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Foreign Exchange Exposure and Multinationality of Indian Firms

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Abstract

The research paper examines the relationship between the foreign exchange exposure of the S&P BSE500 companies and the extent of their multinationality. The level of multinationality and extent of foreign exchange exposure measured individually for 357 constituent firms depending on the availability of data. Foreign earnings to total earnings ratio measured multinationality, while a two factor regression coefficient with share price returns as a dependent variable and USD/INR rate as independent variable and S&P 500 index returns as a control variable. Annual Financial data and monthly market data for all constituent companies from January 2007 to December 2015 (9 years) was collected from Prowess database, BSE and RBI website. The results provides no conclusive evidence on a strong relationship between the variables and also there was no causal relationship established using Granger Causality Test.

Keywords: Multinationality, Exchange Rate Exposure, Multinational Corporations, Bombay Stock Exchange, Causality Tests.

1. Introduction

Among the factors which affect the foreign exchange exposure of firms, the level of multinationality is considered primary. Many studies concluded that there is a direct foreign exchange exposure for multinational companies as compared to the indirect exposure for domestic companies (Abe de Jong, 2002; Agyei-Ampomah, Mazouz, & Yin, 2013; B.Bernard, 2008; Dominguez & Tesar, 2006; Krapl & O'Brien, 2015). While multinational firms are said to have a direct impact from the exchange rate variation, the domestic firms are also not exempted from the volatility in the exchange markets which affect them indirectly. Studies claim that it is not only the multinationals which face the exchange rate exposure, the domestic companies are exposed to exchange rate exposure as well (Aggarwal & Harper, 2010; John A. Doukas, 2003; Kohlscheen, 2014; Martin & Mauer, 2003). There have been research on the impact of changes in the exchange rate on the performance(Asaolu, 2011; Chiang & Yu, 2005; O'Brien, 2010), multinationality on performance (Jain & Prakash, 2016; Verbeke & Brugman, 2009), risk level, and management of firms(Abe de Jong, 2002; "Forex Risk Management : Ways for Succeeding in Turbulent Economic Times," 2013; Pramborg, 2005; Tai, 2008).

There is no gain without risk, as the saying goes. Among the typical risks being addressed by firms, exchange rate risk is considered more prominent for the multinationals. Exchange rate risk refers to the possibility of suffering a drawback due to the movements of the exchange rates of countries that these firms operate in. Research have been rampant in various topics related to multinationality and exchange rate exposure, however, there is not much study which correlates the multinationality with exchange rate exposure and even fewer studies in discerning the causal relationship between the two variables.

Direct and indirect relationship between firm level exposure and its level of multinationality was studied with a sample of 953 non-financial US companies, to indicate that the operational and financial hedging is the best way to manage the FX rate risk among multinational companies (Hutson & Laing, 2014). In the Indian context, there have been even fewer studies in the topic area of exchange rate exposure, though efforts have been made to study the determinants of exchange rate exposure, (Manisha Goel, Gupta, Lalit Goel, & Professor, 2011; Sivakumar & Sarkar, 2008), there has been almost no study contributing to the level of multinationality and correlation with the level of foreign exchange exposure. This research aims to focus on the foreign exchange exposure of firms listed on the Bombay Stock Exchange in the recent years and evaluate if multinationality is a factor which affects the level of exposure.

2. Literature Review

2.1 Multinational Corporation / Multinationality

A multinational corporation is one which has its presence over more than one nation, has transactions in multiple nations or is influenced in its operation due to foreign currency rates. Defining the multinational in clear term would pave the way to classify them appropriately for further analysis and treatment in research.

A multinational company can be defined as an organization which operates in more than one nation at the performance, structural or behavioral levels. At a performance level the firm is said to have foreign sales, earnings, assets or employees. At a structural level the top management of the firm would be of different nationality and at a behavioral level the management is oriented towards international strategic opportunities (Aggarwal, Berrill, Hutson, & Kearney, 2011). This can be considered as a robust definition because each one of these criteria can be quantified and used to scientifically classify firms according to their level of multinationality. The levels of multinationality of Indian companies have not been studied extensively to date. There are handful of studies published prominent among them is the ISB measure of transnationality of top 100 Indian companies. Comparing the level of multinationality with performance of the company has been done by studies such as Jain & Prakash, 2016. This study took a partial look at the relationship between multinationality and performance for Indian software firms. In the Indian context there have been no studies done to date which compares the exchange rate exposure and the level of multinationality. However, there are studies which measure the exchange rate exposure and the intensity of the factors affecting the exposure at firm and industry level.

