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DOES BROWNIAN RISK MATTER IN DEBT OR EQUITY ISSUANCE AND REPURCHASE DECISION IN INDIAN NON-FINANCIAL COMPANIES?

ABSTRACT

External commercial borrowings (ECBs) of Indian non-financial firms have grown by 107 % in past few years. Looking at the high reliance of firms on external debt, this paper investigates the effect of foreign exchange, interest rate and firm specific risk on the debt issuance and retirement decision. It also investigates the factors affecting equity issuance and retirement decision of the firms. Foreign exchange risk and interest rate risk is estimated using stochastic volatility and GARCH (1,1) methods. Firm specific risk is calculated using Black-Scholes Merton model for company valuation. The results highlight that interest rate risk negatively affects the debt issuance and positively affects debt retirement decision of the firms. However, the foreign exchange risk does not affect debt issuance and retirement decision. Firm-specific risk negatively affects propensity of debt issuance of firms but plays no role in debt retirement. Foreign exchange risk, firm-specific risk, and profitability negatively affect propensity of issuance of debt to issuance of equity. This result supports the view that risky firms are more likely to finance their capital needs via new equity issues rather than by new debt issues to avoid the high-risk premium and to limit the likelihood of bankruptcy.

Key Words: foreign exchange risk, firm specific risk, leverage, stochastic volatility, Monte-Carlo Markov chain.

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INTRODUCTION

Macroeconomic environment plays an important role in deciding firm's financing choices as per Choe, Masulis, and Nanda (1993) and Korajczyk and Levy (2003). Risk related to firm's earnings and macroeconomic environment impacts various cost and benefits related to different financing options available to the firm, hence, the firm should alter its financing decision when there are changes in risk structure within which the firm operates. According to structural model given by Chen (2010), both Jump risk - large shocks in the economy that change the conditional moments of growth rates over the business cycle - and Brownian risk - small random shocks that affect the cash flows of the firm- are important in determining the target leverage ratio of the firm. They alter the risk structure within which a firm operates where volatility in exchange rate, interest rate, and idiosyncratic risk is part of Brownian risk component faced by firms.

If the Brownian risk is important in target leverage determination, then firms facing high foreign exchange risk, idiosyncratic risk, and interest rate risk should alter their capital structures in accordance with these factors. It is hypothesized, in the market-timing theory that firm's security issuance or retirement decision is based upon macroeconomic conditions at the time funds are raised. If firm's cash flow is highly variable due to Brownian risk component, it should alter its capital structure accordingly. According to Huang and Ritter (2005), when external equity is cheap, issuing equity is the first choice. Similarly, when debt is cheap, issuing debt becomes the first choice. Firms may issue equity or debt even if they have no immediate financing needs and don't require adjustment of their capital structure, because issuing overvalued securities in an economic boom than in an economic recession is more likely? This is due to reduced default threshold selected by shareholders which leads to decreased bankruptcy costs. Economic boom and recession constitute the Jump risk component faced by the firms. Hence, it can be inferred that firms calculate the time of security issuance. Both Jump and Brownian risk are important determinants of default risk, which in turn affect the cost of raising capital.

In addition, Loof (2004) argued that economy-wide factors should affect the speed of adjustment of leverage. Also, Hackbarth, Miao, and Morellec (2006)'s theoretical model suggests that the restructuring threshold is lower in an economic boom than an economic recession because the default threshold selected by shareholder is reduced which leads to decreased bankruptcy cost. Economic boom and recession constitutes the Jump risk

component faced by the firm. However, it is important to answer whether firms are looking at Brownian risk component also while restructuring its capital structure or not?

According to an IMF (2015), "External commercial borrowings (ECBs) of Indian non-financial firms grew by 107 % between March 2010 and March 2014. Corporate leverage has increased as the equity markets saw relatively few issuances. As a result, the mean ratio of debt to equity for Indian non-financial firms increased from 40 % in 2001 to 81 % in 2013. Hence, greater external funding has exposed Indian firms to external shocks, as they rely on foreign sources for more than one-fifth of their debt financing, primarily through external commercial borrowings (ECBs), trade credits, and bonds. This increased the exposure to non-rupee debt has led to large foreign currency repayment obligations by India's corporate." Hence, exposure of Indian firms to exchange rate risk has been increased.

Therefore, looking at the importance of macroeconomic conditions, increased financing through external commercial borrowing (IMF, 2015) the current study investigates the impact of Brownian risk which is the foreign exchange risk, firm-specific risk, and interest risk on the debt and equity issuance and retirement decision of Indian non-financial firms. This paper is organized into following sections: Section 2 documents the literature review; section 3 covers the data and methodology used; section 4 presents the empirical results; and section 5 concludes the study.

