Capital Structure and Exchange Rate Risk; An Empirical Analysis of Indian Non- Financial Firms

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Abstract

The paper aims at capturing exchange rate risk and then studies its impact on firms' capital structure specifically considering firms' choice between debt and equity as the source of business financing with respect to its exchange rate risk irrespective of the degree of its international involvements, considering a sample of 295 Indian non-financial manufacturing firms over a period 1995-2011. The study finds approximately 75% of firms are exposed negatively and approximately 25% firms are exposed positively to exchange rate risk. Firms' who are the net importers having negative exchange rate Beta have higher leverage than firms who are net exporters with positive Betas. All firms whether it is positively or negatively exposed have lower profitability and are more fragile during exchange rate depreciation. The study also finds the evidence that Indian non-financial exporting firms are exhibiting significant growth than importing firms with the prevailing exchange rate structure.

Key words: *Exchange Rate Exposure, Debt-Equity, Panel data analysis*

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Introduction

The Indian debt market has provided adequate space for Indian corporate wherein earlier it depended on internal bond market and it faced high cost of borrowing together with liquidity crunch. Thus Indian companies decided to go abroad for cheaper loans and found that borrowing, especially in US dollars, was a cheap method compared to internal borrowing because RBI has been keeping its rates extremely high for years. Indian firms continues to rely on external sources of finance. While the amount of new equity finance has been increased, still Indian firms rely on debt financing. The dependence on external sources on finance especially on debt finance makes financial structure vulnerable as moving into external associations and involvement of exchange rates exposure. Exchange rate changes affect the firms' debt - equity position and valuation of their cash flow. The relationship between debt and equity is the formal means of understanding the financial health of a firm which is firm specific in the context of firm size, its foreign involvement, the level of risk towards the currency movements, industry structure, etc. A company's debt to equity ratio is a measure of how aggressive it has been in leveraging its assets for growth. If the debt to equity ratio for a company is high, the company may be carrying too much debt in comparison to its actual net worth. In such scenario, the firm's

decision to maintain a certain level of accepted debt-equity ratio is also affected by change in exchange rate which is basically a conversion window that translates all the foreign debts to home currency. As we look how exchange rate movements affect the firm value or profitability, it also important to analyze the impact of exchange rate fluctuation on debt-equity position. The main issue carried out here is in what condition Indian firms' debt-equity ratio is altered.

The main objective of this paper is to capture how debt-equity position of a firm is impacted due to exchange rate fluctuations. It also aims at addressing the significant contribution of key firm specific factors to immunize capital structure of a firm from exchange rate risk. The findings of this paper will surely help the financial managers to take necessary actions to build an optimum capital structure of a firm incorporating exchange rate risk.

Theoretical Background

An optimum capital structure depends on maintaining proper balance between debt and equity. Too much debt will overextend the ability to pay and makes the firm vulnerable to large interest rates or penalties. However, too much equity will affect the business ratio if the ownership interest is exposed to outside control. All in all, the debt to equity ratio needs a proper mix. It provides different opportunities for raising funds and hence a commercially acceptable ratio between debt and equity financing should be maintained. From the lender's perspective, the debt-to-equity ratio measures the amount that is available for repayment of a debt in the case of default. Excessive debt financing may impair the credit rating and the ability to raise more money in the future. Too much debt makes the firm risky, an unsafe platform for investment and skeptical to ride out unanticipated business downturns, credit shortages, or manage the shock of an interest rate increase. Conversely, too much equity financing can indicate that the capital is not used to its highest capacity or capital is not being used advantageously as leverage for obtaining cash. Similarly, too little equity may suggest the owners are not committed to their own business. In the current scenario of higher interest rates, companies with high debt to equity ratio are finding themselves very intense. One, however, needs to see the industry in which the company operates. The capital-intensive industry firms tend to take more debt in order to finance their projects and hence there is a higher debt to equity ratio subsequently.

