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THE RELATIONSHIP BETWEEN LEVERAGE, MATURITY, AND INVESTMENT DECISION: EVIDENCE FROM EMERGING MARKETS

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Abstract. *In this paper, we examine simultaneous relationship between leverage, maturity and over(under)- investment in emerging markets. We divide leverage into short term and long term to investigate the relation between current and future simultaneous relationship between leverage and investment decision, between debt maturity and investment decision, and between leverage and debt maturity. This research used twenty emerging market data from 2006 – 2016. First of all, our results show that firms in emerging markets prefer to use short-term debt to long-term debt to minimize the underinvestment problem. Second, there is a simultaneous non-linear relation between long-term leverage and growth opportunities in emerging markets firms. Third, long-term debt has non-linear effects on investment decision in emerging markets firms. It can be concluded that firms in emerging markets have different characteristics with regard to their capabilities to manage the interaction between leverage, maturity and investment compared to developed markets.*

Keywords: *leverage, debt maturity, investment, emerging markets.*

I. Introduction

Modigliani and Miller (1958) show that in a perfect capital market, financing and investment decisions are completely independent. Since that study, rich theoretical research has found various frictions that drive linkages between financing and investment decision. Based on the theoretical model from McConell and Servaes (1995) and Lang et al. (1996), Aivazian et al. (2005) find empirical evidence that leverage has a significant effect on investment. Johnson (2003), Billett et al. (2007) and Dang (2011) examine how investment opportunities impact corporate financing policies. They find that

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high-growth firms adopt low-leverage to mitigate underinvestment incentives. On the other hand, Ogden and Wu (2013) and Wu and Yeung (2012) argue that the growth opportunities and leverage have non-linear relationship because trade-off benefits and cost of debts may alter considerably as the growth opportunities change. In contrast, risks related with asset substitution for a firm that has substantial growth opportunities may increase severely.

Myers (1977) points out that outstanding debt may distort the firm's investment incentives downward to maximize equity value. On the contrary, Jensen and Meckling (1976) argue that for firms with large free cash flow, debts can be used as a disciplining device because it can reduce overinvestment in risky projects.

Debt maturity mitigates these agency conflicts in financing and investment decision (Myers, 1977; Barena et al., 1980; Childs et al., 2005). Since the short-term debt increases the financial flexibility of the firm, it reduces dramatically the agency costs of under- and overinvestment (Aivazian et al., 2005; Childs et al., 2005). Shorter term maturity increases the control rights of lenders to discipline management that has the same incentives as the shareholders (Diamond & He, 2014). However, short-term debt has several disadvantages. Liquidity risk related to using the short-term debts can constrain the use of a short-term maturity debt (Diamond, 1991; Dang 2011).

The majority of empirical evidence supports the role of short-term debts in reducing agency conflicts between shareholders and creditors (Barclay & Smith, 1995; Guedes & Opler, 1996; Stohs & Maure, 1996; Ozkan, 2000; Dang, 2011). However, Hennessy (2004) shows that debt overhang effect is not reduced by the issuance of future secured debt. Dang (2011) finds that debt maturity is unaffected by growth opportunities and does not mitigate the negative impact of growth opportunities on leverage. Dang (2011) argues that the relative importance of liquidity risk and debt overhang determine the level of leverage and debt maturity.

Previous research conducted by Dang (2011) examines the potential interaction of corporate financing and investment decision that focus more on target leverage (Long-Term Debt + Short-Term Debt). Our paper puts additional emphasis on each of short-term and long-term leverage (current and future condition) to investigate the interaction of corporate financing and investment decisions in emerging markets.

Effects of total leverage on investment are still debatable because of the above-mentioned contradictory theories and empirical evidence. So, the purpose of this research is to understand the dynamic interaction between long-term leverage, maturity, and over (under)- investment in emerging markets as seen from the side of short-term and long-term condition. The existing research on interaction of leverage, maturity and investment decision relies on the UK firms. Emerging market data allows us to take advantage of a considerable cross-country variation in important firm characteristics and institutional settings. Firms in emerging markets have a different legal and institutional setting and underdeveloped stock markets than Anglo-Saxon countries (La Porta et al., 1999). The majority of firms in emerging markets are characterized by highly con-

centrated ownership (La Porta et al., 1999) and limited access to the long-term capital market. Firms in emerging market compared to the US markets have relatively limited options for long-term debts.

