CHAPTER IV: THE RESEARCH STUDY

Chapter 411: Research Study- Macro Level

411.1 The objectives: What is to be studied

The study

- To investigate the change if any in the level of few key interest rates
- To investigate the existence, if any, of volatility of the above interest rates; and
- To investigate the financial integration among these interest rates

The study is focused on interest rates and the term structure of interest rates. Specifically, the study investigates short term interest rates in money markets and term structure of interest rates of GOI bonds.

411.2 Research Approach: How the stated objectives are to be achieved

The study is primarily interested in examining the balance sheet effect of financial liberalization. As the macro variables such as interest rates directly affect corporate balance sheets the study

411.3 Limitations

The scope of the study is limited to examining integration in domestic financial markets. The study does not investigate the financial integration of domestic and international financial markets via interest rates.

411.4 Rationale for the Study
Chapter 4.12. Hypotheses

Hypothesis No.: 1

H01: Financial liberalization has not reduced the overall levels of interest rates across the entire spectrum of interest rate structures including the term structure of interest rates.

H11: Financial liberalization has reduced the overall levels of interest rates across the entire spectrum of interest rate structures including the term structure of interest rates.

Hypothesis No.: 2

H02: Financial liberalization has not raised volatility of interest rates across the entire spectrum of interest rate structures including the term structure of interest rates.

H12: Financial liberalization has raised volatility of interest rates across the entire spectrum of interest rate structures including the term structure of interest rates.

Hypothesis No.: 3

Ho3: Financial liberalization has not led to greater integration among interest rates.

H13: Financial liberalization has led to greater integration among interest rates.

81 Usually the hypothesis that is supported (prediction) is called the alternative hypothesis and the hypothesis that describes the remaining possible outcomes is the null hypothesis. http://www.socialresearchmethods.net/kb/hypothes.php
Chapter 421: Research Study-Micro Level

421.1 Research Study Objectives: What is to be studied

As per stylized facts and various anecdotal evidences, financial liberalization has transformed Indian firms, such as giving rise to Indian multinationals. Also some empirical research (Patnaik and Shah 2010) and the analysis by this study of aggregate finances of 2237 non finance non government companies (“NFGCs”) point out that global financial crisis of FY 2008-9 did affect Indian firms.

In view of the above, the study sets up the following objectives

Research Objective

(3) To investigate the long term effect of financial liberalization on firms’ balance sheets; (More particularly on debt maturity structure of firms); and

(4) To investigate the effect of global financial crisis on firms’ balance sheets (More particularly on debt maturity structure of firms)

The study investigates how exogenous (to the firms) events (such as financial crisis), economic environment (financial liberalization) and macroeconomic financial variables (interest rate and the term structure of interest rates) affect the relationship between these macro financial (interest rate, etc.) variables and the real variables (output/growth, income and employment) in the real sector. Since the study is in the realm of corporate finance, the study takes corporate sector as a proxy.
421.2 Research Approach: How the stated objectives are to be accomplished

421.2.1 Corporate Sector - A proxy for the Real Sector

There are 3 major constituents of real sector namely, government, households and firms. Since the study is in the field of corporate finance, firms i.e. companies are used as a proxy of the real sector for the following reasons. In India corporate sector is increasingly becoming more important as shown below.

**Corporate Sector - Gross Domestic Savings**

The private sector which contributed negligible to India’s gross domestic savings in FY 2000 has emerged as a significant contributor, as can be seen from chart 42.1 below.

The above chart shows that after households, corporate sector is the largest contributor to the gross domestic savings.

**Corporate Sector - Gross Capital Formation**
The role of private corporate sector in gross capital formation has grown over as can be observed from the following chart 42.2.

As can be seen from the above chart, since FY 2006 private corporate sector has overtaken as the single largest contributor of gross capital formation.

**Corporate Sector-Profits as a Percentage of Gross Domestic Product ("GDP")**

Also the corporate profits have been growing if measured as a percentage of GDP as can be seen below.
The chart above shows that the corporate profits have grown as a percentage of GDP all these years, except in FY 2000, FY 2006 and FY 2009 due to down turn. However, the trends line is upward sloping over the period.

**Listed Companies**

The choice of publicly listed firms is determined exclusively by the availability of accounting data. The data of listed companies are easily available.

**Non Financial Companies**

Additionally, the study concentrates on the non-financial sector of the economy, as it is here that investment and financing decisions are ultimately carried out. Financial companies i.e. intermediaries such as banks, non banking financial companies (“NBFCs”) are providers of capital to non financial companies. Further financial
companies are subject to capital adequacy and other norms by regulatory agencies making their capital and debt maturity structure not comparable to non finance companies.

**Non Government Companies**

Also the study excludes non government companies as their corporate governance and financing are different from those of private corporate sector. For instance, Indian Oil Ltd.\(^{82}\) has different finances due to huge oil subsidies.

**421.2.2 Long Term Effect of Financial Liberalization-captured in Time**

The study constructs long time series, covering the 10 years from FY 2001 to FY 2010, to be able to include periods characterized by financial constraints (caused by contagion effect of global financial crisis) and financial liberalization. Since the extent of financial liberalization changes from the year to year and considering that financial liberalization is greater in FY 2010 than\(^{83}\) say, in FY 2001, it is expected that the long term variable will capture the effect of financial liberalization.

**421.2.3 Investigation into the Effects of Global Financial Crisis**

The approach of the study also differs as far as investigation into the effect of global financial crisis is concerned. It has two-prong approaches. First, the panel data set

\(^{82}\) As on March 31, 2011, IOL had subsidy/grant of about Rs.23000 crores from the government besides having Oil Marketing Companies Government of India Special Bonds (Source: Annual Report of IOL for FY 2010-11). Besides government companies are used as a front for overseas sovereign borrowings as the Government of India does not borrow from capital markets through issue of sovereign bonds like many other countries (such as Greece).