If a lot of debt is used to finance increased operations (high debt to equity), the company could potentially generate more earnings than it would have without this outside financing. If this were to increase earnings by a greater amount than the debt cost (interest), then the shareholders benefit as more earnings are being spread among the same amount of shareholders. However, the cost of this debt financing may outweigh the return that the company generates on the debt through investment and business activities and become too much for the company to handle. This can lead to bankruptcy, which would leave shareholders with nothing.

The more profit the firms have, the more internal funds will be available, resulting in a

less external fund in which the firm will desire, according to the Pecking Order Theory. Thus, pre-tax profitability is theoretically and negatively associated with the firms leverage decision. Low-margin firms produce at a low quantile of the future demand distribution to prevent costly under-selling. Since these firms then face relatively little risk in their future earnings, they have low default probabilities and can support low-cost debt. For higher margins, firms increase their scale and increase risk (significantly relative to the low risk of the lowest margin firms). The result is the potential default probabilities rise rapidly as margins increase, causing higher borrowing costs, and decreasing leverage overall.

Firm size has become such a routine to use as a control variable in empirical corporate finance studies that it receives little to no discussion in most research papers even though not uncommonly it is among the most significant variables. Debt is positively related to firm size as hypothesized by Jensen's free cash flow theory (Jensen, 1986). As firms grow, managers have more power as the number of assets under their control increases. Accordingly, there may be free cash flows in excess of those required to invest in positive net present value projects. Therefore, interest and principal payments can help alleviate this overinvestment problem for the firm. Furthermore, smaller and younger firms typically have not established reputations and have higher levels of information asymmetry for lenders.

Market to book can also be a proxy of targeted debt ratio as well as the growth opportunity. Then higher values of MTB should be associated with lower target leverage ratios. Rajan and Zingales (1995) argue that highly levered companies are more likely to give up profitable investment opportunities. Hence, growth opportunities (proxied by the market value of assets divided by the book value of assets) should be negatively related to debt-to-equity ratios.

Literature Review

There are few studies that have examined the effect of exchange rate exposure on firms' capital structure. Among the studies that focus on stock price - based exposure, Jorion (1990, 1991), Bodnar and Gentry (1993), and Amihud (1994) regress a company's stock return on exchange rate changes and additional control variables such as a market portfolio return. Dumas (1978), Hodder (1982), and Adler and Dumas (1984) define exchange rate exposure as the effect of exchange-rate changes on the value of a firm. This definition has no implication for a causal relationship between exchange- rate fluctuations and changes in firm value. In other words, stock prices and exchange rates are endogenously determined. Choi and Prasad (1995) and Bodnar and Gentry (1993) have also reported significantly higher number of firms exposing to foreign exchange risk.

Many studies have investigated the relation between capital structure and firm-level determinants and they have introduced almost a same set of factors. Some have found that external determinants of capital structure play a substantial role in financial decision-making process and the knowledge

about the power and direction of such influence supports managers to make effective and accurate financial decision for stable and successful development. There are some similar agreements on the key internal factors affecting capital structure including profitability, firm size, asset structure, liquidity, growth opportunities, uniqueness, industry classification, earning volatility and stock return (Yang et al., 2010; Chakraborty, 2010). Bokpin, (2009); You & He (2011); have considered the effect of external factors on the capital structure. GDP is one of the most used external factors.

Firm Size is considered to be a very important determinant of the firm in taking any financing decisions. It basically gives the potential of any firm to finance for a profitable NPV investment. A number of recent papers have found a positive relationship between firm size and the use of debt, including Wald (1999) and Mackay and Phillips (2002). Both papers use the log of total assets to measure firm size. Dalbor and Upneja (2002) found a positive relationship between size and debt for publicly traded restaurant firms. Their proxy for size is the log of the market value of stockholder equity.

