Agency Cost, Growth Options, and Debt Maturity in the Indian Corporate Sector

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Abstract

The debt maturity literature has established that agency cost problems, information asymmetry, and liquidity risk are important factors which determine the corporate debt maturity structure. Using panel OLS regression methodology on a panel data of 266 firms drawn from BSE 500, this research paper investigates empirically how agency cost determines debt maturity decisions in the Indian corporate sector. The agency cost hypothesis established that agency problems caused by the conflict of interest between shareholders and bondholders can be mitigated through short-term debt maturity. Therefore, debt maturity is inversely related. The research finds that the coefficient of growth options is positive and significant as against the empirical prediction that debt maturity and growth options are inversely related. However, the positive and significant coefficient on growth options reveals the severity of agency problems in the Indian corporate sector. The research findings lead to the conclusion that debt- equity conflicts over the exercising of growth options are mitigated by not issuing short-term debt. Maturity matching, long-term debt with call and sinking fund provisions, bank debt, secured debt, and debt with covenants are the corporate borrowing strategies adopted by the Indian companies to deal with agency problems, information asymmetry, and liquidity risk.

Keywords: debt maturity, capital structure, leverage, agency problems, agency cost

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Separation of ownership and control in modern corporations leads to conflict of interest between managers and shareholders, and bondholders and shareholders. The agency theory is concerned with apparent agency conflicts or conflict of interest between agents and principals. The conflict of interest between the agents and principal has different incentive characteristics and has a differential impact on the value of the firms. The firm's managers may have personal goals that contend with the shareholders' wealth maximization goals. Since the shareholders authorize managers to administer the firm's assets, there is bound to be a potential conflict of interest between these two groups. Jensen and Meckling (1976) suggested that leverage and debt maturity are effective ways to mitigate the agency problems due to conflict of interest between managers and shareholders.

Given that the investment, financing, and dividend policies are endogenous, there are four sources of conflict of interest between shareholders and bondholders. Smith Jr. and Warner (1979) suggested that the dividend payoff, claim dilution, asset substitution, and underinvestment present potential opportunities for wealth transfer from bondholders to stockholders. The capital market participants recognize the agency conflicts, and the rational bondholders understand the incentives of the stockholders. Myers (1977) suggested that if the risky debt is outstanding, the management acting on behalf of the shareholders' have an incentive to design the investment plan, which is beneficial to the stockholders and detrimental to the bondholders. The bondholders recognize these incentive problems and overvalue the bonds as the reflection of the possible wealth transfer from the bondholders to stockholders. Thus, the existence of risky corporate debt in the capital structure may reduce the present market value of the firm by weakening the corporation's incentive to undertake good future investments. This is the problem of agency cost induced by risky debt in the capital structure of a firm. The short debt maturity, covenanted long-term debt, debt with call, sinking fund provisions, and maturity matching are effective strategies for mitigating agency problems caused by conflict of

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interest between shareholders and bondholders, including underinvestment and risky asset substitution (Barnea, Haugen, & Senbet, 1980 ; Jonson and Stulz, 1985 ; Myers, 1977).

Research in finance has been dominated by empirical studies on the agency problems, information asymmetry, liquidity risk, and the impact of these factors on the leverage, debt maturity decisions, and market value of the firms. Empirical research studies have unearthed some stylized facts about the impact of agency cost problems on debt maturity choices, but these evidences are largely based on the corporate experience of developed countries. Though the Indian economy has been passing through the transition from being a mixed economy to market economy, numerous market imperfections inherited by mixed economy have distorted the functioning of corporate debt market. Moreover, the Indian corporate sector is characterized as a complex industry structure in which numerous state-owned huge enterprises, public sector companies, large number of family controlled firms, huge number of small and medium sized and opaque firms co-exist. The dysfunctional corporate debt market and complex industry structure coupled with complex corporate tax regime have accentuated the agency cost problems in the corporate sector.

Objective of the Study

The main objective of this paper is to examine how agency cost hypothesis determine debt maturity in the Indian corporate sector. This paper also explores how corporate debt market imperfections condition corporate debt maturity decisions.

Review of Literature

✧ **Debt Maturity :** Debt maturity is a strategic decision which can magnify the risk return profile of the equity shareholders. The debt maturity choice is not only a device for magnifying the market value of the firm by increasing the interest tax shield of debt, but is also a strategic tool for mitigating the problems of agency cost conflicts, information asymmetry, and liquidity risk. The agency cost hypothesis establishes that the debt maturity structure is an effective strategy for mitigating agency problems due to conflict of interest between the debtholders and stockholders, including underinvestment and asset substitution problems.

The definition of debt maturity is the most contentious issue in the debt maturity literature because there have been differences of opinion among the researchers over the measurement of debt maturity. We have used balance sheet approach to measure debt maturity as suggested by Barclay and Smith Jr. (1995) and Deesomsak, Paudyal, and Pescetto (2005). Debt maturity is defined as the proportion of long-term debt in the total debt capital. Debt maturity (DEBTMAT) is defined as the ratio of long-term debt (LTD) to total debt (TD). The long-term debt is defined as the debt repayable after one year of issuance excluding the portion of long-term debt that matures in the current year.

$$\text{DEBTMAT} = \frac{\text{Long Term Debt (LTD)}}{\text{Total Debt (TD)}} \tag{1}$$

✧ **Agency Cost Hypothesis :** The agency problems due to the conflict of interest between the stockholders and bondholders over the exercise of growth options are greater for smaller firms with more growth options in the investment opportunity set. Therefore, empirical literature has identified two proxies, growth options (GROWTH) and firm size (SIZE) for representing agency cost problems.