2.2 Exchange Rate Exposure

Financial risks like credit risk, interest rate risk, inflation risk and exchange rate risks are of serious concern to all firms. Among these financial risks, exchange rate exposure is considered more explicit and may effect a firm whether or not they are directly involved in the foreign currency dealings. Exchange rate risk refers to the possibility of facing difficulty or losses due to the changes in the exchange rate of the country in which the firm operates. Though it is implied that companies that deal in foreign currencies, are affected by foreign exchange exposure, even purely domestic firms can face such risks and will need to manage such risks. The high volatility of exchange rates further complicates the exchange exposure. These fluctuations have had a profound impact on domestic and foreign sales, profit levels and profit margins of firms.

The exchange rate risk or currency risk can be divided into three types namely Translation Exposure, Transaction Exposure and Economic Exposure. Translation risk is the result of this restatement of a firm's foreign currency denominated accounts, where the exchange rate used causes changes in the value documented in the parent company's financial statements. In essence, translation risk is the effect exchange rates have on the figures shown on the parent company's consolidated balance sheet. Transaction risk, on the other hand, is the extent to which a given exchange rate will change the value of foreign-currency-denominated transactions, which have already been entered into by a firm. Finally, economic risk is the extent to which the value of the firm will change due to a change in the exchange rate. (Madura, 2009)

The vast literature on this topic suggests, measuring or gauging the exchange rate exposure of companies is challenging as many researchers have found conflicting results ranging from no effect of exchange rate on the stock performance to high risk measure due to volatility of the exchange rates on the corporate performance business (Du, Ng, & Zhao, 2013; Hekman, 1983; Lee, 2011; Peter B, Kenen. Dani, 1986; Rugman & Oh, 2011). In the recent years the researchers have been able to identify specific exposures and relate them to the performance of the corporate and guide in managing such risks with the use of derivatives instruments.

Beyond the general definition of the term exchange rate exposure, a researcher, intending to conduct a financial analysis with the measure of exchange rate risk should define the term in quantifiable manner. One such definition is provided by Adler and Dumas where they have stated three criteria for a risk to be defined as currency risk exposure. Firstly the effect of the exposure must be measurable in terms of some currency, domestic or foreign depending on the multinationality of the firm. A second criterion is that the measure of the asset and liability, physical or otherwise must be considered from the investor's viewpoint. And a third criterion is that it must have a dual dimension of measurability and manageability. This means the exposure should be both measurable and manageable quantitatively by using financial tools (Adler & Dumas, 1984).

2.3 Measuring Level of Multinationality

Level of multinationality, also called 'International diversification' can be measured in different ways. The first which method is proposed by (Aggarwal et al., 2011), where they device that the firms be classified into 6 levels depending on the number of regions / territory they operate in. The classification encompasses all firms with no interaction beyond their national boundaries to those firms which operate regionally and globally as domestic firms, regional/ trans-regional firms and global firms. Trans-regional firms can be further classified as T2, T3, T4 or T5 companies depending on the number of regions they operate in. The regions are the continents of the world. For this method though, it is easier to collect the data and classify the firms, there are several limitation like all regions and countries that the firm operates in is given equal weights and it just takes the nominal number of countries a firm operates in as a basis for declaring it a highly multinational firm or otherwise, regardless of whether, the impact of multinationalness is felt in its performance, operation or any other variable that needs to be evaluated.