LITERATURE REVIEW

Macroeconomic environment plays an important role in firms financing choice (Choe, Masulis, and Nanda, 1993; Korajczyk and Levy, 2003). Macroeconomic environment plays role in firm's capital structure adjustment to target leverage according to Cook and Tang (2010). Due to adjustment costs, clustering of leverage rebalancing occurs as documented by Leary and Roberts (2005). Cook and Tang (2010) studied the impact of macroeconomic environment on firm's adjustment to target leverage. They studied the macroeconomic environment with the help of default spread, term spread, and dividend yield. They used partial adjustment capital structure model. They found that firms adjust to target leverage faster in good times than in bad economic states. Hence, it is inferred that changes in the risk structure (i.e., Jump risk) of the macroeconomic environment changes the cost associated with the financing and therefore affects capital structure issuing and retirement decision.

Stock prices have significant effect on issuance of equity according to Masulis and Korwar (1986). Choe, Masulis, and Nanda (1993) found that equity issuance relative to the debt is positively correlated with previous stock returns and various business cycle variables. Bayless and Chaplinsky (1991) and Jung, Kim, and Stulz (1996) studied debt versus equity choice using event study methodology. They studied stock price response to issuing choice between debt and equity. Hovakimian, Opler, and Titman (2001) investigated the factors affecting debt and equity issuance and repurchase choice by the firms. They used Logit model to study debt to equity issue and debt to equity retirement. Managers time their equity issuance as documented by Baker and Wurgler (2002). Managers who time the equity market will also time the debt market. If market timing affects debt and equity issuance decisions, then measures of the equity market (the market-to-book ratio) and the debt market (the interest rate) ought to have significant impacts on changes in leverage. Welch (2004) found that equity price shocks have a long-lasting effect on corporate capital structures as well. He concluded that stock returns are the primary determinant of capital structure changes and corporate motives for net issuing activity are largely a mystery.

Huang and Ritter (2005 found that the real GDP growth is positively associated with the likelihood of debt issuance, but it is not reliably related to the likelihood of equity issuance. Hackbarth, Miao, and Morellec (2006), Hennessy, Levy, and Whited (2007), and Baum, Stephan, and Talavera (2009) documented that increase in macroeconomic risk leads to a significant decrease in firm's optimal leverage. Hackbarth, Miao, and Morellec (2006) found that cash flows of firms are conditional on both idiosyncratic risk and macroeconomic conditions. They developed a contingent claim model that predicts both the pace and size of the adjustment to be positively correlated with current economic conditions due to the lower restructuring threshold in good states than in bad states, that is firms frequently restructure their capital structure in good times as compared to bad economic states.

Baum, Stephan, and Talavera (2009) and Rashid (2011) indicated that firms significantly reduce their leverage during periods of high risk. They had used volatility of GDP as an indicator of macroeconomic risk. Almeida, Campello, and Weisbach (2004) and Baum, Caglayan, Stephan, and Talavera (2008) found that firms increase their demand for liquid assets in response to an increase in macroeconomic uncertainty. Hence, these empirical findings indicate that managers realign their leverage decision and liquid assets of the firms to guard the firm against the adverse effects of risk associated with aggregate

economic activities. In this context, the effect of macroeconomic volatility on leverage is expected to be negative.

Baum, Stephan, and Talavera (2009) documented a set of large US non-financial firms that an increase in macroeconomic risk leads to a significant decrease in firm's optimal leverage. Hatzinikolaou, Katsimbris, and Noulas (2002) examined the impact of inflation risk on firm's debt-equity ratios and they found that inflation risk has a significant negative effect on a firm's debt-equity ratio. Levy and Hennessy (2007) examined firm's financing choices in a general equilibrium framework. They predicted that firms issue equity pro-cyclically. They also documented that firms are more likely to reduce their outstanding debt in periods of poor macroeconomic conditions. More recently, Chen (2010) developed a dynamic capital structure model to examine how corporate financing policy responds to macroeconomic fluctuations. They postulated that unpredictable variations in macroeconomic conditions significantly affect firms' financing policies.

Mukherjee and Mahakud (2012) studied the impact of macroeconomic condition on firm's speed of adjustment to target leverage. They used Panel GMM methodology to study the objective. They postulated that financing behavior of firm is different depending on economic conditions. All of the firms have the target leverage ratio across macroeconomic conditions, and the adjustment speed to target leverage has been pro-cyclical. Chadha and Sharma (2015) used inflation and GDP as economic indicators and found that inflation is negatively associated whereas GDP is positively related to target leverage but these variables were statistically insignificant. They have used fixed effect panel data methodology to study the determinants of target leverage. Sinha and Agnihotri (2015) studied the determinant of leverage decision and speed of adjustment of leverage using system GMM for panel data. They observed that foreign exchange, interest rate, and firm-specific risk forms determinants of target leverage.

Foreign exchange risk and its impact on leverage decisions

According to structural model given by Chen (2010), both Jump risk and Brownian risk are important for determining the target leverage ratio of the firm where volatility in exchange rate, interest rate, and idiosyncratic risk is part of Brownian risk component faced by firms.