2. Theoretical framework and Hypotheses

2.1 Interaction between Long-term Leverage and Investment Decision

Myers (1977) proposed a theoretical model for interactions between leverage, debt maturity, and investment decision under conflicts of interest between debts and shareholders. The potential transferring value of the investment projects results in the debt holders to encourage the firm to significantly decrease positive Net Present Value investment. Hennessy (2004) mentions that leverage does not only reduce the level but also the composition of investment, with underinvestment being more severe for long-lived assets. Even though debts provide the tax shield and other benefits, underinvestment problems reduce optimal leverage of the firm (Johnson, 2003). Then, if the firm has more valuable growth opportunities, it lowers its leverage or shortens the maturity of the debts (Myers, 1977). In contrast, Dang (2011) mentions that there is no strong evidence that by actively alleviating leverage to mitigate debt overhang, firms will be able to make more value-adding investments.

On the other hand, Ogden and Wu (2013) and Wu and Yeung (2012) argue that the growth opportunities and leverage have non-linear relationship because trade-off benefits and cost of debts may alter considerably as the growth opportunities change. A firm with considerable growth opportunities has lower needs to discipline to limit overinvestment or debt overhang (Ogden & Wu, 2013). In contrast, risks related with asset substitution for a firm that has substantial growth opportunities may increase severely. Then those factors related with growth opportunities have negative effects on leverage with non-linear forms.

Effects of total leverage on investment are still debatable because of the above-mentioned contradictory theories and empirical evidence. Simultaneous non-linear effects between growth opportunities and leverage may be seen more in the long-term debt measure than in total debts. Using the short-term debts may invoke a liquidity problem (Johnson, 2003; Childs et al., 2005), but it can reduce the underinvestment problem that has a long-term leverage. Short-term debts can mitigate potential conflicts related with growth opportunities and debt level, but not in the case of long-term debts.

H1: There is a simultaneous nonlinear relation between long-term leverage and growth opportunities.

2.2 Interaction between Leverage and Debt Maturity

Diamond (1993) mentions that shorter debt maturity and leverage are strategic substitutes for controlling debt overhang. Then, firms with growth opportunities always try

to shorten debt maturity so that growth opportunities should never negatively affect leverage (Johnson, 2003). Further, Childs et al. (2005) show that financial flexibility using short-term debts significantly reduces the agency costs of under- and overinvestment. Shortening debt maturity, however, simultaneously can incur various types of new costs related with the liquidity problem of shorter debt maturity (Johnson, 2003; Childs et al., 2005). Childs et al. (2005) also argue that the firm tends to prefer using long-term debt, even though short-term debt can reduce agency cost from under- and overinvestment in the growth option.

Since short debt maturity can mitigate underinvestment problems, it increases leverage. However, it can also simultaneously increase liquidity risk. Then, it can reduce optimal leverage. Given these two counter effects, when choosing debt maturity or level of short and long-term debt, firms would trade off the cost of underinvestment problems against the cost of increased liquidity risk (Johnson, 2003). The less financially flexible the firm, the more it reduces the leverage, but it still cannot shorten the maturity because of liquidity constraints (Childs et al., 2005). Then, the composition of the level of short and long-term leverage is endogenously determined with the trade-off benefits and costs of using short-term debts (Johnson, 2003). Dang (2011) also mentions that the choice of leverage and debt maturity is determined by the relative importance of over- and underinvestment problem.

H2a: There is a negative relationship between debt maturity and investment.

H2b: There is a simultaneous negative relation between long-term debt and short-term debt.

2.3 Interaction between Debt maturity and Investment Decision

Shareholders may underinvest because they do not have incentives to initiate profitable projects when most of the cash flows generated by the project are for debtholders (Myers, 1977). Stockholders may also undertake riskier investment projects since they may obtain larger profits with limited liabilities (Jensen & Meckling, 1976; Diamond & He, 2014). In order to mitigate these conflicts of interest, creditors may act by granting shorter debt maturity to borrowers (Myers, 1977; Childs et al., 2005). Diamond and He (2014) argue that if all debt matures before the investment opportunities, then the firm without debt in place can make investment decisions as if an all-equity firm.