Rugman & Oh suggest using scale metrics and scope metrics in measuring and ranking the level of multinationality of firms. In their paper, they proposed to test the two methods of evaluating the multinationality of the largest 246 US firms listed in the Fortune Global 500 over the 2000-2007 periods. For the scale metrics they proposed to use metrics like foreign to total sales (FS) and foreign to total assets (FA). And for the scope metrics they suggest using counts based on the number of foreign countries; number of foreign subsidiaries (NOFB); ratio of foreign countries to total countries in which a firm has a subsidiary (FC); and the ratio of foreign subsidiaries to total subsidiaries (FB). They conclude that scope metrics greatly overestimate the foreign involvement of US firms, so the scale metrics is recommended to be used in measuring the multinationality. (Rugman & Oh, 2011). On similar lines, (Asmussen, 2009; Verbeke & Asmussen, 2016), demonstrate the classification of multinationality as national firms, regional firms and global firms. This measure, specifically the scale metrics, is considered to be more scientific in classifying the firms as per the degree of its multinationality by considering variables which would actually impact the firm in terms of measurable impact due to its multinationality, like the percentage of foreign sales, foreign assets etc. A more popular and objective measure of multinationality is the transnationality index (TnI). UNCTAD developed a multivariate measure for its World Investment Report (UNCTAD, 2015), called the transnationality index (TnI) . The TnI combines three ratios: foreign sales to total sales, foreign assets to total assets, and foreign employment to total employment to balance different types of internationalization across various industries.

2.4 Measuring Exchange Rate Exposure of Firms

The factors that affect exchange rate exposure needs to be evaluated for their impact on the firm value and returns so as to be able to discern the seriousness of the risk that a firm faces due to volatility in the foreign exchange rates internationally. Understanding the determinants of the exchange rate and investigating the effect of these factors could prove to be 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 (Adler & Dumas, 1984; Shunke M. Bartram, Brown, & Minton, 2010; Chang, Hsin, & Shiah-Hou, 2013; Huffman, Makar, & Beyer, 2010). 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. The studies using multiple factors do not in any way justify that their method is superior to the traditional one factor model.

This paper uses the foreign earnings to total earnings ratio to measure the level of multinationality of the constituents of BSE S&P 500. The foreign exchange exposure is measured using the simple regression model as described by (Phillipe Jorion, 1990) and followed by many popular studies like (Agyei-Ampomah et al., 2013; Asaolu, 2011; Chernobai, Jorion, & Yu, 2011; Philippe Jorion, 1991). Relationship between Exchange rate exposure and stock returns claimed by (Söhnke M Bartram & Bodnar, 2009) formed the basis for measurement of the exchange rate exposure of sample firms. This study contributes to the existing literature by addressing the gaps in the study of correlation between exchange rate exposure and the level of multinationality. By using the constituent companies of S&P BSE 500 as sample, the study addresses the dearth of research in the Indian context in this area. All empirical results to date are based on the general measure of multinationality and exposure without considering the individual measure on a firm level. This result of this study could be considered more robust as it delves into measuring the individual firm multinationality and exposure and directly comparing them against each other.

3. Research Methodology

A three step empirical approach was followed; first to measure the level of multinationality and the level of exposure to the exchange rate for each constituent company of BSE S&P 500. This step included the estimation of the time series data to check for suitability of the data for the chosen tool. In the second step the correlation between the measure of multinationality and the measure of exposure was undertaken and finally a causality test between these measures were conducted.

3.1 Research Objectives

1. Measure the level of multinationality for the each company
2. Measure the exchange rate exposure for each company
3. Evaluate the relationship between multinationality and exchange rate exposure of sample companies.

3.2 Research Hypothesis

The following hypothesis is aimed to be tested as an intended outcome of the study.

H_{01}: There is no correlation between the firm level exchange exposure and their multinationality

H_{02}: There is no causal relationship between the level of multinationality and the exchange rate exposure of firms

3.3 Data Collection

The financial data for the sample companies were collected for a period of 2006 to 2016 from the Prowess Database services of CMIE. A thorough examination and comparing of the dataset was done to check the reliability and comparability of the data over the study period. It was found that data was only available for 467 companies. And comparing the company names over the desired period indicated that the constituent names did not match in data set for 2006 and 2016. These years were thus excluded from further analysis and only data for 2007 to 2015 were included in the study. There were minor mismatch in two other periods, which were adjusted by excluding one company each from the data set in two different years. The foreign earnings (FE) to total earning (TE) ratio is used as a proxy for multinationality, where FE= Exports +Foreign dividends + foreign interest +other foreign earnings - Foreign exchange spending and TE= Total Income. In calculation of the FE/TE ratio, the total income or the foreign earnings data for 38 companies were missing, so these companies were removed from the sample, the final sample size was thus 429companies. The idea of the research was to measure the multinationality level of the sample companies on the basis of their actual level of foreign dealings reported. It is also a performance measure of multinationality as per popular studies. (Aggarwal et al., 2011). The ratio so obtained were collected for each individual companies with only their absolute values. This was considered a measure of multinationality.