Profitability of a firm decides the prospective of investment and developing of a business of any firm. A profitable firm tries to avoid raising debt as it will curtail its profitability. Modigliani and Miller (1958) have a theory of "capital structure irrelevance" where argue that financial leverage does not affect the firm's market value with assumptions related to homogenous expectations, perfect capital markets and no taxes. Sarkar and Zapatero (2003) find a positive relationship between leverage and profitability. Myers and Majluf (1984) find firms that are profitable and generate high earnings are expected to use less debt capital comparing with equity than those that do not generate high earnings. Sheel (1994) showed that all leverage determinants factors studied, excepting firm size, are significant to explain debt behavior variations. Gleason, et al., (2000) Using data from retailers in 14 European countries, which are grouped into 4 cultural clusters, it is shown that capital structures for retailers vary by cultural clusters. This result holds in the presence of control variables. Using both financial and operational measures of performance, it is shown that capital structure influences financial performance, although not exclusively. A negative relationship between capital structure and performance suggests that agency issues may lead to use of higher than appropriate levels of debt in the capital structure, thereby producing lower performance. Chiang et al., (2002) results show that profitability and capital structure are interrelated; the study sample includes 35 companies listed in Hong Kong. Raheman et.al., (2007) find a significant capital structure effect on the profitability for non-financial firms listed on Islamabad Stock Exchange. Abor (2005) seeks to investigate the relationship between capital structure and profitability of listed firms on the Ghana Stock Exchange and find a significantly positive relation between the ratio of short-term debt to total assets and ROE and negative relationship between the ratio of long-term debt to total assets and ROE. Gill, et al., (2011) seeks to extend Abor's (2005) findings regarding the effect of capital structure on profitability by examining the effect of capital structure

on profitability of the American service and manufacturing firms. A sample of 272 American firms listed on New York Stock Exchange for a period of 3 years from 2005 – 2007 was selected. The correlations and regression analyses were used to estimate the functions relating to profitability (measured by return on equity) with measures of capital structure. Empirical results show a positive relationship between short-term debt to total assets and profitability and between total debt to total assets and profitability in the service industry. The findings of this paper show also a positive relationship between short-term debt to total assets and profitability, long-term debt to total assets and profitability, and between total debt to total assets and profitability in the manufacturing industry. Smith and Stulz (1985) argue that hedging can reduce the probability that a firm will go bankrupt and thereby reduce the expected costs of financial distress. We employ a firm's long-term debt ratio (DE) to measure its probability of financial distress. Ceteris paribus, firms with higher DE tend to face larger expected costs of financial distress and hence have a greater desire to engage in hedging activities. Thus, we hypothesize that multi- national firms with greater financial leverage are more likely to hedge and hence are less exposed to exchange-rate risk.

Geczy et al. (1996), they used the ratio of a firm's book-to-market value of equity (BM) as a proxy for a firm's growth opportunities. BM is calculated as the ratio of a firm's year-end book value of equity to SIZE. The lower the BM, the greater a firm's incentive to employ more currency derivatives to hedge in order to reduce underinvestment costs. Thus, the firm's exchange- rate exposure becomes smaller.

Nature and Sources of Data

The sample consist of 295 Indian firms that are listed on Indian stock exchange (BSE). The sample period in this study is extended over a period of 17 years, from the first of January 1995 to the last of December 2011. All the firms are non-financial in nature. We obtain the trade-weighted Indian rupee currency exchange-rate index from the Reserve Bank of India (RBI), and Firm level data from Prowess (CMIE). The market return data is orthogonalized.

Description of Data

Debt Ratio is the debt-equity ratio. The proportion of debt ratio indicate what proportion of the firm's capital is derived from debt compared to other sources such as preferred stock, common stock and retained earnings. A higher proportion of debt capital compared to equity capital makes earnings more volatile and increases the probability that a firm could default on the debt. It leads to greater financial risk. (1) Debt equity ratio is the ratio of total long term debt to total equity. (2) Exchange rate Beta is the risk coefficient obtained from the estimation of exchange rate exposure. (3) Log (PBITDA) in this model is referred to as, "the company's operating profit before the deduction of interest, tax, and depreciation, (4)Firm size and (5) Market to book can also be a proxy of targeted debt ratio as well as the growth opportunity. All these variables are taken from CMIE Prowess.

Research Methodology

An initial estimation of exchange rate exposure is required in order to get beta which is supposed to be the measure of risk and on the basis of which total sample of firms are divided into positively exposed and negatively exposed firms. The above relation is answered by setting up a time-series regression model in which the relationship between firm value and foreign exchange rate movements is analyzed. Stock price is taken as the proxy for firm value and trade-weighted exchange rate has been taken for its unique characteristics. This will clarify the magnitude of the foreign exchange rate exposure.