\(^{83}\) For instance, the Government increased the current limit of FII investment in Government Securities by US $ 5 billion. The incremental limit shall be invested in securities with residual maturity of over five years. Further current limit of FII investment in corporate bonds is also increased by US $ 5 billion. http://www.sebi.gov.in/cms/sebi_data/attachdocs/1293785187375.pdf
collected for 10 year period is used to generate three cross section data bases (one for each of the three years) to carry out cross section studies for each of the three years. This is in line with the approach used for examining the effect of financial crisis by “before”, “during” and “after” by Deesomsak, Paudyal, and Pescetto (2009) who use this approach while investigating effect of the 1997 Asian financial crisis on firms in five (5) Asian countries (Australia, Malaysia, Singapore, Thailand).

Secondly, the panel data set is divided into three panel data sets, each one terminating in the year before the crisis (i.e. 2001 to 2008), during (i.e. 2001-2009) the crisis and after (2001-10) the crisis. It is expected that this innovative approach will serve as a cross check for cross section study and enhance the robustness of results.

421.3 The Scope of the Study

The research objectives are to investigate the effect of financial liberalization and contagion effect of the global financial crisis of FY 2009 on corporate balance sheets.

The corporate balance sheets have various variables. The study selects debt maturity structure as a dependent variable. Hence the study examines the effect that financial liberalization as well as the global financial crisis on debt maturity structure.

The study’s scope is (i) Hypotheses Testing; and (ii) Model Testing

421.3.1 Hypotheses Testing

In line with the objectives, the study has two hypotheses as follows.

85 These are non directional hypotheses
Hypothesis No.1

H10: The financial liberalization has not altered the debt maturity structure of firms. (There is no difference in DMS during the period under the review.)

H11: The financial liberalization has altered the debt maturity structure of firms. (There is difference in DMS during the period under the review.)

Hypothesis No.2

H20: The Global Financial crisis has not altered debt maturity structure of firms. (There is no difference in DMS before, during and after the global financial crisis.)

H21: The Global Financial crisis has altered debt maturity structure of firms. (There is difference in DMS before, during and after the global financial crisis.)

421.3.2 Model Testing

Besides the hypotheses testing, the study also carries out model/s testing. As discussed in Chapter 31, there are many variables i.e. the determinants that determine debt maturity structure of a firm. The study proposes to test some of propositions set out in theories earlier. The details are discussed in chapter 422.

Hypothesis No.1

86 Usually the hypothesis that is supported (prediction) is called the alternative hypothesis and the hypothesis that describes the remaining possible outcomes is the null hypothesis. http://www.socialresearchmethods.net/kb/hypothes.php
**H10:** The financial liberalization has *not altered* the relationship between the determinants (of debt maturity structure maturity structure) and the debt maturity structure of firms. (The predicted signs have not changed during the period under the review.)

**H11:** The financial liberalization has *altered* the debt maturity structure of firms. (The predicted signs have changed during the period under the review.)

**Hypothesis No.2**

H20: The Global Financial crisis *has not altered* the relationship between the determinants (of debt maturity structure of firms) and debt maturity structure of firms. (There is no difference in the predicted signs before, during and after the global financial crisis.)

H21: The Global Financial crisis *has altered* debt maturity structure of firms. (There is difference in the predicted signs before, during and after the global financial crisis.)

**421.4 Rational for the Study**

In India, while equity capital markets are well developed, debt markets especially for corporate debt do not have adequate depth and breadth. Though financial liberalization has facilitated firms’ access to overseas debt markets, many firms may not be eligible or due to their own characteristics thereby leaving little choice in their debt maturity choice.

Indian firms’ choice of debt maturity is more limited than those in developed countries for variety of reasons. Firstly, Indian firms depend mainly on banks for their
credit requirement. Secondly, India’s debt markets especially corporate bond markets are not as deep and wide as in the USA where these theories of debt maturity have been developed and tested. Thirdly, many Indian firms have access to international debt markets due to financial liberalization. However, not all firms can actually raise funds from overseas owning to their own firm characteristics. Finally, Indian firms do not have access to long term funds as the Indian capital markets do not have developed sources (such as pension funds) for long term funds.

421.5 Difference: This Study and the previous empirical research

This study differs from the earlier empirical studies in the following respects:

1. It covers a longer period of 10 years over FY 2000 to FY 2010 and therefore covers at least three cycles viz. 2001-2, FY 2005-6 and 2008-9 (global financial crisis caused by subprime crisis in the USA) when corporate sector experienced trough.

2. In view of the globalization and liberalization (such as outward FDI), the study has additional viz. contemporary firm characteristics which capture newer facets of firms.

3. Apart from the firm characteristics, the study examines the effect of macro-economic variables – this is the first in the area of empirical research on the debt maturity structure of firms in India.

4. The study examines the effect of global financial crisis (“GFC”) that occurred during the period under review. No empirical study in India has examined the effect of GFC on debt of firms.
Chapter 422: Hypotheses and Explanatory Variables- Micro–Firm Level Study

The research objectives are to investigate the effect of financial liberalization and contagion effect of the global financial crisis on corporate balance sheets.

The corporate balance sheets have various variables. The study selects debt maturity structure as a dependent variable. Hence the study examines the effect that financial liberalization as well as the global financial crisis on debt maturity structure.

The study’s scope is

(a) Hypotheses Testing; and

(b) Model Testing

Besides the hypotheses testing, the study also carries out model/s testing. There are many models that determine debt maturity structure of a firm. The study proposes to test some of these models.

The dependent variable is debt maturity structure. The study empirically tests propositions derived from tax, risk management, asymmetric /signaling and agency cost theories. The explanatory variables are various attributes/characteristics of firms.