(1) Growth Options (GROWTH) : A firm's future investment opportunities are like options and the conflict of interest between the shareholders and bondholders over the exercising of this investment option is another significant source of agency problems. Myers (1977) argued that a firm's growth opportunities are like call options and the value of growth options depends on undertaking the discretionary future investment by a firm. Issuing risky debt for financing growth options induces a suboptimal investment strategy in which the benefits will accrue to the bondholders in the form of reduction in the probability of default and corresponding increase in the value of debt. Hence, the risky debt financing increases the conflicts between shareholders and debtholders, and deteriorates the firm's incentive to undertake good future investments. The conflict of interest between shareholders and bondholders over future growth

options can be mitigated by employing low leverage or shortening maturity of debt. As the risky debt is outstanding, the stockholders' actions aimed at maximizing the value of their equity claims can result in reduction in both the value of firm and outstanding bonds. Smith Jr. and Warner (1979) suggested that production of investment covenants, dividend covenants, financing covenants, and bonding covenants are written in the debt indenture to follow firm value maximizing investment policies. Barnea et al. (1980) put forward that the agency cost problems of debt associated with informational asymmetry and growth options can be resolved by short-term debt and long-term debt with call and sinking fund provisions. Financing new investment projects with secured debt limits wealth transfer from stockholders to existing bondholders and reduces the incentives for stockholders to abandon these projects. Therefore, Johnson and Stulz (1985) suggested that the agency conflicts between shareholders and bondholders over the exercise of growth options can be reduced by issuing secured debt.

Fama (1985) proposed that private bank loans can significantly reduce the agency cost because the banks have a comparative advantage over other private lenders in monitoring the activities of borrowers and exercising control by enforcing debt covenants and shortening maturity of debt. Barclay and Smith Jr. (1995) and Stohs and Mauer (1996) argued that firms can mitigate agency cost problems by adopting recapitalization strategies with appropriate maturity of debt. Alcock, Finn, and Tan (2008) established that the short-term debt and restrictive covenants are substitutes in controlling the agency conflicts between the stockholders and bondholders over the exercise of growth options.

The growth option is proxied to the ratio of market value of asset to book value of asset (MV/BV). The market value of the asset is estimated as the book value of the asset plus the difference between the market value and book value of the equity shares.

$$GROWTH = \frac{\text{Market Value of Asset (MV)}}{\text{Book Value of Asset (BV)}} \qquad (2)$$

(2) Firm Size (SIZE) : The debt maturity literature has identified firm size as one of the important determinants of corporate debt maturity structure because the firm size is a proxy that represents the agency cost hypothesis, signaling hypothesis, and liquidity risk hypothesis. The agency cost hypothesis predicts that smaller firms have higher growth options and are more likely to experience conflict of interest between various stakeholders.

Smith Jr. and Warner (1979) argued that agency problems between shareholders and debtholders may be particularly severe for small firms with high-growth option. The high failure rates, lack of economies of scale in raising long-term public debt, and high-growth options are the basic features of small firms, and the bondholders attempt to control the risk of lending to small firms by restricting the length of debt maturity. Titman and Wessels (1988) suggested that larger firms are said to have much easier access to the capital markets and smaller firms are generally precluded from accessing long-term debt markets because of the small proportion of their collateralized assets to future investment opportunities. Consequently, debt maturity and firm size are positively related.

Affordable transaction cost, lower information asymmetry, easy capital market assess, reputational considerations, and weak incentive problems are relevant for larger firms, which enables them to issue long term debt (Antoniou, Guney, & Paudyal, 2002 ; Dennis & Sharpe, 2005). The empirical hypothesis suggests that debt maturity is directly related to firm size. The firm size is measured as the natural logarithm of the estimated market value of the firm (MV) at constant 1993-1994 prices. The wholesale price index (WPI) serves as the deflator.

$$\text{Firm Size (Size)} = \text{Natural Log of MV of the firm} \qquad (3)$$

↳ **Control Variables :** Debt maturity literature establishes that signaling hypothesis, liquidity risk, and tax hypothesis provide rational explanation to debt maturity. Therefore, firm quality, bond ratings, asset maturity, corporate tax, term structure, and asset variance are included in the regression model as control variables.

(1) Firm Quality : The signaling hypothesis establishes that debt maturity is an appropriate and valid signal to the asymmetrically informed market about the quality of the firm. The managers would adjust the firm's debt maturity structure to signal their assessment about the true firm quality in an asymmetrically informed financial market. The signaling hypothesis establishes that the debt maturity and firm quality are inversely related. Flannery (1986) prescribed abnormal earnings or firm quality (QUALITY) as the proxy for insiders' information about the firm quality.

The firm quality is estimated as the difference between next year's and this year's earnings per share (EPS), scaled by this year's stock price (SP).

$$\text{Firm Quality} = \frac{EPS_{t+1} - EPS_t}{SP_t} \tag{4}$$

(2) Bond Rating : Liquidity risk is the most important determinant of debt maturity choice since debt maturity and credit risk has a rather complex relationship. Diamond (1991) argued that debt maturity choice is a trade-off between the borrower's preferences for short-term debt due to private information about future credit ratings and liquidity risk. Therefore, debt maturity and credit risk are non-monotonically related; firms with highest and lowest credit ratings prefer to issue short-term debt, and firms with intermediate ratings issue long-term debt. The empirical hypothesis is that debt maturity is non-monotonically related to credit ratings. The bond ratings (BOND) and the square of the bond ratings (SQBOND) are used to test Diamond's prediction of non-monotonic relation between debt maturity and credit ratings.