Adler and Dumas (1984) and Jorion (1990) suggested the following two-factor model as an alternative specification to the univariate time series regression

$$R_t=\alpha_0+\beta_x R_{xt}+\beta_m R_{mt}+\varepsilon_t \quad \ldots\ldots\ldots\ldots (1)$$

Where R_t is the rate of return of firm's stock, R_{xt} is the rate of return on a trade-weighted exchange rate index, measured as the Indian Rupee price of the foreign currency, R_{mt} is the rate of return on a market portfolio, and ε_t is the random error.

Secondly, the present study has undertaken panel data analysis to capture the investment behaviour of Indian manufacturing firms. Panel data otherwise known as longitudinal or cross sessional time series is a data structure where the behaviour of the entities is observed across time. These entities could be countries, states, firms etc. The advantage of panel data over other data structure is that it allows controlling for the variables that cannot be observed or measured. It also controls the variables that change over time but not across entities. Hence it accounts for individual heterogeneity and have the freedom to include variables at any stage of the analysis. Keeping in mind the large scope of heterogeneity in the firm size, the present study have used panel data technique. Fixed Effect and Random Effect models have been experimented to capture the functional relationships between the models.

Fixed Effect (FE) Model:

FE models are useful when we want to analyse the impact of variables that vary over time. It explores the relationship between predictor and the outcome variable within an entity and each of the entity has its own features that may or may not be captured by the predictor variables. It is believed that something within the individual entities may bias the predictor or outcome variable and hence need to be controlled. This is the rationale behind the assumption that the correlation between entity's error and predictor variable should be zero. FE model removes the effects of the time invariant features of the predictor variables so that the net and unbiased effect of the predictor can be captured. Generally, those time invariant characteristics are unique to the entity and should not be correlated with other entities. Each entity is independent and therefore the entity's error term (ε_{it}) and constant (α_i) should not be correlated with others. The constant (α_i) captures the individual effects. If error term (ε_{it}) and constant (α_i) are correlated, then FE

model is not suitable rather we have to choose Random Effect (RE) models. The equation of FE model can be written as:

$$Y_{it} = \alpha_{1i} + \beta_1 X_{1it} + \beta_2 X_{2it} + \varepsilon_{it} \ldots\ldots\ldots\ldots (2)$$

i = 1, 2,.....N. (Cross-sectional identifier)

t = 1, 2,.....T. (Time identifier)

FE model assumes slope of the model remain constant and intercept (α) change across individuals (or panels) but remains fixed over time. Hence FE models are time Invariant.

Random Effect Model:

RE models are otherwise known as Random intercept or Partial pooling model. The rational of RE model is that the variation across entities is assumed to be random and uncorrelated with the independent variables. If you believe that the difference across entity has some influence on dependent variable then we should use RE model. Moreover we could include time invariant variables in RE models who are absorbed by intercept (α_i) in FE models.In case of RE model, α_{1i} is assumed to be random with group mean value of intercept.

$$Y_{it} = \alpha_{1i} + \beta_1 X_{1it} + \beta_2 X_{2it} + \varepsilon_{it} \ldots\ldots\ldots\ldots (3)$$

and $\alpha_{1i} = (\alpha_1 + \mu_i)$

$$Y_{it} = \alpha_1 + \beta_1 X_{1it} + \beta_2 X_{2it} + \omega_{it} \ldots\ldots\ldots\ldots (4)$$

Where $\omega_{it} = (\mu_i + \varepsilon_{it})$ is a composite error term with firm specific error (μ_i) and cross section error term (ε_{it}).

Selection of Appropriate Model:

Hausman test is used to decide the preferred model between FE and RE models in panel data analysis. It basically tests whether the unique error (μ_i) is correlated with repressor. The null hypothesis (H_0) of Hausman test implies, H_0: μ_i is not correlated with repressor. Hausman assumes an asymptotic χ^2 distribution. If H_0 is rejected, then Fixed Effect (FE) model will be the appropriate model otherwise Random Effect (RE) model would be the alternative selection. Conceptually, if μ_i and X_i are correlated, then FE model is preferred and if ifμ_i and X_i are uncorrelated, then RE model is preferred.