Risk management literature emphasizes the impact of exchange rate risk on corporate cash flows, motivating corporate risk management in the presence of capital market imperfections such as bankruptcy costs according to Smith and Stulz (1985), Shapiro

(1975), Hodder (1982), and Adler and Dumas (1984). Flood and Lessard (1986) studied the impact of exchange rate exposure on cash flows. Bodnar and Marston (2002) used structural model of foreign risk exposure of firms they assumed the following relationship:

$$\frac{d \ln V}{d \ln S} = \frac{d \ln CF}{d \ln S}$$

Here, V is firm value, S is the exchange rate, and CF is a cash flow measure of the firm. Hence, high foreign exchange risk volatility affects firm cash flow volatility, which constitutes the Brownian risk component, and as a result it should affect firms leverage decisions. Therefore, Brownian risk faced by firms like foreign exchange risk and interest rate risk is used in the present study. Therefore, following hypotheses are prepared.

Hypothesis 1: *Foreign exchange risk does not affect debt issuance of non-financial firms.*
Hypothesis 2: *Foreign exchange risk does not affect debt retirement of non-financial firms.*

As per Baker and Wurgler (2002) managers timed the equity market as well as debt market. If market timing affects debt and equity issuance decisions, then measures of the debt market (the interest rate) ought to have significant impacts on changes in leverage. Therefore, following hypothesis is proposed. As interest rate is an important factor in taking debt and increase in interest rate will make debt financing less lucrative therefore following hypotheses are formed:

Hypothesis 3: *Interest rate risk negatively affects debt issuance of non-financial firms.*
Hypothesis 4: *Interest rate risk positively affects debt retirement of non-financial firms.*

Hovakimian, Opler and Titman (2001) studied firm specific and jump risk factors affecting debt to equity choices. Therefore, apart from studying firm specific and jump risk, Brownian risk factors affecting debt issuance and retirement decision is also investigated in present study. The current study also investigates the debt to equity choice in terms of foreign exchange risk, interest rate risk, and idiosyncratic risk faced by the firms. Following hypotheses are developed:

Hypothesis 5: *Interest rate risk negatively affects debt to equity issuance of non-financial firms.*

Hypothesis 6: *Foreign exchange risk does not affect debt to equity issuance of non-financial firms.*

Hypothesis 7: *Idiosyncratic risk negatively affect debt to equity issuance of non-financial firms.*

Reviewing the above studies, it is inferred that macroeconomic environment plays a pivotal role in capital structure decision of the firm. Total risk is composed of two factors, Jump risk and Brownian risk. Most of the studies focused on the effect of Jump risk on the adjustment to target capital structure. The variables used were GDP growth rate, default spread, term spread, or inflation (to study the state of the economy) with the help of partial adjustment model. If we look at the report of IMF 2015, it is observed that due to increased financing of debt through external commercial borrowing, foreign exchange risk exposure is constantly increasing for non-financial firms. Therefore, due to high Brownian risk faced by the non-financial companies, the current study investigates the effect of macroeconomic environment (specifically Jump risk) and risk associated with factors like foreign exchange, interest rate, and firm-specific volatility on debt and equity issuance and retirement decision of a firm using multinomial logit model for panel data.

DATA AND METHODOLOGY

Annual financial data of 244 Indian firms listed on S&P BSE 500 is taken from CMIE Prowess data base. Period of analysis considered in the present study is from 2005 to 2014. Following Rajan and Zingales (1995), firms in financial sector are excluded from the current study. Hence, we have 2440 firm-year observations in the present study. Term spread is used as a measure of state of the economy. Term spread is taken as the difference between the twenty-year government bond yield and the three-month Treasury-bill rate. A high value of term spread is viewed as a strong predictor for a good economy (Stock and Watson, 1989; Estrella and Mishkin, 1998). Net debt issued (repurchased) is identified by tracking the change in total debt (as used by Hovakimian, Opler, and Titman, 2001). The sample contains debt issued from both private and public sources. An event is considered as net debt/equity issued (repurchased) when net amount issued (repurchased) is greater than 1% of the book value of the assets. This way of defining equity issue means that those cases will be excluded from the present study, where equity was issued in a call of convertible bond. In case of debt small changes in debt due to maturity of debt will be excluded. Return of 91-day T-bill is taken as risk free rate of return.

Methodology

Multinomial logit model is used in the analysis where, in first set of analysis, 1 is coded for issuance of debt, 2 is coded for retirement of debt, and 0 is coded for no action taken. Here, the coefficients of the multinomial logit model are estimated by full information maximum likelihood method. A mixed logit or a random parameters logit model is used. Multinomial logit regression models are popular approaches to estimating the probabilities associated with events captured in a polychotomous variable.