(3) Asset Maturity : The matching hypothesis is based on the conventional maxim on debt maturity, where long-term assets are financed with long-term debt, and short-term assets are financed with short-term debt. Morris (1976) suggested that firms generally attempt to deal with liquidity risk by following a hedging policy by which maturity of debt is matched approximately equal to the life of an asset. Myers (1977) argued that if the asset values move together with liability values, the hedging firms are more likely to match the maturities of assets and liabilities. The market value of the firm can be maximized by issuing debt, whose maturity corresponds to the life of the investment projects being undertaken. The matching hypothesis predicts that debt maturity is positively related to asset maturity. The matching hypothesis is proxied to asset maturity (ASSETMAT). The asset maturity (ASSETMAT) is estimated as the ratio of the net property, plant, and equipment (PPE) divided by annual depreciation expense (DEP).

$$\text{Asset Maturity} = \frac{\text{Plant, Property, Equipment (PPE)}}{\text{Depreciation (DEP)}} \tag{5}$$

(4) Corporate Tax Rate : The dynamic trade-off theory of capital structure also proposes that the optimal leverage and debt maturity are determined by a trade-off between the various costs and the benefits of debt depending upon the firm value volatility. Therefore, the corporate tax rates, term structure, and asset variability are important determinants of corporate debt maturity. The tax hypothesis postulates that optimal debt maturity is determined by the trade-off between tax benefits of debt, and the costs associated with financial distress and bankruptcy. Kane, Marcus, and McDonald (1985) argued that the optimal debt maturity involves a trade-off between the tax advantage of debt, bankruptcy cost, and debt issue flotation cost. Therefore, debt maturity and corporate tax rate are inversely related. The empirical prediction is that debt maturity is inversely related to the tax rate. The corporate tax rate has been proxied to tax rate (TAXRATE), and the tax rate is the ratio of income tax paid (TP) to pre-tax income (PTI).

$$\text{Tax Rate} = \frac{\text{Tax Paid (TP)}}{\text{Pre Tax Income (PTI)}} \tag{6}$$

(5) Term Structure : The dynamic trade-off theory establishes that optimal debt maturity of a firm is determined in an environment characterized by stochastic interest rate and firm value volatility by trading-off the costs and benefits of debt financing (Brick & Ravid, 1985). Therefore, debt maturity is positively related to term structure. The term structure (TERM) is measured as the difference between the month-end yields on 10-year government bond and 6-month government bond matched to the firm's fiscal year end.

Term Structure (TERM) = Month end yield on 10 year Govt. Bond - Month Yield on 6 month Govt. Bond   (7)

(6) Asset Variance : The dynamic trade-off theory postulates that value-maximizing firms frequently adopt appropriate recapitalizing strategies depending upon the term structure, asset volatility, and debt issue flotation cost.

Kane et al. (1985) demonstrated that the decreasing firm value volatility reflects the fact that firms with less asset volatility would rebalance capital structure less frequently and issue long-term debt. The increasing firm value volatility reflects the fact that firms would issue short-term debt periodically due to the concerns of capital structure adjustment. Therefore, optimal debt maturity and asset variance are inversely related. The firm's asset variance (ASSETVAR) is estimated as the standard deviation of the first difference in earnings before interest and taxes, and depreciation and amortization (EBITDA), scaled by the average book value of assets (BV).

$$\text{Asset Variance} \quad = \quad \frac{\text{EBITDA}}{\text{Average Book Value of Assets (BV)}} \qquad (8)$$

(7) Leverage : The capital structure theories establish that the optimal capital structure and optimal leverage of a firm is determined by the trade-off between interest tax shields of debt and higher bankruptcy cost. Empirical studies on maturity have treated leverage as a control variable while determining debt maturity. The empirically testable research hypothesis is that debt maturity is positively related to leverage. Leverage is measured as the ratio of total debt to market value of the firm.

$$\text{Leverage} \quad = \quad \frac{\text{Total Debt (TD)}}{\text{Market Value of Firm (MV)}} \qquad (9)$$

Research Methodology

(1) Data and Sample : Empirical investigation on the agency cost hypothesis and corporate debt maturity is based upon secondary data. The data were obtained from PROWESS - the Centre for Monitoring Indian Economy (CMIE) and Reserve Bank of India (RBI) bulletins. The study is based on sample drawn from the BSE 500 index. The BSE 500 is composed of companies from 20 industries and represents nearly 93% of the total market capitalization on the Bombay Stock Exchange (BSE). Financial firms and firms with missing observations during the sample period were excluded. The actual span of the study is confined to a period of 10 years from 2000-2009. The research is primarily based on panel data and the panel data were created by pooling cross-section and time series data. The final sample has 266 observations for cross section and 2660 observations for panel data.

The panel data analysis is a method of studying a particular subject within multiple sites, periodically observed over a defined time frame. The panel data allows us to distinguish inter-individual differences from intra-individual difference by providing sequential observation for a number of individuals. The focus of the panel data research is on controlling the impact of unobserved heterogeneity among the cross-sectional units over time in order to draw inferences about the population characteristics. The pooled OLS regression, fixed effect regression, and random effect regression are important methods of panel data analysis. The choice between random effect and fixed effect regression is decided by applying Hausman test. Hausman test concludes that the fixed effect regression is the preferred model for panel data analysis.

Fixed effect regression is a method of panel data analysis that controls the time invariant unobserved individual characteristics called fixed effects, which might be correlated among the cross-sectional units over time, and draw inferences about the population characteristics. The fixed group effect model examines group differences in intercepts, assuming the same slopes and constant variance across companies. The company-specific group effect is time invariant and is considered as a part of the intercept, that the disturbance term is allowed to correlate with other regressors. The fixed effect models uses least squares dummy variable (LSDV) and within effect estimation methods. The OLS estimator is based on the time-demeaned variables called within estimators or fixed effect estimators, which remove the unobserved time invariant individual fixed effects. Therefore, estimated coefficients of the fixed effect models cannot be biased because of the omitted time invariant characteristics.

The general formulation of the within effect fixed effects linear panel data model is given below:

$$Y_{it} = \alpha_i + \beta_1 X^t_{it} + \varepsilon_{it} \qquad i = 1, 2, \ldots\ldots, N. \quad t = 1, 2, \ldots\ldots, T. \qquad (10)$$

where,

$i =$ cross section dimension,

t = time series dimension,

Y_{it} = dependent variable,

α_i = unobservable time invariant individual fixed effects,

X_{it} = explanatory variable,

β_1 = regression parameter,

ε_{it} = disturbance term.