Based on its underlying theory, the testable propositions (relationship between dependent variable and explanatory variable) state the direction (positive or negative) between the dependent variable debt maturity structure and an independent i.e. explanatory variable.

These propositions are organized according to the four arguments used in the theory section earlier.
The theories have remained static while the real world being dynamic has changed significantly since then. For instance, international capital flows have become more pronounced. Most developing economies have liberalized to permit international capital flows. Further, trade liberalization has been followed by financial liberalization leading to firms becoming more globally integrated. Hence firms operating in the globalized world are different than those envisaged by the theories of debt maturity structure. The study classifies these under contemporary firm characteristics. These are discussed in a separate section below. Finally macro economic variables which are investigated in the context of debt maturity structure are discussed separately.

I. The Dependent Variable: Definition and Measurement

Long term and Short term Debt

There is no universal definition of short- or long-term debt. Some studies consider debt as long-term if it is payable after a year (e.g. Scherr and Hulburt, 2001) while others define it as long-term if it is payable after three (Barclay and Smith, 1995) or five years (Schiantarelli and Sembenelli, 1997).

Debt Maturity

Prior studies have used various measures of debt maturity. For instance, Dennis et al. (2000) use duration, Guedes and Opler (1996) use maturity of new issues, and Stohs and Mauer (1996) use weighted average maturity of liabilities as a dependent variable. Scherr and Hulburt (2001) use two maturity specifications (long-term debt payable after one year to total debt; and weighted-average debt maturity) and report only minor sensitivity of the results to the choice of definitions. Antoniou et al (2002) define the long-term debt as the debt maturing in more than one year and the
maturity ratio is defined as long-term debt divided by total debt. Among the Indian empirical studies, Majumdar R. (2010) uses ratio of long-term debt (debt maturing in more than one year) to total debt.

The debt maturity structure is usually depicted as a ratio of long-term debt to total debt. The long-term debt is considered either as a debt maturing over one year or as a debt maturing over longer period (mostly five years). The study uses the ratio of debt maturing over one year to total debt.

There are several reasons for using this form. First, data that differentiates various maturities of the debt are not available in either companies’ financials or data bases such as CMIE Prowess. The only differentiation available is a binary differentiation i.e. an up-to-one-year and over-one-year debt. Second, after\textsuperscript{87} the liberalization the Indian lenders (which are now banks) and other providers of debt funds in India are not very keen to provide debt capital or loans longer than five years maturity. Therefore the differentiation between a below-five-year debt and over-five-year debt is not relevant either. And finally, the corporate finance practitioners pay less attention to particular (3, 5, 7 or 8 year) maturities of long-term debt than to short-term debt vs. long-term debt decision-making.

II. Explanatory Variables: Reasoning and measurement

The explanatory variables can be grouped into three broad categories; (i) firm’s characteristics; (ii) firm with contemporary characteristics; and (iii) macroeconomic factors. The variables in the first category focus on key characteristics of firms, which according to various theories of debt maturity structure influence firms’ maturity choice. The second category of variable comprise more contemporary

\textsuperscript{87} Before liberalization, the all India financial institutions used to provide long term loans of about 7 years at fixed interest rate of 14% per annum.
characteristics such as market power, uniqueness of firms and extent of financial integration with world.

422.1 Traditional Debt Maturity Structure Theories

These theories have evolved from theories of capital structure.

422.1.1 Tax Argument

422.1.1.1 Effective Tax Rate

Kane et al. (1985) indicate that the tax shield advantage is inversely related to debt maturity. In other words, if the effective tax rate is low, then firms prefer to issue long-term debt. Scholes and Wolfson (1992) propose the tax clientele argument to predict the relationship between debt maturity and taxes. It is argued that not all firms can afford (a luxury) to issue long-term debt although transaction costs stemming from rolling-over short-term debt become higher. The authors contend that firms having high marginal tax rates construct a natural clientele of cheap long-term debt (long-term debt yields higher tax shield). They, then, expect a positive relation between debt maturity and marginal tax rates as firms can use the ongoing tax advantages of long-term debt. It is \textit{effective tax rate} (ETR) that is likely to be positively related to debt maturity, because profitable firms have higher taxable income, and thus receive greater tax benefits from long-term debt. Taxability can influence firms’ debt maturity because choosing long-term debt over short-term debt can create a tax timing option to repurchase and re-issue debt.

\textit{Measurement}

88 Harwood and Manzon (1998) show that the firms with high marginal tax rate use more long-term debt than the firms with low marginal tax rate.
Effective Tax Rate (ETR) is defined as the ratio between tax paid and earnings after interest and before taxes (Ozkan, 2000). The study uses tax paid to profit before tax as a measure of effective tax rate.

**TAX1: Debt Maturity is positively related to Effective Tax Rate (“ETR”)**

### 422.1.1.2 Non Debt Tax Shield

Brenan and Schwartz (1978) did pioneering work on optimal capital structure using the contingent claims analysis approach of Black and Scholes (1973), Merton (1974) and Black and Cox (1976). Assuming that the value of an unlevered firm follows a Gauss-Wiener process, they argue that short term debt is optimal as they find that the optimal leverage ratio decreases with maturity of debt. While they allow for both taxes and bankruptcy costs (e.g. tax benefits of debt are lost upon bankruptcy) and assume a constant risk free interest rate per year, they do no firm value comparisons while altering the debt maturity strategy.

DeAngelo and Masulis (1980) draw attention to alternative tax shields such as depreciation, research and development expenses, investment deductions, etc., that could substitute the fiscal role of debt. Sogorb-Mira (2005) investigates the role of non debt tax shield in the debt maturity structure of Spanish SMEs.