A reduced form approach of the corporate structure model based on a logical base used to test how the debt - equity ratio behaves with different determinants such as exchange rate beta, firm size, profitability and growth opportunity. A Panel Regression is employed to trace out these above explained determinants and its relation with the financial leverage ratio of the Indian firms. Before applying the regression test the total sample is divided into two: such as positive and negative beta companies. This regression will clear the question related to the leverage decision taken by the Indian firms and will help in framing corporate policies. The basic model is presented in equation (5). But equation (6) represents actual value consideration, where Log Equity is considered as proxy for firm size, (PBIT/Avg. Total Assets) is considered as proxy for Profitability and Market-to-book is considered for Growth opportunity of the firm.

$D/E = \alpha + \beta_1$ (Ex-rate Beta) + β_2 (Firm size) + β_3 (Profitability) + β_4 (Growth Opportunity) + ε_t (5)

$D/E = \alpha + \beta_1$ (Ex-rate Beta) + β_2 (Log Equity) + β_3 (PBIT/Avg. Total Assets) + β_4 (Market-to-book) + ε_t (6)

Empirical Results

We obtained the exposure betas for the multinational firms by regressing 295 firm returns on market portfolio return and a return on trade weighted exchange rate measure. Out of total 295 Indian firms, 221 firms have negative Beta (β) and 74 firms have positive Beta (β). In other words, we can interpret it as, out of the sample of 295 non-financial firms, the return of 74.91% firms are appeared to be negatively exposed to exchange rate risk and the return series of 25.09% firms are positively exposed to exchange rate change (Table 1). A firm with positive exchange rate β is expected to have positive impact on its stock returns at the time of depreciation of Rupee against the trade weighted exchange rate (as per in this study) and a firm with negative exchange rate β is expected to have negative impact on its stock returns. The firm with positive Beta is considered as net exporters because, a net exporting firm gains out of exchange rate depreciation in term of home currency through export revenue channel and firms with negative Beta is considered as net importers because they lose out of exchange rate depreciation due to imported inputs channel. On this logic, the present study identifies that 74.91% of Indian non-financial firms are net importers whose returns are negatively impacted by exchange rate depreciation and only 25.09% firms are net exporters whose returns are positively impacted due to rupee depreciation. The present study uses these estimated exchange rate Beta of 295 firms as exchange rate risk parameter that ultimately influence their capital structure through choice between debt and equity. But in terms of debt structure, we must expect that firms with positive exposure to currency movements display increases in leverage during currency depreciations. The rationale for such an argument is that firms that benefit from a currency depreciation have an incentive to increase their leverage, because if the risks of high leverage materialize then, firms expect a currency depreciation as a form of a bailout (see Bris and Koskinen, 2000). The estimated impact of currency exposure over Debt-equity ratio is captured by panel regression and the estimated statistics are presented in table no 2,3,4 and 5. In order to see whether a fixed effect model or a random effect model is preferred one, we run a Hausman test and found for both export oriented firms sample and for import oriented firms samples random effect model is preferred. Thus, we will consider those two tables (3 and 5) for our analysis and table 2 & 4 are presented for reference. Table: 3, represents the estimated test statistics of random effect model of positive beta firms. The number of firms are 74 with 1258 observations. The Wald Chi square test statistics of 67.51 with probability 0.00 confirms the overall level of significant of the model and the entire coefficient in the model is different than zero. The estimated errors $u_i$areassumed not to correlate with regressors in the random effects model as indicated by corr (u_i, xb) = 0. The Rho

(interclass correlation) factor comes out to be 0.27049 confirms that 27.04% of the variance in the model is due to differences across panels. Similarly, we can interpret the estimated test statistics of table: 5 for negative exchange rate Beta firms. In this case the interclass correlation (Rho) comes out to be 0.3977, implies 39.77% of the variance in the model is due to differences across panels. In both the samples Rho appearing to be high. Note that interclass correlation should always be non-negative and to be interpreted as the proportion of total variance between groups that captures within-class similarity of the covariate-adjusted data values. From Table No- 3 it is noticed that all the variables are found to be significant.