Model estimated

$$y_{it} = x_{it}\beta + c_i + \mu_{it} \tag{1}$$
$$\Pr(y_{it} = 1|(x_{it}, c_i) = G(x_{it}\beta + c_i) \tag{2}$$

Where y_{it} is dependent variable taking value of 1, 2 or 0. x_{it} are independent variables considering firm *i* at time *t*. c_i is an unobserved variable and μ_{it} is the error term. $\Pr$ is the probability that y_{it} takes value 1 conditioned on x_{it} and c_i. Goodness-of-fit is measured using the pseudo-R2 approach of McFadden (1974) where both unrestricted (full model) likelihood and restricted (constants only) likelihood functions are compared.

$$\text{Pseudo R}^2 = 1 - [logL_\omega / logL_\Omega] \tag{3}$$

Variables used in the study

Share price effect (SPE)

According to Welch (2004), implied debt ratio (IDR) is the mechanical effect of stock price changes on leverage (debt ratio).

$$IDR_t = {D_{i,t-1}} \Big/ {(D_{i,t-1} + S_{i,t-1} P_{i,t-1} (1 + R_{i,t}))} \tag{4}$$

Where IDR is the Implied debt ratio IDR, $D_{i,t}$ is the debt ratio for firm *i* at time *t*. S is the number of shares outstanding at time t_1 and P is market price of share, R is return of share. According to Flannery and Rangan (2006), IDR can be divided into two

parts:$IDR_t = SPE_t + D_{t-1}$. Therefore, share price effect (SPE) is the change in debt ratio due exclusively to share price changes. It is denoted as follows:

$$SPE = \left(\frac{D_{i,t-1}}{(D_{i,t-1} + S_{i,t-1}\, P_{i,t-1}\,(1+R_{i,t}))} \right) - D_{i,t-1} \qquad (5)$$

Therefore, in the present study, variable SPE is used to study impact of share price change on leverage decision of the firms.

Firm specific risk

In the present study, firm specific risk is calculated by taking coefficient of variation of operating profit as taken by Pandey (2001). Firm specific risk is also calculated using Black-Scholes company valuation formula. In 1974, Merton proposed a model where a company's equity is an option on the assets of the company. Merton model gives the value of firm equity at time T as:

$$E_T = \max(V_T - D, 0) \qquad (6)$$

This shows that the equity of a company is a call option on the value of the assets of the company with a strike price equal to the repayment required on the debt. The Black-Scholes formula gives the value of the equity as:

$$E_0 = V_0 N(d_1) - De^{-rT} N(d_2) \qquad (7)$$

Where, $d_1 = \frac{ln V_0/D + (r + \sigma_V^2/2)T}{\sigma_v \sqrt{T}}$ and

$$d_2 = d_1 - \sigma_v \sqrt{T} \qquad (8)$$

Since, V_0 and σ_v are not directly observable, hence Ito's lemma is used.

RESULTS

Table 1 summarizes the data characteristics. In order to run the regression, collinearly of variables should be small.

Table 1. Summary statistic

Summary statistics	Mean	Std. Dev	Minimum	Maximum	Count
Interest rate risk	0.124	0.127	0.059	0.503	2440
Foreign exchange risk	0.084	0.025	0.057	0.140	2440
Share price effect	0.004	0.113	-0.405	0.686	2440
Innovation	0.006	0.014	0.000	0.156	2440
Size	10.133	1.440	2.104	13.929	2440
Tangible asset	0.265	0.159	0.001	0.866	2440
Liquidity	0.079	0.109	0.000	0.837	2440
PB	4.289	6.058	-48.130	71.670	2440
Profitability	0.090	0.092	-0.381	0.723	2440
Macroeconomic condition	1.079	1.350	-0.355	4.694	2440
Firm specific risk	0.118	0.096	0.003	0.885	2440

To assess the correlation among independent variables, correlation matrix is generated. It is evident from Table 1, that very less correlation exists among the variables hence, the problem of multi-collinearity is not witnessed. Table 2 represents the correlation matrix among the variables.

Issue of debt to equity

In order to study the effect of risk factors on debt issuance, retirement decision v/s no action taken by firm's multinomial logit model in panel is used. In Table 3, firms which are issuing debt are coded as 1, firms which retire debt are coded as 2, while firms which take any action are coded as 0. From Table 3, it is evident that foreign exchange risk does not affect debt issuance decision of the firms. Hence, H_{01} is accepted. Firm-specific risk is negatively affects propensity of debt issuance. Titman and Wessels (1998), Lemmon, Roberts, and Zender (2008) Antoniou, Guney, and Paudyal (2008), and Baum, Stephan, and Talavera (2009) documented that firm-specific risk negatively affects firms leverage decision.