**Measurement**

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89 Named after Carl Gauss the normal distribution is sometimes called the Gaussian distribution. A Gaussian process is a stochastic process for which any finite linear combination of samples will be normally distributed (or, any linear function applied to the sample function will give a normally distributed result.)
Non–Debt Tax Shields (NDTS) is measured using the ratio between depreciation and taxes (Titman and Wessels, 1988; Michaelas et al., 1999). It is measured as depreciation divided by earnings before interest and depreciation (EBIT).

*TAX2: Debt Maturity is negatively related to non-debt tax shields (“NDTS”)*

### 422.1.1.3 Profitability

It is expected that Profitability (PROF) is likely to be positively related to debt maturity, because profitable firms have higher taxable income, and thus receive greater tax benefits from long-term debt. Taxability can influence firms’ debt maturity because choosing long-term debt over short-term debt can create a tax timing option to repurchase and re-issue debt.

*Measurement*

Profitability is defined as the quotient between earnings before interest and taxes (EBIT) and assets (Michaelas et al., 1999; Fama and French, 2002). The study uses percentage change in EBIT.

*TAX3: Debt Maturity is positively related to profitability (“PROFITROCHANG”)*

### 422.1.1.4 Term Structure

Brick and Ravid (1985) argue that when term structure of interest rates is upward sloping, long-term debt is optimal since tax gains are accelerated. They, in their 1991 paper Brick and Ravid (19991), further show the optimality of long-term debt even if yield curve is flat or downward sloping assuming interest rates are uncertain. In their model, Brick and Ravid first set leverage and then maturity. However, Lewis (1990) argues that tax (assuming tax is the only market imperfection) has no effect on debt maturity decisions if optimal leverage and debt maturity are simultaneously
determined. In a multi-period model with interest rate uncertainty, Kim et al. (1995) demonstrate that a long-term debt maturity strategy maximizes investor tax-timing option value (repurchasing or reissuing the debt). The analysis, which is empirically supported, predicts that the firm lengthens debt maturity as interest rate volatility increases and as the slope of the term structure increases.\footnote{Stohs and Mauer (1996) find a negative association between the slope of the yield curve and debt maturity. The argued reason being the attempt of firms to avoid term premium in long-term interest rates. Emery (2001) supports this inverse relationship.}

**Measurement**

The standard measure for this variable (TERM) is the difference between the month-end returns on long-term government bond and short-term treasury-bill.

Antoniou et al (2002) measure it as the difference between the month-end yields on long-term (10 years or more) government bond and three-months treasury-bills, with a six month lag, matched to the month of firms’ fiscal year-end. In the context of China, Cai et al. (2008) use short-term and long-term lending rates as above to proxy for the government bond and t-bill rates, respectively. The study uses the difference in the annual yield of 5- year Government of India (“GoI”) Bond and 6-month GoI Treasury Bill.

TAX4: Debt Maturity structure is positively related to the term structure (“TS”).

**422.1.5 Volatility of Interest Rates**

Dammon (1980) examines the optimal leverage decision assuming an incomplete markets framework. In this case, since firms do not have complete supply-side
flexibility (i.e., complete flexibility in altering the portfolio mix of financing to take advantage of price premiums) there will be an optimal financing decision. He finds that there is an optimal bond duration i.e. the optimal life of zero-coupon bonds issued at time (0) that is unrelated to the term structure of interest rates. However, he does not demonstrate, as Brick and Ravid (1985) do, the existence of an optimal debt maturity strategy.\(^91\)

In the context of developing equity value model for financial intermediaries, Sartoris (1993) has shown that the asset and liability decisions are a function of the slope of the yield curve, the existence of a term premium. Baker et al (2002) and Butler et al (2006) indirectly examined the term structure of interest rates and corporate bond issues. Ju and Ou-Yang (2003) who examined how an optimal capital structure and an optimal debt maturity are jointly determined in a stochastic interest rate environment find that the long-run mean of the short-term interest rate process is a key variable in the determination of both the optimal capital structure and the optimal maturity structure. In addition, the volatility of the interest rate process and the correlation between the interest rate process and the firm's asset value process play important roles in the determination of the debt maturity structure. Downing and Wang (2005) study corporate debt values, capital structure, and the term structure of interest rates in a unified framework by employing numerical techniques to compute the firm's optimal capital structure and the value of its long-term risky debt and yield spreads when the value of the firm's unleveraged assets and the instantaneous default-free interest rate are risk factors. Debt and leveraged firm value are thus explicitly linked to properties of the firm's unleveraged assets, the term structure of default-free interest rates, taxes, bankruptcy costs, payout rates, and bond

\(^{91}\) That is, are the (tax) benefits of a t-period long term debt equivalent to the benefits of short-term debt whose principal is rolled over until period t?
covenants. The results clarify the relationship between a firm’s capital structure and movements in the term structure and other important aspects of the capital structure decision. Greenwood et al (2010) claim that time variation in the maturity of corporate debt arises because firms behave as macro liquidity providers, absorbing the supply shocks associated with changes in the maturity structure of government debt and find evidence that when the government funds itself with more short-term debt, firms fill the resulting gap by issuing more long-term debt, and vice-versa

**Measurement**

Antoniou et al (2002) measure it as standard deviation of monthly government bond yield over the previous year, matched with the month of firms’ fiscal year-end. Cai et al (2008) measure short-term interest volatility (IRV-S) by taking the standard deviation of monthly short-term [0–6 months] lending rates over the previous year, and long-term interest volatility (IRV-L) by taking the standard deviation of long-term [5 years and longer] lending rates over the previous year. The study uses volatility of difference in annual yields of commercial papers.