(2) Basic Regression Model: The independent variables, growth options (GROWTH), firm size (SIZE), firm quality (QUALITY), bond ratings (BOND, SQBOND), asset maturity (ASSETMAT), tax rate (TAXRATE), term structure (TERM), asset variance (ASSETVAR), and leverage (LEVERAGE) were regressed on the dependent variable debt maturity to study the nature of relation between growth option and debt maturity. The basic regression model is given below:

$$DEBTMAT = \alpha + \beta_1 \left(\frac{MV}{BV} \right) + \beta_2 (SIZE) + \beta_3 \left(\frac{EPS_{t+1} - EPS_t}{SP_t} \right) + \beta_4 (BOND) + \beta_5 (SQBOND) + \beta_6 \left(\frac{PPE}{DEP} \right) + \beta_7 \left(\frac{TP}{PTI} \right)$$

$$+ \beta_8 \left(\frac{\sigma\, EBITDA}{MV} \right) + \beta_9 (TERM) + \beta_{10} \left(\frac{TD}{MV} \right) + u_i \qquad\qquad (11)$$

Or

$$DEBTMAT = a + \beta_1 (GROWTH) + \beta_2 (SIZE) + \beta_3 (QUALITY) + \beta_4 (BOND) + \beta_5 (SQBOND) + \beta_6 (ASSETMAT)$$

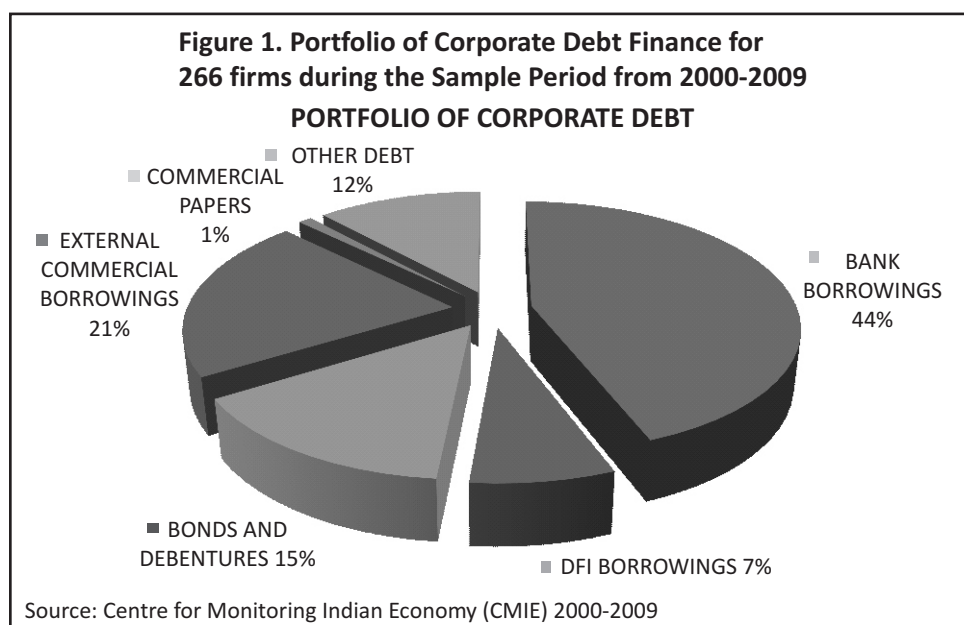$$+ \beta_7 (TAXRATE) + \beta_8 (ASSETVAR) + \beta_9 (TERM) + \beta_{10} (LEVERAGE) + u_i$$

where,

$DEBTMAT$ = debt maturity,

α = intercept,

β = coefficients for independent variables,

u_i = disturbance term.

Figure 1. Portfolio of Corporate Debt Finance for 266 firms during the Sample Period from 2000-2009

PORTFOLIO OF CORPORATE DEBT

OTHER DEBT 12%

COMMERCIAL PAPERS 1%

EXTERNAL COMMERCIAL BORROWINGS 21%

BANK BORROWINGS 44%

BONDS AND DEBENTURES 15%

DFI BORROWINGS 7%

Source: Centre for Monitoring Indian Economy (CMIE) 2000-2009

Results and Analysis

✤ **Debt Portfolio Analysis :** The corporate debt portfolio refers to the composition of different debt instruments issued by firms for financing business activities as shown in the capital structure. The capital structure reflects the composition of corporate debt, corporate borrowing strategies, and corporate debt market functioning. The debt portfolio analysis can provide supplementary evidence to the regression analysis that may help to interpret the empirical findings more accurately and meaningfully. Figure 1 depicts the types and composition of different debt instruments utilized in the average debt capital for the sample period from 2000-2009.

Table 1. Descriptive Statistics of Dependent Variable and Independent Variables for the period from 2000-2009

Variables	Median	Mean	Std. Dev.	Minimum	Maximum
DEBTMAT	0.63	0.56	0.33	0	1.00
GROWTH	1.26	1.84	1.59	0	16.05
FIRM SIZE	6.79	6.86	1.51	0.32	12.13
QUALITY	0.01	0.06	0.58	-3.13	18.16
ASSETMAT	12.51	14.03	8.44	0	97.92
TAXRATE	0.23	0.22	0.18	0	3.83
TERM	1.14	1.38	0.85	0.19	2.71
ASSETVAR	0.1	0.11	0.07	0.02	0.54
LEVERAGE	0.19	0.24	0.21	0	1.44

Source: Centre for Monitoring Indian Economy (CMIE) 2000-2009

Note : The dependent variables debt maturity (DEBTMAT) is defined as the long-term debt divided by total debt (LTD/TD). The independent variables are defined as follows: GROWTH is the market value of the firm scaled by the book value of firm(MV/BV); SIZE is the natural log of the estimated market firm value measured in crores of constant 1993-1994 rupees using the whole sale price index as deflator; QUALITY is the difference between next year's earnings per share and this year's earnings per share, scaled by this year's common stock price per share; ASSETMAT is the book value of plant, property, equipment divided by annual depreciation cost; TAXRATE is the ratio of income tax paid to pretax income; ASSETVAR is the ratio of the standard deviation of the first difference in earnings before interest, tax, depreciation and amortization to the average assets; TERM is the difference between the long term and short term yields on government bonds; and LEVERAGE is the ratio of total debt (sum of long term debt, long term debt due within 1 year, and short term debt) to market value of the firm (TD/MV).