Table 2. Correlation table

Correlation	IRR	FER	SPE	Innovation	Size	TA	Liquidity	PB	Prof	MEC	FSR
Interest rate risk(IRR)	1										
Foreign Exchange Risk (FER)	0.262	1									
SPE	0.344	0.234	1								
Innovation	-0.014	0.016	-0.005	1							
Size	-0.040	0.141	-0.041	0.015	1						
Tangible Assets(TA)	0.004	-0.033	-0.043	0.008	0.072	1					
Liquidity	0.043	-0.018	-0.004	-0.028	0.019	-0.266	1				
PB	-0.102	-0.095	-0.032	0.031	-0.099	-0.146	0.102	1			
Profitability(Prof)	0.043	-0.057	-0.076	0.086	-0.002	0.218	0.127	0.244	1		
Macroeconomic condition(MEC)	0.173	-0.159	-0.236	-0.022	-0.073	0.009	0.054	-0.005	0.105	1	
Firm specific risk (FSR)	0.039	-0.178	-0.051	0.029	-0.041	-0.213	0.057	0.284	0.111	0.1576	1

- Innovation is investment in R&D .

- Pb is Price to book ratio.

- Prof is cash flow to total assets

Table 3. Issuance and retirement of debt

Panel 1. ISSUANCE OF DEBT

Variable	DEBT (SV) Coefficients	DEBT(GARCH) Coefficients	DEBT(Macroeconomic) Coefficients	DEBT(COV) Coefficients
Size	-0.24[0.049]***	-0.21[0.05]***	-0.16[0.04]***	-0.14[0.04]**
Innovation	-2.53[0.049]	-1.21[0.49]	-1.52[0.82]	-1.10[0.82]
Tangible assets	3.30[0.46]***	3.15[0.46]***	3.29[0.46]***	3.47[0.45]***
PB	-0.0065[0.013]	-0.008[0.013]	-0.009[0.012]	-0.01[0.012]
Foreign exchange risk	-0.478[2.89]	-2.29[2.21]	-	-
Idiosyncratic risk	-1.49[0.89]***	-2.12[0.62]***	-1.39[0.62]***	-0.09[0.02]
Interest rate risk	-1.70[0.53]***	-3.30[0.83]***	-	-
Profitability	-8.99[0.89]***	-9.11[0.89]***	-9.15[0.90]***	-9.19[0.89]***
Macroeconomic condition	-	-	0.43[0.08]***	0.42[0.08]***
SPE	-0.93[0.44]**	-1.54[0.44]**	-	-
Liquidity	-2.43[0.79]***	-2.58[0.78]***	-2.71[0.77]***	-2.75[0.77]***
Intercept	3.49[0.59]***	3.27[0.57]***	3.31[0.56]***	2.73[0.52]***
McFadden R^2	0.19	0.18	0.19	0.19
LR Ratio (test statistic)	997***	992.48***	1008***	995***

Panel 2. RETIRE DEBT

Variable	DEBT (SV) Coefficients	DEBT(GARCH) Coefficients	DEBT(Macroeconomic) Coefficients	DEBT(COV) Coefficients
Size	-0.071[.048]	-0.055[.049]	-0.04[0.04]	-0.02[0.04]
Innovation	-7.07[0.149]	-5.99[0.46]	-6.30[0.66]	-5.57[0.67]
Tangible assets	1.45[0.47]***	1.50[0.47]***	1.55[0.47]***	1.41[0.46]***

PB	-0.023[0.011]**	-0.018[0.011]	-0.019[0.012]	-0.017[0.011]
Foreign exchange risk	-2.95[2.96]	-0.29[2.20]	-	-
Firm specific risk	0.80[0.57]	0.37[0.56]	0.72[0.56]	0.01[0.09]
Interest rate risk	-0.02[0.57]	2.12[0.79]***	-	-
Profitability	1.95[0.87]**	1.56[0.86]	1.57[0.87]	1.83[0.87]**
Macroeconomic condition	-	-	0.11[0.08]	0.12[0.08]
SPE	-0.73[0.48]	-	-	-
Liquidity	-3.96[0.70]***	-4.08[0.69]***	-4.06[0.69]***	-4.07[0.70]***
Intercept	0.79[0.60]	0.21[0.05]	0.05[0.56]	0.10[0.53]
McFadden R²	0.19	0.18	0.19	0.19
LR Ratio (test statistic)	997***	992.48***	1008***	995***

- SV represents volatility estimation by stochastic volatility.

- GARCH represents volatility estimation by GARCH(1,1) method.

- COV represents firm specific estimation by coefficient of variance of EBIT.

- Values in [] represents standard error.

- *** represents significance at 1% and ** represents significance at 5%

Good macroeconomic conditions increase propensity of issuing debt. Hence, it can be inferred that macroeconomic conditions play an important role in debt issuance. Interest rate risk affects the debt issuance decision of the firms but foreign exchange risk does not affect debt issuance decision. However, according to the IMF Report (2015), non-financial firms use more external commercial borrowing. Therefore, firms are more sensitive to foreign exchange risk. Hence, while issuing debt, firm's manager should take into account the foreign exchange risk faced by the firms.