*TAX5: The expected relation between IRV-L and DMS is positive.*

**422.1.2. Risk Management Argument**

Risk management policies aim at reducing the riskiness of firms. According to Morris (1976) firms essentially choose between two risk management policies; either a —short policy where the principle of maturity matching is violated by using shorter debt maturities, or a —long policy where debt maturities are longer and matched to the maturities of assets. The rationale behind a long policy is to avoid inefficient liquidation associated with frequent refinancing (liquidation risk). The rational for the short policy is to benefit from less costly short term financing, while still maintaining a
natural hedge when the covariance between net operating income and future interest rates is positive. The latter cause both net income and cost of equity being less variable, thus increasing the value of the firm. The riskiness of firms is proxied by earnings volatility.

422.1.2.1 Earnings Volatility

However, the issue of risk management is not only of concern to managers, but equally important to creditors. Subsequently, the risk management policy implemented will be influenced by the negotiating power of the firm and creditors, respectively. As negotiating power is difficult to proxy, two opposing hypotheses are formulated and meant to capture both the eventuality that the discretion of debt maturity choices lay with the creditors (supply-side driven) and the firms (demand-side driven).

Measurement

Various researchers have used different measures. The study uses EBIT percentage changes over the previous year divided by total assets as a measure.

RM 1: Debt maturity is negatively related to earnings volatility (EV)

[The higher the earning volatility, the lesser will be proportion of long term borrowings]

422.1.2.3 Asset Structure

Measurement

Asset Structure (AS) is measured as the quotient between tangible assets (fixed assets and inventories) and assets (Michaelas et al., 1999; Bevan and Danbolt, 2000a,b). The study uses total gross fixed assets by depreciation.
RM 3: Firms try to match the maturities of assets and liabilities

[Debt maturity is positively related to asset structure (AS)]

422.1.2.4 Profitability

Since risk is mitigated if there is adequate debt servicing capacity. Debt servicing capacity is measured as profit before interest, depreciation & amortization and tax (“PBITDA” or “EBITADA”) divided by interest and repayment of borrowings. Higher is this ratio higher will be the capacity to service debt. It is expected that DMS will have negative relationship with DSC. Firms with higher DSCR will tend to issue more short term debt than long term debt, as these firms have capacity to service debt.

Measurement

Profitability is defined as the quotient between earnings before interest and taxes (EBIT) and assets (Michaelas et al., 1999; Fama and French, 2002). The study uses ratio of debt service coverage.

RM 4: Debt maturity is negatively related to debt servicing capacity (DSC)

[The firm with higher debt service ratio will have more of short term debt]

422.1.3 Signaling and Liquidity Argument

The predictions derived from the models of Flannery (1986) and Diamond (1991) implies a non-monotonic relation between firm quality and debt maturity. The literature also provides ample empirical support for these predictions. In line with the models and empirical findings the following hypotheses are formulated.
422.1.3.1 Liquidity

It is expected that DMS is directly related to LIQUID (ability to meet short-term liabilities) and FA/TA (proportion of illiquid assets); and inversely linked to CA/TA (proportion of liquid assets).

Measurement

Cai et al. (2009) measure liquidity (LIQUID) by current assets to current liabilities ratio. The study uses current ratio (current assets/current liabilities) to measure liquidity.

LIQ 1: Debt Maturity is negatively related to current ratio.

[The higher the current ratio, the larger will be the long term borrowings]

422.1.3.2 Leverage

DMS may be positively related to LEVER as the literature presents conflicting arguments.

Measurement

Cai et al. (2009) measure leverage by the ratio of the book value of total debt divided by the book value of total assets. The study uses total borrowings divided by total borrowings plus net-worth, as a measure of leverage.

SIG 2: Debt Maturity is positively related to leverage

[The higher the leverage, more will be the long term borrowings]
422.1.3.3 Firm Quality

Kane et al. (1985) show, using an option valuation model, that the volatility of asset returns is inversely related to debt maturity. Sarkar (1999) finds a negative relation between risk and debt maturity. He argues that high volatility in earnings increases the probability of financial distress, which leads to high bankruptcy risk. In order to avoid this risk, firms tend to issue short-term debt

**Measurement**

Various researchers use different yardsticks to measure firm quality. It also included credit rating. The study does not propose to test this proposition.

*SIG 3: Debt maturity is negatively related to high firm quality (HQ)*

*[The higher the firm quality, less will be the long term borrowings]*

422.1.3.4 Relationship between Firms and Lenders-Firm Age

A lot of literature has dealt with the relationship between creditors and borrowers. Diamond and Rajan (2000) and Rajan and Zingales (1998) has Information asymmetries between firms and creditors are expected to decreases with the passage of time. Hence, it is expected that debt maturity is positively related to the duration of creditor relations, proxied by firm age.

**Measurement**

The study uses the difference between the current year and the year of incorporation as the age of the firm.

*SIG 4: Debt maturity is positively related to firm age*

*[The older the firm, more will be the long term borrowings]*
422.1.3.5 Share Price Performance

Guedes and Opler (1996) test adverse selection models of maturity choice using past stock returns as a predictor of debt maturity. Lucas and McDonald (1990) argue that firms will usually wait to issue securities if they expect an increase in their share price because of good news, but will not wait until bad news is released. Consequently, one would usually expect a stock price run up prior to the issue of an informationally disadvantaged security like equity or long-term debt. Antoniou et al. (2006) link the positive relationship between share price performance (SPP) and debt maturity structure to the signaling power of debt. For instance, when managers perceive that a drop in share price fails to reflect the ‘true’ (but unknown) value of the firm, they have a motivation to send a credible signal to the market. This signaling can be achieved by issuing short-term debt. The underlying assumption is that lenders, when lending short term funds, are likely to closely monitor and frequently assessed managers. Similarly, firms with favorable information tend to avoid long-term debt and issue short-term debt instead, because they hope to negotiate more favorable terms later.

Measurement

The study uses the year end price differential as measure of market price performance.