The Figure 1 shows that the Indian companies generally raise necessary debt capital through borrowing from bank and development financial institution (DFIs), external commercial borrowings, bonds and debentures, commercial papers, and other forms of debts. The banks continue to be the major contributor to corporate debt. The total debt issued by the firms in the sample comprised of 44% bank borrowings, 21% external commercial borrowings, 15% bonds and debentures, 7% development financial institution borrowings, 1% commercial papers, and remaining 12% by other forms of debt, including deferred credit from suppliers, loans from Central and State governments, and inter-corporate loans during the period from 2000-2009. The portfolio of corporate debt reminds us that the Indian corporate debt market is very much traditional in diversity of products, and the corporate sector is very much conservative in debt financing strategies.

✤ **Descriptive Statistics :** The descriptive statistics such as mean, median, standard deviation, minimum, and maximum are used to explain the basic characteristics of both the dependent variable and independent variables. The Table 1 contains the descriptive statistics for panel data on dependent variable and independent variables for 266 firms for 10 years during the period from 2000-2009.

The Table 1 shows that the dependent variable debt maturity (DEBTMAT) recorded a mean and median of 0.56 and 0.63 respectively, with a standard deviation of 0.33. These results show that the debt maturity varied extremely across the sample companies. This reflects the fact that approximately 56% of the debt had a maturity of more than one year, and the remaining 44% of the debt had a maturity of less than one year. Hence, it can be said that the Indian corporate sector is characterized by a moderate level of debt maturity. The Table 1 discloses the mean, median, and standard

Table 2. Pearson's Correlation Matrix of Dependent Variable and Independent Variables for the Period from 2000-2009

VARIABLES	DEBTMAT	GROWTH	SIZE	QUALITY	BOND	SQBOND	ASSETMAT	TAXRATE	TERM	ASSETVAR	LEVERAGE
DEBT MAT	1.00										
GROWTH	-0.12*	1.00									
FIRM SIZE	0.02	0.38*	1.00								
QUALITY	0.02	-0.05*	-0.05*	1.00							
ZSCORE	-0.11*	0.60*	0.21*	-0.04*							
SQZSCORE	-0.04*	0.29*	0.10*	-0.01							
BOND	0.15*	-0.21*	0.07*	0.11*	1.00						
SQBOND	0.14*	-0.18*	0.05*	0.13*	0.97*	1.00					
ASSETMAT	0.18*	-0.14*	0.00	0.00	0.19*	0.20*	1.00				
TAX RATE	-0.01*	0.06*	0.10*	-0.05*	-0.12*	-0.16*	-0.06*	1.00			
TERM	0.06*	-0.10*	-0.28*	0.04*	0.03	0.05*	-0.01	-0.17*	1.00		
ASSET VAR	-0.01	0.20*	-0.17*	0.04*	-0.17*	-0.13*	-0.03	-0.00	-0.00	1.00	
LEVERAGE	0.25*	-0.50*	-0.25*	0.11*	0.38*	0.34*	0.24*	-0.20*	0.24*	-0.09*	1.00

Source: Centre for Monitoring Indian Economy (CMIE) 2000-2009

*Significant at the 10% level

Note : The dependent variables debt maturity (DEBTMAT) is defined as long-term debt divided by total debt (LTD/TD). The independent variables are defined as follows: GROWTH is the market value of the firm scaled by the book value of firm(MV/BV); SIZE is the natural log of the estimated market firm value measured in crores of constant 1993-1994 rupees using whole sale price index as deflator; QUALITY is the difference between next year's earnings per share and this year's earnings per share, scaled by this year's common stock price per share; BOND is the firm's cardinalized bond rating based on emerging market model of Altman, where AAA=1,.........CCC=7 and default firms receive a code of 8; SQBOND is the firm's squared cardinalized bond ratings; ASSETMAT is the book value of plant, property, equipment divided by annual depreciation cost; TAXRATE is the ratio of income tax paid to pretax income; ASSETVAR is the ratio of the standard deviation of the first difference in earnings before interest, tax, depreciatio, and amortization to the average assets; TERM is the difference between the long term and short term yields on government bonds; and LEVERAGE is the ratio of total debt to market value of the firm (TD/MV).

deviation of growth options (GROWTH), which are 1.84, 1.26, and 1.59 respectively. The high dispersion around the mean growth options explains that Indian firms have valuable investment options and are subject to potential underinvestment problems as predicted by the agency cost hypothesis. The mean and median values of firm size (SIZE) are 6.86 and 6.79, with a standard deviation of 1.50, which shows the low dispersion of firm size around the mean. The firm quality (QUALITY) recorded mean, median, and standard deviation as 0.06, 0.01, and 0.58 respectively, which indicates the incidence of high variation in the future abnormal profits across the firms. The mean and median values of asset maturity (ASSETMAT) are 14.03 and 12.51 respectively, with a standard deviation of 8.44, which explains that asset maturity varied widely across the sample companies.

The Table 1 also illustrates that mean and median values of tax rate (TAXRATE) are 0.22 and 0.23 respectively, with a standard deviation of 0.18, which discloses the presence of high variation in the tax rate across the sample companies. The mean and median values of term (TERM) are 1.38 and 1.14, with a standard deviation of 0.85, which discloses the high volatility in the term structure of interest. The mean, median, and standard deviation of asset variance (ASSETVAR) are 0.11, 0.1, and 0.07 respectively. The low levels of dispersion around the mean asset variability reflects the fact that the Indian corporate sector uses more long-term debt in the capital structure as compared to short-term debt. The values of mean and median for leverage (LEVERAGE) are 0.24 and 0.19 respectively, with standard deviation of 0.21, which explains the existence of a large variation in the proportion of debt in the capital structure of the sample firms.