Discussion and Analysis

The exchange rate beta is significant but negatively related to the leverage (debt-equity ratio). It means for net exporting firms, higher the exchange risk, lower will be the leverage. Otherwise, we can say that, among the firms which gains during depreciation tends to finance less from debt and more from equity or other form of earned income. The result goes against the theoretical prediction. This shows although the firm has potential to make valid and profitable investment in adverse situation but it is not much aggressive to finance its investment from debt. The firm is not ready to pay or bear any extra burden from debt. Preferably, a favorable financial scenario may give a sentimental advantage to the net exporters to raise more equity than debt. Investors may also expect dividend out of excess profit and hence reduce their required rate of return which makes equity financing relatively cheaper than debt financing. From the Table No- 5 that represents net importers, it is found that the exchange rate beta is significant but positively related to financial leverage for negative beta firms. For importing firms higher the exchange rate risk, higher is the financial leverage. This implies that during depreciation the importing firms tend to finance more from debt. It looks uncomfortable to accept the point why an importing firm whose return is impacted negatively during depreciation because of imported cost channel tends to finance its investment from debt. Is it because expectation of low profitability scenario increases its expected required rate return from equity which makes it relatively expensive than debt in Indian capital market. The firm will look at to substitute external debt to internal debt but still prefer debt financing due to poor cash flow projection. Hence the present study have concluded that negatively exposed firms increase their leverage more than positively exposed firms. The model the study have added some key firm specific factors as control variable. From the evidence of literature, Rajan and Zingales (1995) considered firm size by the logarithm of sales. They obtain a positive coefficient in their regressions, although, in their view, a negative relationship between size and debt levels is sensible if size is also a proxy for the information outside investors have. The result depicted in Table No- 3 and 5 says for both exporting and importing firms, the size of firm (proxied by log of equity value) has a positive relationship with its leverage. The positive sign on this variable lends support to the free cash flow theory. Additionally, and despite disagreeing

theoretical predictions regarding the effect of profitability on leverage, Rajan and Zingales (1995), find a negative relationship between EBITDA (normalized by the book value of assets) and book debt-to-equity ratios. We have taken PBIT/ Avg. Asset as the measure of profitability. From the Table No-3 and 5 it is evident that for both exporting and importing firms, the size of firm has a negative relationship with its leverage which goes along with Rajan and Zingales (1995). This is explained by the fact that debts are relatively more expensive than equity, and therefore employing high proportions of them could lead to low profitability. The results support part of earlier findings by Fama and French (1998),Graham (2000), and Booth et al. (2001). This explanation can be supported by the theory of 'Pecking order'.

Firms with growth opportunities do not display higher levels of debt. The result depicted in Table No- 3 says exporting firm shows significant and negative relation with MTB. This goes along with the theory that whatever the growth opportunities a firm has, it never desires to finance its investment from debt. On the other hand Table No- 5 says importing firms show an insignificant relation with MTB. This result is supported by Rajan and Zingales (1995) which also found that the coefficient of the market-to-book ratio is not significant for Italy and Japan.

Conclusion

We find that the firms with negative exchange rate Beta have higher leverage than firms that have positive exchange rate beta. The results of higher leverage, higher financial fragility and lower profitability for negative exposure companies are consistent with the arguments with Bris and Koskinen (2002), whereas the evidence that all kinds of firms suffer from these problems is consistent with Aghion et al. (2001). We also provide evidence that is consistent with Aghion et al. (2001) that all firms whether it is positively or negatively exposed have lower profitability and are more fragile during currency depreciation. Also the observation that positive exposure companies grow faster than negative exposure companies is in accordance with Schneider and Tornell (2001).