SIG 5: Debt maturity is positively related to Share Price Performance (SPP)

[Firms with higher share price performance tend to borrow more long term funds]
422.1.4. Agency costs argument

Agency problems are inherently difficult to measure directly, and hence a more indirect approach is necessary. Agency problems related to the use of debt will occur in situations where asset substitution, under and overinvestment problems are more likely. If debt maturity is used to remedy these agency problems, shorter maturities are expected to coincide with these situations.

422.1.4.1. Monitoring costs and Firm Size

Large firms generally attract more attention in the societies they operate, and at the same time these firms hold scale benefits in producing and communication information to the public. Based on these assumptions, monitoring is expected to be easier as firms grow and subsequently to reduce the costs of monitoring. As a result, the potential for agency conflicts is reduced, implying that shorter debt maturities not used to resolve age

Warner (1977) finds that the ratio of bankruptcy costs to firm value tends to decrease as the firm size increases. Titman and Wessel (1988) suggest that small firms tend to be financed by short-term debt because they may face high transaction costs when they issue long-term debt or equity.

Measurement

Cai et al.(2008) measure a firm’s size (SIZE) by the natural logarithm of its total sales in 1999 prices. The study uses log of firm total assets.

AC 1: Debt maturity is positively related to firm size (FS)

[Larger the firm, more is the long term debt]
422.1.4.2 Monitoring and Asset Structure

Managers of firms with a high portion of fixed assets generally have less flexibility with respect to investment decisions, compared to managers of firms with higher portions of current or intangible assets. Subsequently, monitoring of firms with a high fixed to total assets ratio should be easier and less costly, again leading to less reliance on short term dept to mitigate potential agency problems.

*Measurement*

Again the study does not propose to test this proposition.

*AC 2: Debt maturity is positively related to asset structure (AS)*

*[Higher is the proportion of fixed assets in total assets, more is the long term debt]*

422.1.4.3 Asset Substitution and Asset Maturity

The potential problem of asset substitution increases with decreasing asset duration, as managerial investments discretion increases. Increased possibility for such wealth transfer implies increased monitoring costs for creditors. If short term debt were used to mitigate this potential agency problem, one would expect to observe a negative relation between a firms average asset life and debt maturity.

*Measurement*

The asset life is measured as gross fixed assets divided by depreciation.

*AC 3: Debt maturity is negatively related to average asset life (AL)*

*[Longer is the asset life, larger will be long term debt]*
422.1.4.4 Underinvestment and Growth Opportunities

Several studies identify relations between debt maturity structure and a firm’s growth opportunities. Along with growth opportunities follows numerous future investment decisions for managers of such firms, increasing the potential for underinvestment problems.

In the underinvestment theory, if growth opportunities are high, a firm should use more short-term debt. In the overinvestment theory, long-term debt can help to control the overinvestment behavior of management, which means the sign of GROW should be positive.

In view of the above, it is expected that debt maturity is inversely related to the growth.

Measurement

Cai et al. (2008) use the book value of total assets plus the market value of equity minus the book value of equity, scaled by the book value of total assets. The study uses growth in total assets over the previous year. The study uses growth in total assets, as the measure.

AC 4: Debt maturity is negatively related to growth opportunity (GO)

[Firms with high growth opportunities borrow on short term]

422.1.4.5 Financial Distress and Firm Quality

The probability of financial distress intensifies the agency problems between owners and creditors (A3). Risky firms have a higher probability of financial distress and consequently, firms with volatile earnings should experience more severe A3 problems. If short term debt is employed to mitigate these problems one would
expect to observe a negative relation between debt maturity and volatility in earnings before interests and taxes.  

**Measurement**

Volatility has been measured differently by various researchers. The study uses volatility in EBIT.  

*AC 5: Debt maturity is negatively related to volatility in earnings (EV)*  

*[More volatile are the earnings, more will be the short term borrowings]*

422.1.4.6 Ownership structure  

The free riding problem occurs in situations where no owner holds a sufficiently large share of the firm, which would allow them to capture enough of the benefits, following an intervention, to offset the costs of such. Low ownership concentration may therefore lead to a lack of monitoring incentives among owners. An approach to remedy this incentive problem is to ensure short term financing and thus shift the monitoring costs to the creditors through frequent renegotiations and refinancing. Firms exhibiting very low ownership concentration are expected to have debt with shorter maturities. On the back of these arguments the following hypothesis is proposed.  

**Measurement**

The study uses the extent of ownership by foreign corporate as MNC-F, to measure the owners’ control.  

*AC 6: Debt maturity is negatively related to ownership concentration (OC)*  

*[Larger is the owners’ shareholding, smaller will be the long term borrowing]*
422.1.4.7 Managerial ownership

Managerial ownership: With low managerial ownership, the owners will seek to control the discretion of managers through the use of shorter maturities. As managerial ownership increases, the more power the manager exerts on the maturity decision, and in line with their inherent preference for less monitoring, managers seek to increase the maturities to ensure the —quiet life. However as managerial ownership further increases, the more aligned the interest of managers and owners becomes, leading to a less severe A1 problem. With the A1 problem minimized the owners seek to reduce the costly A3 problem by maintaining shorter maturities. In total this indicates a concave relation between debt maturity and managerial ownership.

Measurement

The study does not propose to test this.

AC 7: Debt maturity is concavely related to managerial ownership (MO)

422.1.4.8 Family Control

Family control: In line with the proposition of Schmid et al. (2008), stating that family involvement may act as an effective mechanism to control agency problems, thus reducing the need for shorter maturities for the same purpose, the following hypothesis on the relation between family control and debt maturity is formulated.

Measurement

The study does not propose to test this.

AC 8: Debt maturity is positively related to family control (FF).