✧ **Correlation Analysis :** The Table 2 presents Pearson's correlation coefficients, which establishes the nature of relationship between debt maturity and independent variables, growth options, firm size, firm quality, bond ratings, asset maturity, tax rate, term structure, and asset variance. The Table 2 shows that the correlation coefficient on

DEBTMAT and GROWTH is significant and negative. The significant correlation coefficient on growth options strongly supports the research hypothesis that debt maturity and growth options are inversely related. The correlation coefficient on DEBTMAT and firm SIZE is positive but insignificant. The insignificant correlation between debt maturity and firm size summarily rejects the empirical research hypothesis that debt maturity is positively related to firm size. The correlation coefficient on DEBTMAT and QUALITY is positive and insignificant. The positive and insignificant coefficient on firm quality and debt maturity rejects the empirical research hypothesis that debt maturity is inversely related to firm quality.

The Table 2 reveals that the correlation coefficient between BOND and DEBTMAT is significant and positive. The significant coefficient on BOND is consistent with the empirical hypothesis that higher the liquidity risk, higher is the debt maturity and lower the liquidity risk, the lower is the debt maturity. The significant and positive correlation between SQBOND and DEBTMAT is opposite of the empirical research hypothesis that an inverse relation exists between SQBOND and DEBTMAT. The findings on debt maturity and bond ratings reject the empirical prediction of liquidity risk hypothesis that bond ratings are non-monotonically related.

The Table 2 also shows that the correlation between DEBTMAT and ASSETMAT is positive and significant. The significant and positive correlation coefficient on DEBTMAT and ASSETMAT strongly supports the matching hypothesis that debt maturity is directly related to asset maturity. The correlation coefficient on DEBTMAT and TAXRATE is significant and negative. The significant and negative correlation between TAXRATE and DEBTMAT supports the empirical research hypothesis that an inverse relation exists between debt maturity and tax rate. The significant and positive relation between DEBTMAT and TERM strongly supports the research hypothesis that debt maturity varies directly with the slope of the term structure. The insignificant correlation coefficient between DEBTMAT and ASSETVAR rejects the empirical research hypothesis that optimal debt maturity is inversely related to asset variance. The positive and significant correlation between DEBTMAT and LEVERAGE strongly supports the agency cost hypothesis that firms with higher leverage have more long-term debt in the capital structure.

✤ **Regression Analysis :** The nature of relationship between debt maturity and agency cost hypothesis in the Indian corporate sector was investigated using the panel OLS regression methodology. The dependent variable, debt maturity (DEBTMAT) is regressed on the independent variables - growth option, firm size, firm quality, asset maturity, tax rate, term structure, asset variance, and leverage using cross section, pooled OLS, and fixed effect regression specification.

(1) Growth Options : The Table 3 shows that the estimated coefficient on GROWTH options in fixed effect regression is significant and positive as against the empirical prediction of agency cost hypothesis. The regression coefficient on GROWTH is positive and significant, but is the opposite of the empirical research hypothesis that debt maturity is inversely related to growth options. The significant but positive coefficient on GROWTH repudiates the agency cost hypothesis that debt maturity and growth options are inversely related, and firms with high growth options borrow short-term debt to mitigate agency cost problems including risky asset substitutions and underinvestment. Our result are consistent with the findings of Stohs and Mauer (1996) and Alcock et al. (2008) that debt maturity and growth options are directly related, and the agency problems due to the conflict of interest between stockholders and debtholders over the exercise of growth options are not mitigated by short-term debt. The long-term debt with covenants and call and sinking fund provisions are substitutes to short-term debt maturity in controlling agency problems.

However, our research findings summarily reject the arguments of Jensen and Meckling (1976) and Myers (1977), who said that agency problems can be curtailed by short-term debt maturity. The research finding are in stark contrast with the findings of Barclay and Smith Jr. (1995) and Geudes and Opler (1996) that the maturity structure is inversely related to growth options, and short-term debt maturity can be effectively used to curtail the agency problems. However, the research results on growth options conflict with the empirical predictions of agency cost hypothesis - the significance of growth options unambiguously emphasizes the prevalence of severe agency problems in the Indian corporate sector, and the growth option is one of the important determinants of debt maturity.

(2) Firm Size : The Table 3 shows that FIRM SIZE is positive, but insignificant in fixed effect regression. The coefficient estimates on FIRM SIZE are positive but insignificant in the fixed effect regression, which summarily discards the empirical hypothesis that firm size and debt maturity are positively related. An insignificant firm size also

Table 3. Model 1 Cross-Section, Pooled OLS, and Fixed Effect Regression of Debt Maturity Structure on Independent Variables for 266 Firms during the period from 2000-2009

Independent Variable	Hypothesized Sign	Cross-Section Regression	Pooled OLS Regression	Fixed Effect Regression
GROWTH	-	0.0338 (-2.40)**	-0.00826** (-2.05)	0.0120** (2.15)
FIRM SIZE	+	0.0304*** (2.69)	0.0221*** (9.91)	0.0184 (1.04)
QUALITY	-	0.00615 (0.09)	-0.00707** (-2.21)	-0.0152*** (-6.30)
BOND	+	-0.0506 (-1.47)	0.00355 (0.66)	0.0318*** (3.49)
SQBOND	-	0.00753 (1.61)	0.000393 (0.45)	-0.00315*** (-2.57)
ASSETMAT	+	0.00222 (1.04)	0.00467*** (5.39)	0.00446*** (4.15)
TAXRATE	-	-0.320** (-2.00)	-0.0926*** (-3.75)	-0.0255*** (-2.84)
TERM	+	...	0.0117 (0.82)	0.0240** (2.05)
ASSETVAR	-	0.612** (2.49)	0.180*** (5.36)	...
LEVERAGE	+	0.317*** (2.76)	0.317*** (4.44)	0.202*** (5.94)
INTERCEPT		0.385*** (3.36)	0.251*** (7.42)	0.215** (2.09)
R^2		0.184	0.090	0.5498
F		6.38***	328.81***	421.34***
N		266	2660	2660