Debt that matures soon should have reduced debt overhang (Childs et al., 2005; Diamond & He, 2014). The value of short-term debt is also less sensitive to the value of the firm. Thus, short-term debt seems to receive a smaller benefit from new investment. It means that short-term debt would reduce overhang more than long-term debt (Diamond & He, 2014).

However, short-term debt has several disadvantages. Short-term debt can reduce investment incentives severely when firm value declines after the debt is issued. Titman and Tsyplakov (2007) and Diamond and He (2014) find that with the costs of adjusting leverage, short-term debt reduces debt overhang but it can trigger earlier de-

fault. The lower sensitivity to firm value of short-term debt implies stronger overhang in bad times (Titman & Tsyplakov, 2007; Diamond & He, 2014). Hennessy (2004) also shows that debt overhang effect is not reduced by the issuance of future secured debt. Further, Childs et al. (2005) claim that even if short-term debt can reduce conflicts of incentives to growth opportunities, this benefit of a reduction of agency costs must be traded off with the cost of liquidity risk of refunding short-term debt. Dang (2011) finds that debt maturity is unaffected by growth opportunities and does not mitigate the negative impact of growth opportunities on leverage. Dang (2011) argues that the relative importance of liquidity risk and debt overhang determines the level of leverage and debt maturity.

Further, in general, the majority of the countries in developing market have a bank-based financial system with limited options for long-term debt outside banks. This institutional condition will reduce the mitigating effects of short-term debt on agency conflicts. Though there is an increase in the liquidity risk using short-term debt, it still can reduce the attenuation of the negative effect of growth opportunities.

H3: Short-term debts have positive effects on investment decision.

Previous research used variable leverage that is measured by total debt divided by market value of equity plus book value of debt. In contrast, we spread variable leverage into two variables. This spread is conducted to determine the relation of each different maturity debt to investment decision. As Myers (1977) mentioned, long-term debts may invoke more substantial underinvestment and overinvestment problem than short-term debts. Long-term debt level has negative effects on the level of investment of a firm. However, variability of debt overhang or the underinvestment problem may depend on the long-term debt level. To a certain level of long-term debts, under- and/or overinvestment problem can increase the related agency cost linearly. In contrast, if the long-term debt level is higher than a certain level, related costs of under/ and overinvestment may increase more rapidly than the lower level.

H4: Long-term debt has nonlinear effects on investment decision.

3 Methodology

3.1 Empirical Models

We specify the leverage equation based on the dynamic partial adjusted model (Flannery & Ragan, 2006), which means we use lagged long-term debt as an independent variable. The determinants of control variables that we used, such as profitability, size, and tangibility, are adopted from Rajan and Zinglas (1995). Then we argument it by including our variables of interest as follows:

$$LTD_{i,t} = \alpha_1 + \alpha_2 LTD_{i,t-1} + \alpha_3 INV_{i,t} + \alpha_4 STD_{i,t} + \alpha_5 GROP_{i,t} + \alpha_6 GROPSQ_{i,t} + \alpha_7 MAT_{i,t} + \alpha_8 GROP * MAT_{i,t} + \alpha_9 TANG_{i,t} + \alpha_{10} SIZE_{i,t} + \alpha_{11} PROF_{i,t} + \mu_i + d_c + \epsilon_{i,t}$$

where LTD, MAT, GROP, GROPSQ INV, TANG, SIZE, PROF present long-term debt, debt maturity, growth opportunities, square of growth opportunities, investments, asset tangibility, firm size, and profitability. μ_i represents the time-invariant unobservable firm, and d_c represents the time-invariant unobservable institutional and regulatory country specific fixed effects, and $\in_{i,t}$ shows the error term in such a way that $\epsilon_{i,t} \sim iid\ (0, \sigma_\epsilon^2)$. Variable definitions can be found in Table 1. We argue the following debt maturity equation of Dang (2011):

$$MAT_{i,t} = \beta_1 + \beta_2 MAT_{i,t-1} + \beta_3 INV_{i,t} + \beta_4 GROP_{i,t} + \beta_5 LTD_{i,t} + \beta_6 STD_{i,t} + \beta_7 GROP * LTD_{i,t} + \beta_8 GROP * STD_{i,t} \beta_9 AMAT_{i,t} + \beta_{10} SIZE_{i,t} + \beta_{11} TERM_{i,t} + \beta_{12} TAX_{i,t} + \beta_{13} CFVOL_{i,t} + \beta_{14} PROF_{i,t} + \tau_i + \omega_c + e_{i,t}$$