A summary of the above testable propositions is given in the following tables.
<table>
<thead>
<tr>
<th>Table No.: 422.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testable Proposals</td>
</tr>
<tr>
<td><strong>TAX</strong></td>
</tr>
<tr>
<td>1. TAX1: Debt Maturity is positively related to Effective Tax Rate (&quot;ETR&quot;)</td>
</tr>
<tr>
<td>2. TAX2: Debt Maturity is negatively related to non-debt tax shields (&quot;NDTS&quot;)</td>
</tr>
<tr>
<td>3. TAX3: Debt Maturity is positively related to profitability (&quot;PROFITROCHANG&quot;)</td>
</tr>
<tr>
<td>4. TAX4: Debt Maturity structure is positively related to the term structure (&quot;TS&quot;)</td>
</tr>
<tr>
<td>5. TAX5: The expected relation between IRV-L (or IRV-L) and DMS is positive</td>
</tr>
<tr>
<td><strong>Risk Management</strong></td>
</tr>
<tr>
<td>6. RM 1: Debt maturity is negatively related to earnings volatility (EV)</td>
</tr>
<tr>
<td>[The higher the earning volatility, the lesser will be long term borrowings]</td>
</tr>
<tr>
<td>7. RM 3: Firms try to match the maturities of assets and liabilities</td>
</tr>
<tr>
<td>[Debt maturity is positively related to asset structure (AS)]</td>
</tr>
<tr>
<td>8. RM 4: Debt maturity is negatively related to debt servicing capacity (DSC)</td>
</tr>
<tr>
<td>[the firm with higher debt service ratio will have more of short term debt]</td>
</tr>
<tr>
<td>9. LQ 1: Debt Maturity is negatively related to current ratio</td>
</tr>
<tr>
<td>[The higher the current ratio, the larger will be the long term borrowings]</td>
</tr>
<tr>
<td><strong>Signaling</strong></td>
</tr>
<tr>
<td>10. SIG 2: Debt Maturity is positively related to leverage</td>
</tr>
<tr>
<td>[The higher the leverage, more will be the long term borrowings]</td>
</tr>
<tr>
<td>11. SIG 3: Debt maturity is negatively related to high firm quality (HQ)</td>
</tr>
<tr>
<td>[The higher the firm quality, less will be the long term borrowings]</td>
</tr>
<tr>
<td>12. SIG 4: Debt maturity is positively related to firm age</td>
</tr>
<tr>
<td>[The older the firm, more will be the long term borrowings]</td>
</tr>
<tr>
<td>13. SIG 5: Debt maturity is positively related to Share Price Performance (SPP)</td>
</tr>
<tr>
<td>[Firms with higher share price performance tend to borrow more long term funds]</td>
</tr>
<tr>
<td><strong>Agency</strong></td>
</tr>
<tr>
<td>14. AC 1: Debt maturity is positively related to firm size (FS)</td>
</tr>
<tr>
<td>[Larger the firm, more is the long term debt]</td>
</tr>
<tr>
<td>15. AC 2: Debt maturity is positively related to asset structure (AS)</td>
</tr>
<tr>
<td>[Higher is the proportion of fixed assets in total assets, more is the long term debt]</td>
</tr>
<tr>
<td>16. AC 3: Debt maturity is negatively related to average asset life (AL)</td>
</tr>
<tr>
<td>[Longer is the asset life, larger will be long term debt]</td>
</tr>
<tr>
<td>17. AC 4: Debt maturity is negatively related to growth opportunity (GO)</td>
</tr>
<tr>
<td>[Firms with high growth opportunities borrow on short term]</td>
</tr>
<tr>
<td>18. AC 5: Debt maturity is negatively related to volatility in earnings (EV)</td>
</tr>
<tr>
<td>[More volatile are the earnings, more will be the short term borrowings]</td>
</tr>
<tr>
<td>19. AC 6: Debt maturity is negatively related to ownership concentration (OC)</td>
</tr>
<tr>
<td>[Larger is the owners’ shareholding, smaller will be the long term borrowing]</td>
</tr>
<tr>
<td>20. AC 7: Debt maturity is concavenly related to managerial ownership (MO)</td>
</tr>
<tr>
<td>21. AC 8: Debt maturity is positively related to family control (FF)</td>
</tr>
</tbody>
</table>

Source: The Author’s own compilation based on literature review of theories of debt maturity
423.2 Contemporary Characteristics of Firms

The Indian firms have transformed themselves rapidly in terms of their geographic product markets and access to overseas capital and bond and loan markets for raising funds.

Also many firms have varying degree of market power -in terms of product market and /or input market power.

Also many studies (reviewed in the earlier section titled “Literature Review” of this study) have examined the impact of macro variables as well as financial/economic shocks on corporate balance sheets as firms’ response to the same macro variables differ.

Accordingly this study has constructed data set taking into account these contemporary characteristics of firms and constructed three indices namely,

(1) Market Power Index

(2) Uniqueness Index

(3) Global Integration Index

423.2.1 Market Power Index

As already discussed, the study constructs market power index.

Measurement

The measure of market power is an index constructed as follows.
As can be observed from the above, a company which has market power can obtain security deposits from its dealers/distributors. Such a company gets a score of 1 and a company that does not gets a zero. Similarly, a company that can demand an advance from its customers before or to start the contract/work has a market power and gets a score of one against a company that does not. Likewise if the ratio of sundry creditors to total current liabilities is more than 40%, the company is said to have market power and gets a score of 1. So if a company has all the maximum score it can get is three.

*Market Power: A Firm with higher market power will have less of long term debt (or will have more of short term debt)*

### 423.2.2 Uniqueness Index

A unique company is one which is different from the ordinary company in the following respects.