On the basis of above findings, it is recommended that net importing firms should take advance measures to immunize their balance sheet from exchange rate risk that reduces profitability by increasing the cost of production through imported input cost channel. That can be checked by avoiding imports at depreciated currency. It can be achieved either entering into currency derivatives or by maintaining proper inventory of inputs through advanced imports, although each of these methods have its own cost of implementation. In a similar manner, even though positive beta firms i.e. net exporters are benefited from depreciation of currency through export revenue channel, they should try to extract maximum benefit during depletion of home currency by following a wait and export strategy. A proper inventory management of final exportable output and timing of export could help in maximizing the benefit during the time of currency depreciation subject to nature of product and its market.

Whether the private sector's choice between foreign and domestic debt impacting

probability and the intensity of currency crises is still an open question. The measure of leverage that we report in this paper does not distinguish among different sources of debt financing. However, by estimating measures of exchange rate risk on a firm level, we can at least partially deal with this problem. Disaggregated data on debt financing for emerging and developing economies such as the ones that we consider is not easily available, so indirect measures are necessary. The analysis, however, would have interesting implications, and deserves further research.

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Result Tables

Table: 1 Estimated Exchange rate Beta of 295 firms grouped under positive and negative Beta

Exchange Rate Beta		
Number of Firms	295	In Percentage
-ve Beta	221	74.91%
+ve Beta	74	25.09%

Table: 2 Fixed Effect Model for Firms with Positive Exchange rate Beta

Regression on Fixed Effect Model, (+ ve Beta)			
Number of Observations	1258	F - Stat	14.13
Number of Groups	74	Probability	0.0000
Corr (u_i, Xb) = -0.0920			
Rho = 0.3142			
Variables	**Coefficients**	**t - Stat**	**Probability**
CONSTANT	-18.96	-1.64	0.10
Beta	-7.15	-0.72	0.47
PBIT/Avg. Asset	-0.30	-3.87	0.00
Size	12.60	7.08	0.00
MtB	-0.01	-2.32	0.02

Table: 3 Random Effect Model for Firms with Positive Exchange rate Beta

Regression on Random Effect Model, (+ ve Beta)			
Number of Observations	1258	Wald chi2	67.51
Number of Groups	74	Probability	0.0000
Corr (u_i, Xb) = 0			
Rho = 0 .27049804			
Variables	**Coefficients**	**z - Stat**	**Probability**
CONSTANT	-16.63	-3.67	0.00
Beta	-7.46	-3.62	0.00
PBIT/Avg. Asset	-0.33	-4.28	0.00
Size	11.45	6.85	0.00
MtB	-0.01	-1.83	0.07
Hausman Test Statistics, (+ ve Beta)			
Test: Ho: Difference in coefficients not systematic			
Chi 2 = 8.01		Probability > chi 2 = 0.0912	

Table: 4 Fixed Effect Model for Firms with Negative Exchange rate Beta

Regression on Fixed Effect Model, (- ve Beta)			
Number of Observations	3757	F - Stat	10.29
Number of Groups	221	Probability	0.0000
Corr (u_i, Xb) = -0.2242			
Rho = 0.4403			
Variables	**Coefficients**	**t - Stat**	**Probability**
CONSTANT	17.99	0.790	0.427
Beta	-3.24	-0.530	0.597
PBIT/Avg. Asset	-0.26	-4.620	0.000
Size	5.72	5.220	0.000
MtB	0.0001	0.370	0.708

Table: 5 Random Effect Model for Firms with Negative Exchange rate Beta

Regression on Random Effect Model, (- ve Beta)			
Number of Observations	3757	Wald chi2	49.12
Number of Groups	221	Probability	0.0000
Corr (u_i, Xb) = 0			
Rho = 0.3977			
Variables	**Coefficients**	**t - Stat**	**Probability**
CONSTANT	-2.467	-0.510	0.611
Beta	2.216	1.960	0.050
PBIT/Avg. Asset	-0.257	-4.680	0.000
Size	5.874	5.630	0.000
MtB	0.0001	0.260	0.795
Hausman Test Statistics, (- ve Beta)			
Test: Ho: Difference in coefficients not systematic			
Chi 2 = 1.16		Prob> chi 2 = 0.7633	

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