Exchange rate exposure was measured using the simple regression, following the standard two factor model as proposed by (Adler & Dumas, 1984; Phillipe Jorion, 1990). In order to estimate the level of exposure, the exposure coefficient was to be computed for each of the companies in the sample. For this purpose, the exchange rate monthly returns were regressed with the monthly data for closing price returns with the BSE S&P500 index returns as control variable for the period January 2007 to December 2015 for 429 companies as observed in the calculation of the level of multinationality. The regression coefficient was measured using the following equation:

$$R_{it} = \alpha_{0i} + \alpha_{1i}R_{xt} + \alpha_{2i}R_{mt} + \varepsilon_{it}$$

Where the coefficients α_{1i} and α_{2i} measure sensitivity of stock return to exchange risk, t represent the variable for the time series of 108 months, i is individual company studied, ε is the disturbance/error term. X represents the foreign exchange rate and R represents the closing price returns. In above equation α_{1i} the slope coefficient of the regression is the exchange-rate exposure measure, as it describes the sensitivity of stock returns to unanticipated changes in exchange rates.

The time series estimation was done by collecting all these variables as a panel data and regressed. The white test and ARCH test of heretoskedasticity indicated existence of heretoskedasticity in the

time series so the HAC Newey-West estimation was conducted to remove all unknown autocorrelation and heretoskedasticity.

Table 1: HAC Standard Errors & Covariance (Bartlett Kernel, Newey-West Fixed Bandwidth = 16.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004978	0.000628	7.921138	0
INDEXRETURNS	1.130647	0.014332	78.88848	0
FXRETURNS	-0.073974	0.022854	-3.23685	0.0012

R-squared	0.302213	Mean dependent var	0.01457
Adjusted R-squared	0.302182	S.D. dependent var	0.153125
S.E. of regression	0.127914	Akaike info criterion	-1.27486
Sum squared resid	747.6234	Schwarz criterion	-1.27429

Source: Data collected from RBI and BSE historical archive. Statistics generated using Eviews software

Having the standard errors corrected, the regression equation was then estimated by using the ordinary least square (OLS) method to obtain the exchange rate exposure coefficients for each of the constituent companies with index returns as control variables. This procedure has been motivated from the method used by Hutson & Laing, 2014 in measuring the individual exposure of US firms.

4. Data Analysis and Findings

Foreign Earnings ratio of each company was used as a proxy for level of multinationality. The annual foreign earnings divided by the total earnings for each company was calculated for January 2007 to December 2015. Exchange Rate Exposure was measured using simple regression equation with monthly closing price returns as dependent variable, the monthly exchange rate returns (USD/INR) was the independent variable with monthly BSES&P 500 Index returns for the same period were considered as control variable to find the regression coefficient. Thus the final sample data consisted of two variables indicating the measure of multinationality and the measure of exchange rate exposure for 357 constituent companies. A bivariate analysis of these cross sectional variables were conducted by taking total assets for the respective companies as a proxy for firm size. A log of the total assets value was considered as a third variable to make the data set comparable to the other two variables. Then various measure for evaluating the relationship between multinationality and exchange rate exposure was undertaken.

Table 2: Descriptive Statistics

	N	Range	Mean		Skewness		Kurtosis		Jarque-Bera
			Statistic	Std. Error	Statistic	Std. Error	Statistic	Std. Error	
Multinationality	357	0.87	0.15	0.01	1.68	0.13	3.09	0.26	4.896
Exposure	357	2.12	1.12	0.02	0.28	0.13	2.863	0.26	303.20
LogTA	357	7.88	10.41	0.08	0.58	0.13	6.032	0.26	20.184

Source: Data from Prowess database, RBI and BSE historical archive. Statistics generated using Eviews software

The data description indicated that the variables were suitable for the analysis intended with 357 companies, the data was positively skewed and normally distributed as the skewness and kurtosis indicate. A high value in Jarque-Bera indicates that the model is well defined.

4.1 H_{01}: There is no relation between the Firm Level Exchange Exposure and their Multinationality

A covariance analysis with its correlation indicates a negative correlation and covariance between exposure and multinationality. A high p value 0.808 indicates a weak relationship. However, there seem to be a positive correlation and covariance between firm size and exposure.