*Measurement*

A unique company pays royalty for use of new technology, brand or trade-marks. Such access to technology, brand, etc. makes a company unique. For instance, a company that sells its products under a famous brand can obtain higher margins.
A company that spends more on research and development (R&D) and/or advertising also is expected to be unique as such spends might give it higher margins. Also companies like Infosys Ltd. are highly valued for their non-tangible assets such as corporate governance. That is the reason their intangible assets account for larger share of their market capitalization than their tangible assets. A company that has all the four characteristics gets a score of four and none gets a zero score.

*Uniqueness: A Firm with uniqueness will have less of long term debt (or will have more of short term debt)*

### 423.2.3 Global Integration Index

As mentioned at various places earlier, many Indian companies have become globally integrated in various ways. Some of these ways are given below.

*Measurement*

The following table gives six ways through which a company can become financially integrated. A company that is globally integrated in all six ways gets a score of six.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Attribute</th>
<th>Unique</th>
<th>Non-Unique</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Royalty</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>R&amp;D</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Advertising</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Intangible / Market capitalization</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Score</strong></td>
<td></td>
<td><strong>4</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>

Source: The Author’s own creation based on literature review and own experience
The above table shows that a company that has investment overseas is reckoned as
MNC Indian. Similarly a company that exports at least 2% of its revenue is called
exporting company. A company that has raised (equity) funds through issue of
American Depository Receipts or Global Depository Receipts and got listed either on
a US stock market or European (Luxembourg) stock market gets a score of one. A
score of one is given to a company that has raised funds through external
commercial borrowing (“ECBs”) or foreign currency convertible bonds (“FCCBs”).
Finally, a company attracting foreign financial institution (“FII”) shareholding gets a
score of one. Thus a company that is globally integrated in all six ways gets a score
of six.

Globalization: A globally integrate firm with uniqueness will have less of long term
debt (or will have more of short term debt)

423.3 Macroeconomic Variables

The other macro variables to be tested are:

(1) Term Spread

(2) Interest Rate Volatility
Both (1) and (2) namely, Term Spread and Interest Rate Volatility have been discussed under the Tax argument earlier in this section and hence only one remaining macro financial variable is discussed below.

**Equity Risk Premium**

As per capital asset price model ("CAPM") it is the difference between market rate of return and risk free rate of interest. When this premium is high, firms tend to prefer issuing debt rather than equity. According to Fama and French (1989) the premium should have an impact on both equity and debt market. It is argued that expected bond returns are generally low when business conditions are good due to, e.g. the availability of profitable growth opportunities. Under such conditions, one may observe high equity returns. Baker and Wurgler (2000) find that firms tend to issue equity instead of debt when the future cost of equity is relatively low. Fama and French (1989) also report that expected returns on stocks and corporate bonds move together. Consequently, the study expects equity risk premium to have different impact on debt maturity. For instance, it may be possible due to information asymmetries that firms issue short-term debt when equity premium is high as high equity premium can imply high premium on long term debt.

*MAV1*: Debt maturity structure is positively related to Equity Risk premium

**Summary**

The preceding paragraphs have presented the relationship between debt maturity and explanatory variables and predictions deducted from a variety of theories and existing empirics on the topic of debt maturity structure. To limit the scope of this
thesis, many explanatory variables are not included. The final summary of the explanatory variables that are tested is as follows.

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Debt Maturity</td>
<td>DM=LTB/Total LB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term borrowing defined as payable after one year</td>
</tr>
<tr>
<td>2</td>
<td>Age</td>
<td>Age=Current Year-Date of Incorporation</td>
</tr>
<tr>
<td>3</td>
<td>Size</td>
<td>SIZE=Natural log of Total Assets</td>
</tr>
<tr>
<td>4</td>
<td>Leverage</td>
<td>LEV=Total Borrowings/(Total Borrowings+Networth)</td>
</tr>
<tr>
<td>5</td>
<td>Liquidity</td>
<td>Current Ratio=Current Assets/Current Liabilities</td>
</tr>
<tr>
<td>6</td>
<td>Debt Service Capacity</td>
<td>DSCAP=PBIDT/(Interest+Repayments)</td>
</tr>
<tr>
<td>7</td>
<td>Effective Tax Rate</td>
<td>ETR=Tax Paid/Profit Before Tax</td>
</tr>
<tr>
<td>8</td>
<td>Non Debt Tax Shield</td>
<td>NDT=Depreciation/EBIT</td>
</tr>
<tr>
<td>9</td>
<td>Profitability</td>
<td>PROFIT=[PAT+Interest]+1-[PAT+Interest]</td>
</tr>
<tr>
<td>10</td>
<td>Earning Volatility</td>
<td>EV=EBIT change over the previous year/Total Assets</td>
</tr>
<tr>
<td>11</td>
<td>Asset life</td>
<td>A=Total Gross Fixed Assets/Depreciation</td>
</tr>
<tr>
<td>12</td>
<td>Growth Opportunities</td>
<td>GROW=1+Growth in Total Assets</td>
</tr>
</tbody>
</table>

The above table gives the definition of variable used in the empirical study.

The non-traditional variables are defined as follows.

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Ownership</td>
<td>Foreign Promoters' Shareholding &gt;50%</td>
</tr>
<tr>
<td>13</td>
<td>Tobin's Q</td>
<td>TOBINQ=(Market Capitalization+LTB+NCAS)/(NW+NCAS+LTBs)</td>
</tr>
<tr>
<td>14</td>
<td>Market Power Index</td>
<td>Described separately</td>
</tr>
<tr>
<td>15</td>
<td>Uniqueness Index</td>
<td>Described separately</td>
</tr>
<tr>
<td>16</td>
<td>Globalization Index</td>
<td>Described separately</td>
</tr>
</tbody>
</table>

The following table shows a summary of testable hypothesis to be tested in the empirical study.
For instance, debt maturity structure ratio (long term borrowings/total borrowings) is expected to have a positive relationship with the effective tax rate. It means that a company with high effective tax rate will have large proportion of long term borrowings.