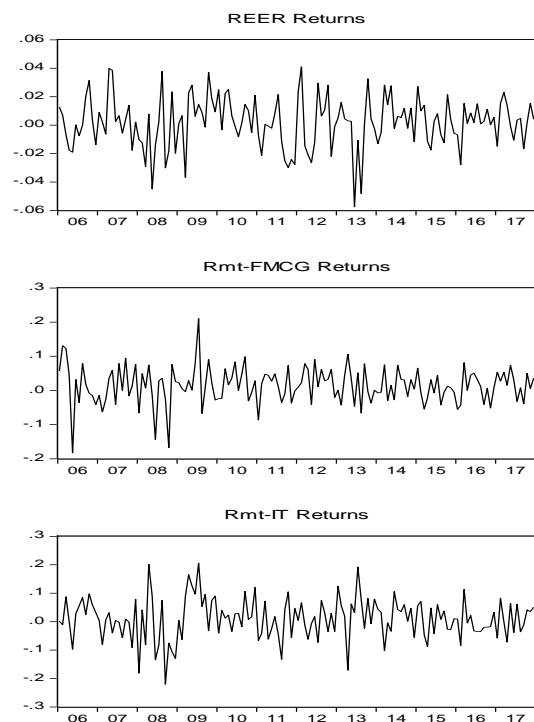

Figure 1: Volatility in the REER Returns, Rmt(IT) Returns and Rmt (FMCG) returns

3.1 Measuring the Exchange rate exposure

The capital market approach was used in the measurement of exchange rate exposure. The two

factor regression model proposed by some studies (Adler & Dumas 1984; Jorion 1990) was used. The coefficient of the OLS equation was considered to be the measure of exchange rate exposure for each sample company.

$$R_{it} = \alpha + \beta_1\,\varepsilon_{it} + \beta_2\,R_{mt+}\,\nu_{it}$$

Where the R_{it} is the monthly return on the individual stock returns, α is the constant, β_1 is the coefficient of the exchange rate returns, which is the measure of exposure, ε_{it} is the exchange risk factor measured as the return on the real effective exchange rate, β_2 is the coefficient of the return n the market index, R_{mt} is the return on the monthly closing price of the respective index and ν_{it} is the error term in the linear equation.

In the next step, the data for the analysis was derived by considering an annual average of the firm level exposure measures for each for the IT and FMCG sector respectively.

Table 2: Average annual exchange rate exposure of firms in the IT and FMCG sector.

Year	IT Sector	FMCG Sector
2006	-0.12	0.1
2007	-1.69	0.23
2008	0.23	0.91
2009	2	1.95
2010	1.04	1.79
2011	1.56	1.67
2012	0.98	0.85
2013	0.48	0.01
2014	2.91	1.52
2015	1.16	1.74
2016	2.3	2.97
2017	0.2	-0.15

The above table indicates the calculated figure of average exchange rate exposure of the two sample industries. For the purpose of this study the coefficient of the exchange rate movements with the firm stock returns as the dependent variable and the respective indices returns and real exchange rate return as the independent variables is the measure of exposure.

The spread of exposure during the study period for the IT firms was between -1.69 to 2.30 and for the FMCG firms was -0.15 to 2.97 which indicates slightly higher variability in the exposure for IT firms.

4. Results and Discussion

On plotting the exposure data for the two sectors as histogram and line chart on the same axis indicates high similarity in the flow of exposure in the two sectors over the study period except in the year 2007, when the IT sector had a sharp negative exposure while the FMCG sector was slightly positive.
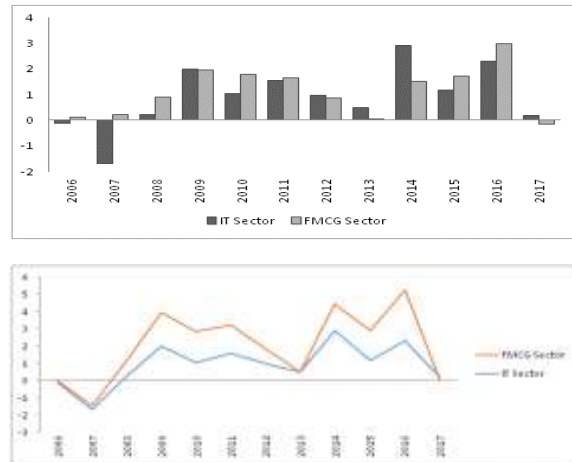

Fig 2: Average FX Exposure of IT and FMCG sector 2006-2017.