Source: Centre for Monitoring Indian Economy (CMIE) 2000-2009
NOTE (1) – Heteroskedasticity, autocorrelation, and cross-sectional dependence consistent t - statistic are reported in parentheses.
*   Significant at 10% level
**   Significant at 5% level
*** Significant at 1% level

Note (2) : The dependent variables debt maturity (DEBTMAT) is defined as long-term debt divided by total debt (LTD/TD). The independent variables are defined as follows: GROWTH is the market value of a firm scaled by the book value of a firm (MV/BV); SIZE is the natural log of the estimated market firm value measured in crores of constant 1993-1994 rupees using whole sale price index as deflator; QUALITY is the difference between next year's earnings per share and this year's earnings per share, scaled by this year's common stock price per share; BOND is the firm's cardinalized bond rating based on emerging market model of Altman, where AAA=1,...CCC=7 and default firms receive a code of 8; SQBOND is the firm's squared cardinalized bond ratings; ASSETMAT is the book value of plant, property, equipment divided by annual depreciation cost; TAXRATE is the ratio of income tax paid to pretax income; ASSETVAR is the ratio of the standard deviation of the first difference in earnings before interest, tax, depreciation, and amortization to the average assets; TERM is the difference between the long term and short term yields on government bonds; and LEVERAGE is the ratio of total debt to market value of the firm (TD/MV).

contradicts the agency cost hypothesis, which suggests that smaller firms tend to have more growth options and are more likely to experience agency conflict and the debtholders tend to reduce the risk of lending to smaller firms by restricting the length of debt maturity. The insignificant coefficient on firm size establishes the fact that firm size is not an important determinant of debt maturity structure in the Indian corporate sector.

(3) Firm Quality : The Table 3 indicates that QUALITY has a statistically significant and negative impact on the corporate debt maturity structure. Consistent with the signaling hypothesis, the coefficient estimates on QUALITY in fixed effect regression are negative and statistically significant across the sample. The statistically significant and negative coefficient on QUALITY strongly supports the empirical research hypothesis that debt maturity is inversely related to firm quality. The significance of signaling hypothesis proves the arguments of Flannery (1986) that debt maturity is inversely related to firm quality and the debt maturity choice of a firm is a valid signal of insider's information about firm quality to the asymmetrically informed market.

(4) Bond Ratings : The Table 3 presents the regression results on debt maturity and bond ratings, which provide strong support for the liquidity risk hypothesis. The coefficient estimate on BOND in fixed effect regression is statistically significant and positive, which confirms the liquidity risk hypothesis that firms with highest credit risk use more long-

term debt and firms with lowest credit risk issue more short-term debt in the capital structure. The regression coefficient on SQBOND is negative and statistically significant in fixed effect regression. The statistically significant and negative coefficient on SQBOND proves that when the liquidity risk deteriorates further, the debt maturity increases, but at a decreasing rate. The statistically significant coefficients on BOND and SQBOND strongly support the liquidity risk hypothesis that debt maturity is non-monotonically related to bond ratings; firms with highest and lowest credit ratings prefer short-term debt, and intermediate rated firms issue long-term debt.

(5) Asset Maturity : The Table 3 indicates that the regression results provide strong support for the matching hypothesis. The statistically significant coefficient on asset maturity (ASSETMAT) is consistent with the empirical research hypothesis that debt maturity and asset maturity are directly related. The significance of asset maturity empirically proves that the Indian companies have been adopting the golden rule of finance, 'matching the maturity of assets and liabilities'. Our research findings on asset maturity strongly support the arguments of Morris (1976) and Myers (1977) that maturity matching is a hedging strategy and risk management tool that can safeguard firms from bankruptcy risk due to the non-synchronization of cash inflows and outflows from the assets.

(6) Corporate Tax Rate : The Table 3 illustrates the regression results on tax rate that provide strong support for the empirical prediction of the tax hypothesis. The coefficient estimate on TAXRATE is statistically significant and negative in fixed effect regression and is consistent with the empirical hypothesis that debt maturity is inversely related to corporate tax rate. The statistically significant and negative coefficient on tax rate strongly supports the tax hypothesis that debt maturity and tax rate are inversely related and as the corporate tax increases, the debt maturity decreases and vice versa.

(7) Term Structure : The Table 3 shows that the estimated coefficient on TERM is consistent with the empirical prediction of tax hypothesis on term structure. The coefficient estimate on TERM in the fixed effect regression is positive and significant, which strongly supports the empirical research hypothesis that debt maturity is positively related to term structure. The significant and positive relation between debt maturity and term structure implies that the firms magnify their market value by optimally adjusting the debt maturity upwardly by issuing long-term debt.

(8) Asset Variance: The Table 3 indicates that the coefficient on asset variance from the pooled OLS regression is statistically significant and has a positive effect on debt maturity. The estimated coefficient on ASSETVAR is statistically significant but positive as against the empirical hypothesis that debt maturity and asset variance are inversely associated. The research findings on asset variance prove that higher asset volatility gives lesser inducement for Indian firms to recapitalize frequently with short-term debt. The increased concerns of liquidity risk and high transaction cost that arise from the refinancing of short-term debt compel firms to adopt long-term debt strategy.

(9) Leverage : The Table 3 indicates that the estimated coefficient on LEVERAGE is statistically significant and has a positive impact on the corporate debt maturity structure. The estimated coefficient on LEVERAGE is positive and statistically significant in fixed effect regression, which strongly supports the empirical hypothesis that leverage is directly related to the debt maturity. The positive relation between debt maturity and leverage implies that the Indian firms are subject to high liquidity risk. As the liquidity risk overwhelms the agency cost problems, the Indian firms employ more long-term debt in the capital structure.

Discussion of Empirical Results

This section critically evaluates the regression findings on agency cost hypothesis and debt maturity in the backdrop of the Indian corporate debt market. The positive and significant coefficient on growth options explicitly establishes that agency problems are pertinent in the Indian corporate sector.