AMAT, TERM, TAX, AGE, and CFVOL donate asset maturity structure, term structure of interest rates, tax rate, firm age, and cash flow volatility. τ_i represents the time-invariant unobservable firm, ω_c represents the time-invariant unobservable institutional and regulatory country specific fixed effects, and $e_{i,t}$ the error term in such a way that $e_{i,t} \sim iid\ (0, \sigma_e^2)$. We adopt investment equation based on Aivazian et al. (2005) and extend variables of interest as follows:

$$INV_{i,t} = \gamma_1 + \gamma_2 INV_{i,t-1} + \gamma_3 LTD_{i,t-1} + \gamma_4 LTDSQ_{i,t-1} + \gamma_5 STD_{i,t-1} + \gamma_6 GROP_{i,t-1} + \gamma_7 MAT_{i,t-1} + \gamma_8 GROP * MAT_{i,t-1} + \gamma_9 GROP * LTD_{i,t-1} + \gamma_{10} GROP * STD_{i,t-1} + \gamma_{11} OCF_{i,t-1} + \gamma_{12} CFVOL_{i,t-1} + \gamma_{13} TURN_{i,t-1} + \varphi_i + \pi_c + \varepsilon_{i,t}$$

where OCF donates operating cash flow, φ_i represents the time-invariant unobservable firm, ω_c represents the time-invariant unobservable institutional and regulatory country specific fixed effects, and $\varepsilon_{i,t}$ the error term in such a way that $\varepsilon_{i,t} \sim iid\ (0, \sigma_\varepsilon^2)$.

3.2 Data

We used an unbalanced panel data of several developing countries based on the lists of the International Monetary Fund because the International Monetary Fund list of developing countries is reliable and representative. The countries included are Bangladesh, Brazil, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Pakistan, Philippines, Russia, South Africa, Thailand, Turkey, Ukraine, Venezuela, Vietnam, Argentina, and Poland. Data are collected from *Thomson Reuters Datastream* database from 2006 to 2016 to see changes in capital structures over 10 years in emerging markets. We assume that the last 10 years of data is enough to show the contemporary

corporate financing and investment decisions of emerging markets. We impose several restrictions on the data. First of all, we exclude firms operating in financing sectors and in utilities sectors. Observations that have missing data for the variables of interest are removed. We retain firms that have been observed for five years and more because of the need of lag variables in the estimation process using GMM. We apply the GMM method, because our empirical analysis is conducted with a dynamic panel model that has an inherent endogeneous problem to improve consistency and efficiency of the estimates. Year and country are used as dummy variables to control differences in macroeconomic, government and policy regulations among countries. We apply a two stage least square analysis because we have three simultaneous equations that need instrumental variables that solve the simultaneous bias problem. We winsorize all variables at the 1st and 99th percentiles to attenuate the effects of outliers.

TABEL 1. **List of Country Names & Number of Observations**

No.	Country	Number of Observations	Percentage (%)
1	Bangladesh	180	0.38%
2	Brazil	1860	3.88%
3	China	11540	24.08%
4	Colombia	210	0.44%
5	Hungary	160	0.33%
6	India	11180	23.33%
7	Indonesia	2420	5.05%
8	Malaysia	5830	12.17%
9	Mexico	740	1.54%
10	Pakistan	1120	2.34%
11	Philippines	990	2.07%
12	Russia	900	1.88%
13	South Africa	1640	3.42%
14	Thailand	3140	6.55%
15	Turkey	1920	4.01%
16	Ukraine	190	0.40%
17	Venezuela	30	0.06%
18	Vietnam	1260	2.63%
19	Argentina	420	0.88%
20	Poland	2190	4.57%
Total		47920	100.00%

Source : Data processing (2018)

Even if the total observation we used was 47920 from 20 countries, when we run regression, every regression has less than 47920 observations, because some variables among them are missing (Tables 4, 5). As we see from Table 1, firms from China and India contribute 47% of all observations, while firms from Bangladesh, Ukraine and Venezuela make up less than 1% from the total observations.