Table 3: Relationship between Multinationality and Exchange Rate Exposure

	Covariance	Correlation	t-Statistic	Probability	Observations
Multinationality	-0.00084	-0.01291	-0.24321	0.807983	357
LogTA	0.083563	0.134449	2.556431	0.010991	357

Source: Author tabulated data. Statistics generated using Eviews software

By regression, the measure of exposure corresponds to the following equation was derived into a model from the two factor regression equation from which the level of multinationality and the level of exposure has been calculated.

$$R_{it} = \alpha_{0i} + \alpha_{1i}R_{xt} + \alpha_{2i}R_{mt} + \varepsilon_{it}$$

α_{0i} = -0.02526*Multinationality + 0.03903* LogTotalAssets + 0.71930, where α_{0i} represents the level of exposure.

4.2 H_{02}: There is no causal relationship between the level of Multinationality and the Exchange Rate Exposure of Firms

To know which variable causes which, the Granger Causality Test was run and the following result was observed.

Table 4: Pair wise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
EXPOSURE does not Granger Cause MULTINATIONALITY	355	0.46715	0.62718
MULTINATIONALITY does not Granger Cause EXPOSURE		0.32978	0.71930
LOGTOTALASSETS does not Granger Cause MULTINATIONALITY	355	0.01465	0.98546
MULTINATIONALITY does not Granger Cause LOGTOTALASSETS		3.57633	0.02901
LOGTOTALASSETS does not Granger Cause EXPOSURE	355	0.12055	0.88647
EXPOSURE does not Granger Cause LOGTOTALASSETS		2.82908	0.06042

Source: Author tabulated data. Statistics generated using Eviews software

An interpretation of the results on the basis of the above P values indicate that exposure does not granger cause multinationality this hypothesis cannot be rejected because the P values for all these bilateral causality test is very high. There is a significance in the p value that multinationality can granger cause firm size and that exposure can cause firm size. These relationships may be explored with further research.

5. Conclusion and Recommendations

The study had been an effort to study the relationship between exchange rate exposure and the level of multinationality of Indian firms as represented by the constituents of BSE S&P500 firms. Financial data of individual firms were collected from the prowess data base, exchange rate data was collected from the RBI archives and the market closing price were manually collected from the BSE India web sites. The duration of the study was 9 years from January 2007 to December 2015. The objective of the study was represented by two hypothesis statements.

To arrive at the results, the raw data was converted into measures of exposure and level of multinationality with suitable justification. Covariance, correlation and Ganger's causality tests indicates almost negligible relationship between multinationality level and exposure. The results are in line with most empirical research in the topic area which states that exposure is not having a big impact on firm performance or the intensity of multinational operation of the firms. The possible reasons could be the impact of using operational hedging by multinational companies to remove the impact of exchange rate changes, thereby protecting the firm against the exposure. On the other hand it may also mean that the concept of exchange rate exposure is hyped and in practice the inward exposure to the exchange rate is offset by the outward exposure to movement in exchange rates. Thus a highly multinational Indian firms may face a low level of exchange rate exposure and a domestic firm may face high exchange rate exposure. There is no conclusive proof of either multinationality causes exchange rate exposure or vice versa.

5.1 Limitations of the Study

1. The measures of multinationality and exchange rate exposure was simplistic as in both cases limited number of variables were considered a more elaborate and refined measure would have improved the reliability of the findings from this study

2. Further classification of the sample firms into industries and an analysis of the same would be more interesting and valuable. Industry specific analysis and evaluation would have permitted exploring measures to identify and manage such exposures.

3. Though the study provides an overview of the relationship between the level of multinationality and the level of exchange rate exposure of the BSE S&P 500 companies, automatic implication of the findings at a national scenario is not warranted or implied.

5.2 Recommendations

Investors, firm management and regulators can consider the results of the study to understand that multinationality and exposure may not move in tangent to each other, as there is no assurance that only the multinational companies would be suffering exchange rate exposure. The most important take away from this study is that domestic companies could face exchange rate exposure possibly as they are not hedged against this risk. Further exploration of other factors which may cause exposure would be useful in predicting, measuring and managing the exchange rate risks among all firms regardless of whether they are domestic or foreign.

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