Firms whose cash flows are highly sensitive to (i.e., highly correlated with foreign exchange volatility) systematic risk would not be able to justify higher leverage in their capital structures. According to Chen (2010), there are two types of systematic shocks that a firm faces in an economy: (1) random small shocks that follows Brownian motion which affect the cash flows(e.g., foreign exchange risk, inflation risk) and (2) large shocks or Jump risk that change the conditional moments of growth rates of the economy (e.g., factors which change the state of the economy). If a firm has low default probability and if its cash flows are highly sensitive to either or both form of the risk then investors ask for higher risk premium. Moreover, firm's cash flows as well as expected tax shield due to debt in their capital structure are discounted by higher risk adjusted discount rate. This makes leverage less attractive for these firms. It is documented by Sinha and Agnihotri (2015) that foreign exchange risk negatively affects the target debt to asset ratio of the firms. However, managers of the firms are indifferent to foreign exchange exposure while taking decision to issue or retire debt.

From Table 3 panel 1, it is inferred that interest rate risk negatively affects propensity of debt issuance decision of the firms. Hence, *Hypothesis 3* is accepted. None of the risk factor affects the debt retirement decision of the firms. In case of control variables, size is negatively associated with the propensity of debt issuance to no action decision (see Appendix Table A). This means firms that are big in size use less amount of debt to finance its investments needs. Rather, they prefer equity financing. Tangibility is positively associated with debt issuance decision meaning firms that have high tangible assets, use assets as collateral and fulfill its financing needs through issuance of debt.

Investment in research and development (innovation) and market-to-book ratio are not significantly affecting the debt issuance decision. However, liquidity, profitability, and share price effect negatively affects the propensity of debt issuance decision, as documented by Titman and Wessels (1988) and Rajan and Zingales (1995) which is consistent with the pecking order model. They also found that large, liquid, and profitable

firms use debt conservatively. Negative relation between debt issuance and share price effect shows that firms which have high share price issue less debt to finance its assets. However, share price effect does not affect debt retirement decision of the firms. Liquidity negatively affects debt retirement decision. This means a firm which maintains high liquidity is reluctant to both debt issuance and retirement. Interest rate risk positively affects debt retirement decision such as the firms which are exposed to interest rate risk retire debt to mitigate its exposure. Profitability positively affects debt retirement decision. Tangibility positively affects debt retirement decision. This means firms that have high tangible assets are active in both debt issuance and retirement.

Effect of risk on firm's debt to equity choice

In order to study the propensity to issue debt in comparison to equity, logit model was used in the study. In Table 4, issuance of debt is coded as 1 and issuance of equity is coded as 0. Foreign exchange risk, idiosyncratic, risk and profitability negatively affect the propensity of issuance of debt to issuance of equity. This means a firm that is highly exposed to foreign exchange risk prefer equity financing as compared to debt financing. Hence, *Hypothesis 6* is rejected. Therefore, a firm facing high idiosyncratic risk prefers financing through equity capital as compared to debt. This preference of firms to issue equity as compared to debt can be a result of bringing down their leverage ratio instead of paying down debt as high leverage ratio exposes them to risk. This result supports the view that risky firms are more likely to finance their capital needs via new equity issues rather than by new debt issues to avoid the high-risk premium to avoid fixed obligation and to limit the likelihood of bankruptcy.

Table 4. Issue debt to issue equity

	Issue debt to issue equity	
	ISSUE DEBT to equity	RETIRE DEBT to equity
Variable	Coefficients	Coefficients
Size	-0.08[0.06]	0.27[0.25]
Innovation	-6.08[0.5]	0.02[0.546]
Tangible assets	2.15[0.58]***	-3.12[1.68]
PB	0.02[0.01]	-0.07[0.059]
Foreign exchange risk	-1.13[2.25]**	0.882[0.40]
Idiosyncratic risk	-3.16[0.76]***	1.43[0.86]**
Profitability	-9.70[0.90]***	0.65[0.97]**
Macroeconomic condition	-0.04[0.05]	-0.12[0.16]
SPE	0.40[0.63]	-2.95[0.5]
Liquidity	-1.4[0.97]	-3.01[.53]
Intercept	3.59[0.76]***	3.22[2.65]**
Interest rate risk	0.461[0.47]	-2.28[1.17]
McFadden R^2	0.22	0.18
LR(test statistic)	59.94***	18.82**

- SV represents volatility estimation by stochastic volatility.
- GARCH represents volatility estimation by GARCH(1,1) method.
- COV represents firm specific estimation by coefficient of variance of EBIT.

Risky firms are likely to reduce the use of debt in their capital structure and thus their target leverage ratio declines. Alternatively, given that the probability of default increases with firm-level risk, it is likely that banks and other lending institutes may hesitate to lend risky firms. Therefore, firms with high business risk would not be able to raise sufficient external funds, and they may have to use either internally generated funds or issue equity, which, in both cases, would result in a decline in target leverage. Another rationale for this inverse relationship between leverage and firm-specific risk is that high firm-specific risk and the vulnerability of expected cash flows, make firms uncertain to fully harvest the tax-shield benefits associated with interest payments and, thereby increasing the expected costs of bankruptcy. Thus, risky firms are likely to reduce the level of debt in their capital structure. Collectively, one could consider these findings as being in line with the TS-BC hypothesis, which states that given positive costs of bankruptcy, risky firms tend to reduce

the level of debt in their capital structure. Tangibility of asset positively affects the propensity of issuance of debt to issuance of equity.