3.3 Definition of Variables

The purpose of this research is to understand the interaction among long-term & short-term leverage, Debt Maturity, Growth opportunity and investment in emerging markets. So, we emphasize on the result from those four variables and their interaction with each other. The long-term debt (LTD) can be obtained from Book Value of Long-Term Debt divided by Market Value of Equity and Book Value of Debt. The short-term debt (STD) variables can be obtained from Book Value of Short-Term Debt divided by Total Assets. Growth Opportunity (GROP) has been calculated from the sum of Market Value of Equity and Book Value of Debt divided by total assets. The rationale for using these formulae to measure growth opportunities is the application of Tobin's Q. Tobin's Q is a performance measure of a company by comparing two values of the same asset, whereas total asset as a denominator reflects replacement of costs, and Market Value of Equity as a numerator reflects future prospect value of market. If there is an increasing value, the profit is likely to be obtained. Based on Tobin's Q we assume that an incentive to make new investment capital is high when market value of shares provides benefits in the future. The variable Debt Maturity (MAT) is derived from Long-Term Debt that matures after one year divided by the total debt. Investments Variables (INV) are derived from capital expenditure minus depreciation and then divided by lagged net PPE (Property, Plant and Equipment).

The other additional control variables such as Cash Flow Volatility (CFVOL) are derived from the difference between annual percentage change in EBITD and the average of this change. Variable Asset Tangibility is derived from Net PPE divided by total assets. Variable Size is measured as logs of sales. Variable Profitability (PROF) is derived from EBITD divided by Total Assets. Variable Asset Maturity Structure (AMAT) is derived from Net PPE divided by depreciation. Variable Term structure is obtained from the difference between 10-year government bond and 1-year government bond from each country. Variable Operating Cash Flow (OCF) is calculated from EBIT plus depreciation, then divided by Total Assets. Variable Efficiency of Investment (TURN) is derived from Sales divided by Total Assets. The last one, variable Tax Rate, is derived from the total tax charge divided by pre-tax income.

4. Result and Discussion

4.1 Correlations Between Variables

In this section, we specify the correlation between each variable that has been summarized in Table 2. Growth opportunity variable has the highest correlation with Long-Term Debt and Short-Term Debt. This correlation result shows higher correlation between growth opportunities and leverage level of the firm. Long-Term Debt (Short-Term Debt) has a positive (negative) correlation with Debt Maturity of 0.05 (-0.16). It is consistent with liquidity risk hypothesis that explains that firms with long-term debt maturity (Short-Term Debt Maturity) will face low (high) liquidity risk and will have an incentive to increase (decrease) leverage (Dang, 2011).

Investment has a positive (negative) correlation with long-term debt (short-term debt) of 0.06 (-0.03). This is consistent with underinvestment hypothesis that states that to control the underinvestment problem, firms need to reduce their leverage, without shortening debt maturity.

TABLE 2. **Correlations, Probabilities between Variables**

	Long Term Debt	Short Term Debt	Debt Maturity	Investment	Tax Rate	Asset Maturity Structure	Cash Flow Volatility	Growth Opportunities	Asset Tangibility	Profitability	Term Structure	Operating Cash Flow	Efficiency of Investment	Size
Long Term Debt	1.00													
Short Term Debt	0.02	1.00												
Debt Maturity	0.05	-0.16	1.00											
Investment	0.06	-0.03	0.01	1.00										
Tax Rate	0.00	-0.03	0.02	0.05	1.00									
Asset Maturity Structure	0.13	-0.05	-0.04	0.18	-0.04	1.00								
Cash Flow Volatility	0.00	-0.02	0.01	0.04	0.02	-0.02	1.00							
Growth Opportunities	0.71	0.70	-0.07	0.02	-0.02	0.05	-0.02	1.00						
Asset Tangibility	0.30	0.04	0.02	0.00	-0.03	0.35	-0.01	0.24	1.00					
Profitability	-0.09	-0.22	0.01	0.06	0.17	-0.14	0.11	-0.21	0.04	1.00				
Term Structure	-0.03	-0.03	0.03	-0.04	-0.04	-0.01	-0.01	-0.04	-0.02	-0.19	1.00			
Operating Cash Flow	-0.09	-0.22	0.01	0.06	0.17	-0.14	0.11	-0.22	0.04	0.31	-0.02	1.00		
Efficiency of Investment	-0.18	0.09	0.12	-0.01	0.09	-0.27	0.02	-0.07	-0.11	0.25	-0.04	0.25	1.00	
Size	0.14	0.08	-0.08	0.06	0.11	-0.10	0.03	0.15	0.07	0.24	0.01	0.24	0.27	1.00