The histogram and the trend line is drawn from the calculation of average FXE of the constituent companies of the two industrial sector indices using the Capital Market Approach.

In terms of the trend of the exposure over the study period, both IT and FMCG sectoral measure of exposure demonstrates a synchronous movement in the volatility within the given range. The descriptive statistics of the data set is as below:

Table 3: Descriptive statistics for the exchange rate exposure series of IT and FMCG firms

	IT Sector	FMCG Sector
Mean	0.9212	1.1326
Standard Deviation	1.2288	0.9615
Kurtosis	0.7531	-0.6577
Skewness	-0.4573	0.2559
Range	4.6052	3.1178
Min	-1.6938	-0.1486
Max	2.9114	2.9691
Jarque-Bera	0.4825	0.317

The mean value was higher for the FMCG sector indicating that the level of exposure faced by these firms were higher for the study period. However the range of the values was higher for the IT firms which

indicates that for the study period the exchange rate exposure varied widely for the IT firms as compared to the FMCG. The skewness for both sectors was close to zero though IT firms showed a slightly negative skewness and FMCG showed positive skewness in exposure values. The distribution was platikurtic for both sectors and the Jarque-Bera value indicates that the distributions were non normal. The test of equality is robust to normality as it considers equality in mean and variance So the data was found to be a good fit for the tests of similarity used.

Thus the similarity in the FXE between the two sectors was evaluated using the test for equality of means and variance.

Table 4: Tests of Equality of Mean, Levene's test of equality of variance and Anova results generated on Eviews 7

Test for Equality of Means Between Series			
Method	df	Value	Probability
t-test	22	-0.4694	0.6434
Satterthwaite-Welch t-test*	20.7969	-0.4694	0.6437
Anova F-test	(1, 22)	0.2203	0.6434
Welch F-test*	(1, 20.7969)	0.2203	0.6437
Test for Equality of Variances Between Series			
Method	df	Value	Probability
F-test	(11, 11)	1.6334	0.4286
Siegel-Tukey		0.0289	0.977
Bartlett	1	0.627	0.4285
Levene	(1, 22)	0.1847	0.6715
Brown-Forsythe	(1, 22)	0.1465	0.7056
Analysis of Variance			

Variable	IT_SECTOR	FMCG_SECTOR	All
Count	12	12	24
Mean	0.9212	1.1326	1.0269
Std. Dev.	1.2288	0.9615	1.0844
Std error of Mean	0.3547	0.2776	0.2214
Mean Diff.	0.9175	0.806	0.8618
Median Diff.	0.9075	0.806	0.8568
Mean Tukey-Siegel Rank	12.5833	12.4167	12.5

The Bartlett weighted standard deviation was 1.103276. The results above shows p value much higher than 0.05. This indicates strong evidence of the absence of heteroskedasticity in the series and decisively failing to reject the null hypothesis that the mean and the variance of the exchange rate exposure faced by IT and FMCG sector firms are not equal. So it can be concluded that there is a strong simultenous movement of exposure values among the two sampled sectors during the study period. There is great equality in the mean and variances of the exposure series of the two sectoral firms.

6. Conclusions

The most important conclusion from the study is that there is not much difference in the average exposure faced by the IT firms and the FMCG firms during the study periods. This could imply that multinationality is a determinant of exchange rate exposure of the firms. The study may not provide a conclusive evidence that industry is a factor in determining the firm level exchange rate exposure. Howeveer it prvides a definite proof that given the similar level of multinationality in the industry, the firms are likely to face similar level of exchange rate exposure.

The same study can be elaborated to include other sectoral indices firms which will then provide a clear view on how the firms in other industry behave from the context of their classified industries.

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