CONCLUSION

This paper investigates the impact of foreign exchange, interest rate (caused by small Brownian shocks), and firm specific risk on debt issuance and retirement decision. It also studies debt to equity issuance and retirement choice of India's non-financial firms. Time period considered for the current study is from 2005 to 2014.

It is observed that interest rate risk negatively affects the propensity of the debt issuance decision of the firms but foreign exchange risk does not affect debt issuance decision. Interest rate risk positively affects debt retirement decision such as firms which are exposed to interest rate risk retire debt to mitigate its exposure. Firm- specific risk negatively affects the propensity of debt issuance. Macroeconomic condition positively affects debt issuance decision of the firms. Good macroeconomic conditions increase propensity of issuing debt. Hence, it is inferred that macroeconomic conditions play an important role in debt issuance decision of a firm.

In case of control variables, size negatively affects the propensity of debt issuance. That means, firms that are big in size use less amount of debt to finance its investments needs. Tangibility positively affects debt issuance decision that means firms that have high tangible assets use assets as collateral and fulfill its financing needs through issuance of debt. Liquidity, profitability, and share price effect negatively affect the propensity of debt issuance decision. Liquidity negatively affects debt retirement decision. That means, a firm which maintains high liquidity is reluctant to both debt issuance and retirement. Profitability positively affects debt retirement decision. Tangibility positively affects debt retirement decision. That means, firms that have high tangible assets are active in both debt issuance and retirement decisions.

Foreign exchange risk, idiosyncratic risk, and profitability negatively affect propensity of issuance of debt to issuance of equity. This result supports the view that risky firms are more likely to finance their capital needs via new equity issues rather than by new debt issues to avoid the high-risk premium, to avoid fixed obligation, and to limit the likelihood of bankruptcy. However, the coefficient of firm-specific risk has a positive sign in debt versus equity repurchase regression. This suggests that firms' propensity to retire debt relative to repurchase existing equity is higher when firm-specific risk is high. Tangibility of asset positively affects the propensity of issuance of debt to issuance of equity..

While deciding the leverage decision, managers should look at the Brownian risk components like foreign exchange exposure of firms also since increased integration of the world financial markets and financing options are available to firms. They should look at correlation of firm's cash flow to foreign exchange exposure and interest rate risk exposure while deciding their leverage decision. Foreign exchange and interest rate risk directly affects the cash flows of the firms and its variability. This study will be useful to practicing managers in designing their capital structure strategy in accordance with economic environment exposure and correlation of the firm's cash flows to foreign exchange risk, interest rate risk and overall macroeconomic environment. This study can be useful in precise downside risk assessment, where various Brownian risk factors should be added while calculating downside risk and hence deciding capital structure on the basis of risk exposure of the firms.

REFERENCES

Adler, M. and B. Dumas. 1984. Exposure to currency risk: Definition and measurement. *Financial Management* 13 (2): 41-50.

Almeida, H., M. Campello, and M. S. Weisbach. 2004. The cash flow sensitivity of cash. *Journal of Finance* 59 (4): 1777-1804.

Antoniou, A., Y. Guney, and K. Paudyal. 2008. The determinants of capital structure: Capital market-oriented versus bank-oriented institutions. *Journal of financial and quantitative analysis* 43 (1): 59-92.

Baker, M. and J. Wurgler. 2002. Market timing and capital structure. *Journal of Finance* 57 (1): 1-32.

Baum, C. F., M. Caglayan, A. Stephan, and O. Talavera 2008. Uncertainty determinants of corporate liquidity. *Economic Modelling* 25 (5): 833-849.

Baum, C. F., A. Stephan, and O. Talavera 2009. The effects of uncertainty on the leverage of nonfinancial firms. *Economic Inquiry* 47 (2): 216–225.

Bayless, M. and S. Chaplinsky 1991. Expectations of security type and the information content of debt and equity offers. *Journal of Financial Intermediation* 1 (3): 195-214.

Bodnar, G. M. and R. C. Marston. 2002. Exchange rate exposure: A simple model. *International Finance Review* 3: 107-116.

Chadha, S. and A. K Sharma. 2015. Determinants of capital structure: An empirical evaluation from India. *Journal of Advances in Management Research* 12 (1): 3-14.

Chen, H. 2010. Macroeconomic conditions and the puzzles of credit spreads and capital structure. *Journal of Finance* 65 (6): 2171-2212.

Choe, H., R. W. Masulis, and V. Nanda. 1993. Common stock offerings across the business cycle: Theory and evidence. *Journal of Empirical finance* 1 (1): 3-31.

Cook, D. O. and T. Tang. 2001. Macroeconomic conditions and capital structure adjustment speed. *Journal of Corporate Finance* 16 (1): 73-87.