(1) Agency Problems and Short-Term Debt : Jensen and Meckling (1976) and Myers (1977) argued that the agency problem due to the conflict of interest between debtholders and stockholders can be mitigated by shortening debt maturity. They reason that short maturity debt gives firms more flexibility in exercising growth options is because the

value of the short-term debt is relatively insensitive to the level of asset risks. However, the significant but positive coefficient on growth options summarily rejects these arguments and indisputably establishes that agency problems in the Indian corporate sector are not mitigated through short-term debt.

(2) Debt with Covenants, Call, and Sinking Fund : Barnea et al. (1980) suggested that long-term debt maturity with sinking fund and call provisions are rationalized means for resolving agency cost problems. Though the significant coefficient on growth option appears to support these arguments, the findings on corporate debt portfolio analysis do not fully support these arguments. The debt portfolio analysis discloses that the debt mobilized through the issue of debenture comprised of only 10% of the total debt in the capital structure during the period under study (from 2000-2009). Therefore, the research results prove that the agency problems in Indian companies are not fully eliminated by the issue of long-term debt with call and sinking fund provisions.

(3) Maturity Matching : Jun and Jen (2005) established that short-term debt maturity and maturity matching are mutually exclusive strategies for mitigating agency problems. The firms with severe liquidity risk than agency problems adopt maturity matching, and the firms with severe agency problems than the liquidity risk adopt short-term debt. The research findings establish that the Indian corporate debt market is recognized as a weak form of market efficiency in which the firms are afflicted by severe liquidity risk and agency problems. The findings on agency cost hypothesis, liquidity risk, and matching hypothesis reveal that as the liquidity risk outweighs the agency cost problems and information asymmetry, the companies adopted maturity matching as a strategy for mitigating agency problems. Thus, the empirical research findings on growth options confirm that agency problems in the Indian companies are, to some extent, mitigated by matching maturity of assets and liabilities.

(4) Collateralized and Secured Debt : Jonson and Stulz (1985) argued that secured debts can alleviate the agency problems and increase the firm's market value rather than redistributing the value among the bondholders. The debt portfolio analysis discloses that the commercial banks are the major contributors to the corporate debt capital and most of the bank borrowings are secured against the assets of the companies. Moreover, the debentures comprised of a meager part of the total borrowings and most of the debentures are secured against the assets of the company. The peculiar characteristics of corporate debt financing - the secured bank debt and secured debentures exemplify that Indian companies are following conservative corporate borrowing practices. Thus, the research findings establish that the Indian firms are largely curtailing agency cost problems by adopting secured debt.

(5) Borrowings from Banks : The findings on the signaling hypothesis suggests that the Indian corporate debt market is characterized by high information asymmetry. Fama (1985) and Antoniou et al. (2005) suggested that banks have comparative advantages over other private lenders to maximize the effectiveness of monitoring and reduce information asymmetry and adverse selection. The debt portfolio analysis reveals that the corporate debt market is dominated by the banks and major portion of the corporate debt is contributed by the commercial banks and financial institutions. The predominance of direct banks' credit enables the banks and financial institutions to monitor the borrowers and thereby reduce the adverse selection and transaction cost in the debt market. The research findings on the agency cost hypothesis disclose that the bank debt probably curtails agency cost problems in the Indian corporate sector.

(6) Agency Cost Hypothesis and the Corporate Debt Market : The Indian corporate sector is characterized by a complex structure in which a large number of family controlled and government-owned huge corporations, numerous opaque, small, and medium sized companies with concentrated ownership and high-growth opportunities coexist. These features have aggravated the agency cost problems.

Our research findings unambiguously emphasize the prevalence of severe agency problems in the Indian corporate sector. The debt portfolio analysis discloses that the Indian corporate bond market is afflicted to numerous market imperfections. The predominance of bank debt, underdeveloped bond market, low level of issues in debentures, shortage of quality debt instruments, and absence of diversified products for risk diversification are some of the imperfections prevailing in the corporate debt market. These imperfections have not only adversely affected the debt financing, but have also exacerbated agency problems, information asymmetry, and liquidity risk in Indian

companies. Under the constraints of thAe corporate debt market imperfections, the corporate sector has developed certain financing strategies. The maturity matching, long-term debt with call and sinking fund provisions, bank debt, secured debt, and debt with covenants are the corporate borrowing strategies adopted by the Indian companies to deal with agency problems, information asymmetry, and liquidity risk.

Conclusion

This research paper explored how the agency cost hypothesis and corporate debt market imperfections determine the debt maturity decisions in the Indian corporate sector. We adopted panel OLS regression methodology on panel data of 266 companies drawn from BSE 500. The agency cost hypothesis establishes that the agency problems caused by the conflict of interest between various stakeholders can be mitigated through short-term debt maturity. Hence, the empirical hypothesis is that debt maturity and growth options are inversely related. The research finds that the estimated coefficient on growth options is positive and significant as against the empirical prediction of agency cost hypothesis that debt maturity is inversely related to growth options. The positive and significant coefficient on growth options reveals the severity of agency problems in the Indian corporate sector. The debt-equity conflicts over the exercising of growth options are mitigated by not issuing short-term debt. The maturity matching, debt with collaterals and covenants, and long-term debt with call and sinking fund provisions are appropriate strategies used for mitigating agency problems.

The research findings on agency cost hypothesis unveil the basic characteristics of corporate borrowing strategies and corporate debt market. Therefore, these research findings have far-reaching implications on the financing decisions of the corporate sector and government agencies that regulate and control the corporate debt market. The imperfections prevailing in the corporate debt market, especially in the corporate bond market, have tremendously constrained the investment activities and have adversely affected the growth and development of industries. The government should develop and introduce innovative and diverse debt instruments in the corporate bond market, which can facilitate avenues for investment, speculation, and risk management in the companies.

The debt maturity literature establishes that corporate debt maturity is jointly determined by agency cost hypothesis, signaling hypothesis, liquidity risk hypothesis, matching hypothesis, and tax hypothesis. Therefore, an important extension of our work would be to examine empirically how these debt maturity principles determine capital structure and debt maturity decisions in the Indian corporate sector.

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