Estrella, A. and F. S Mishkin. 1998. Predicting US recessions: Financial variables as leading indicators. *Review of Economics and Statistics* 80 (1): 45-61.

Flannery, M. J. and K. P. Rangan 2006. Partial adjustment toward target capital structures. *Journal of Financial Economics* 79 (3): 469-506.

Flood, E. J. and D. R Lessard. 1986. On the measurement of operating exposure to exchange rates:A conceptual approach. *Financial Management* 15 (1): 25-36.

Hackbarth, D. J. Miao, and E. Morellec. 2006. Capital structure, credit risk, and macroeconomic conditions. *Journal of Financial Economics* 82 (3): 519-550.

Hennessy, C. A., A. Levy, and T. M. Whited. 2007. Testing Q theory with financing frictions. *Journal of Financial Economics* 83 (3): 691-717.

Hatzinikolaou, D., G. M. Katsimbris, and A. G. Noulas. 2002. Inflation uncertainty and capital structure: Evidence from a pooled sample of the Dow-Jones industrial firms. *International Review of Economics and Finance* 11 (1): 45-55.

Hodder, J. E. 1982. Exposure to exchange-rate movements. *Journal of International Economics* 13 (3): 375-386.

Hovakimian, A., T. Opler, and S. Titman 2001. The debt-equity choice. *Journal of Financial and Quantitative analysis* 36 (1): 1-24.

Huang, R. and J. R. Ritter. 2005. Testing the market timing theory of capital structure. *Journal of Financial and Quantitative Analysis* 1: 221-246.

Jung, K. Y., C. Kim, and R. Stulz. 1996. Timing, investment opportunities, managerial discretion, and the security issue decision. *Journal of Financial Economics* 42 (2): 59-186.

Korajczyk, R. A. and A. Levy. 2003. Capital structure choice: macroeconomic conditions and financial constraints. *Journal of financial economics* 68 (1): 75-109.

Leary, M. T. and M. R. Roberts. 2005. Do firms rebalance their capital structures? *Journal of Finance* 60 (6): 2575-2619.

Lemmon, M. L., M. R. Roberts., and J. F. Zender. 2008. Back to the beginning: persistence and the cross-section of corporate capital structure. *Journal of Finance* 63 (4): 1575-1608.

Levy, A. and C. Hennessy. 2007. Why does capital structure choice vary with macroeconomic conditions? *Journal of Monetary Economics* 54 (6): 1545-1564.

Loof, H. 2004. Dynamic optimal capital structure and technical change. *Structural Change and Economic Dynamics* 15 (4): 449-468.

Masulis, R. W. and A. N. Korwar. 1986. Seasoned equity offerings: An empirical investigation. *Journal of financial economics* 15 (1): 91-118.

McFadden, D. 1974. Conditional logit analysis of qualitative choice behaviour. In P. Zarembka, editor, *Frontiers in econometrics*. New York: Academic Press (105-142).

Mukherjee, S. and J. Mahakud. 2012. Impact of Macroeconomic Condition on Financial Leverage; Evidence from Indian Firms. *Journal of Management Research* 12 (3): 128-140.

Pandey, I. M. 2001. Capital structure and the firm characteristics: Evidence from an emerging market. *IIMA Working Paper No. 2001-10-04* .

Rajan, R. G. and L. Zingales. 1995. What do we know about capital structure? Some evidence from international data. *Journal of Finance* 50 (5): 1421-1460.

Rashid, A. 2011. How does private firms' investment respond to uncertainty? Some evidence from the United Kingdom. *Journal of Risk Finance* 12 (4): 339-347.

Shapiro, A. C. 1975. Exchange rate changes, inflation, and the value of the multinational corporation. *Journal of Finance* 30 (2): 485-502.

Sinha, P. and S. Agnihotri. 2015. Macroeconomic risk and firms financing decision: An empirical panel data investigation using system GMM. *MPRA Paper 67088,* University Library of Munich, Germany.

Smith, C. W. and R. M. Stulz 1985. The determinants of firms' hedging policies. *Journal of Financial and Quantitative Analysis* 20 (4): 391-405.

Stock, J. H. and M. W. Watson. 1989. New indexes of coincident and leading economic indicators. *NBER Macroeconomics Annual* 4: 351-409.

Titman, S. and R. Wessels. 1988. The determinants of capital structure choice. *Journal of Finance* 43 (1): 1-19.

Welch, I. 2004. Capital structure and stock returns. *Journal of Political Economy* 112 (1): 106-132.

APPENDIX

Table A. Table explaining the expected signs of the variables and actual sign

Variable	Expected Sign	Actual Sign	Variable	Expected Sign	Actual Sign
Size	+/-	-	Interest rate risk	-	-
Innovation	-	-	Profitability	+/-	-
Tangible assets	+	+	Macroeconomic condition	+	+
PB	-	-	SPE	-	-
Foreign exchange risk	- or no effect	-	Liquidity	+	-
Idiosyncratic risk	+/-	-			