Source: Data processing (2018)

4.2 Descriptive Statistics

In this section, we first summarize and discuss the empirical results. We then examine the evidence that supports our hypothesis for the interaction among Long-Term Debt, Short-Term Debt, Debt Maturity and Growth Opportunity and our findings that reject our hypothesis.

Long-term debts and short-term debts have a small portion of 25 percentile, or almost zero. It means that many firms in emerging markets do not use debts as their source of funding. All information regarding debts shows that they use more short-term debt than long-term debt. The debt maturity variable until 75% percentile is still below 1. It is consistent with the short-term debt dominance in emerging markets. In contrast, in the previous research by Dang (2011), Debt maturity of 75% percentile in UK firms

TABLE 3. **Descriptive Statistics of Variables**

Variable	Mean	Std. Dev.	Percentile (25%)	Median (50%)	Percentile (75%)
Long Term Debt	0.118	0.146	0.002	0.062	0.183
Short Term Debt	0.144	0.142	0.027	0.106	0.218
Investment	0.107	0.369	-0.040	0.023	0.147
Debt Maturity	0.711	1.589	0.033	0.376	0.716
Tax Rate (%)	0.163	0.217	0.309	0.158	0.282
Asset Maturity Structure	14.177	12.615	7.149	10.813	16.069
Cash Flow Volatility (%)	-0.077	2.161	-0.451	-0.045	0.377
Growth Opportunities	0.266	0.210	0.089	0.243	0.397
Asset Tangibility	0.345	0.219	0.165	0.326	0.504
Profitability	0.093	0.102	0.050	0.093	0.147
Term Structure (%)	0.709	1.608	0.250	0.680	1.440
Operating Cash Flow	0.099	0.102	0.050	0.093	0.147
Efficiency of Investment	0.890	0.662	0.425	0.756	1.175
Size	6.400	1.217	5.652	6.306	7.004

Source : Data Processing (2018)

is 1. It means, in developed markets, firms use more long-term debt (debt that matures after one year) than short-term debt.

Cash flow volatility shows a relatively big standard deviation of 2.161. It shows that cash flow of the firm in emerging markets is highly volatile. Some countries' cash flow volatility increases a lot during the financial crisis period between 2008 and 2009. In UK firms cash flow volatility between 1996 – 2003 is relatively stable.

Growth opportunities show the mean value of 0.266 and maximum value of 0.397. This score is still below one. It means that growth opportunities in emerging markets are still low compared to developed markets (UK firms), which is indicated by the fact the mean value of Growth opportunities in UK is 1.794 and their maximum value is 9.800.

4.3 Main Results

Table 2 presents the results for three models which adopt the GMM estimator. AR tests suggest that all three models are quite satisfactory. But there is one model, Debt Maturity equation, which shows AR test 4%, a little bit lower than 5%. The number of observations from leverage equation is 42,658. Debt maturity equation has 42,561 observations and Investment equation has 42,842 observations. We also use Year & Country as dummy variables.

TABEL 2. **Regression Results**

	Long-Term Debt	Asset Maturity Structure	Investment
LTD		0.239	
		(0.596)	
LTD (t-1)	0.137***		6.031*
	(0.000)		(0.096)
LTD (t-1)square			10.06*
			(0.091)
STD(t)	-0.834***	1.191**	
	(0.000)	(0.037)	
STD(t-1)			4.430
			(0.147)
GROP(t)	1.054***	-0.803	
	(0.000)	(0.111)	
GROP(t)square	-0.346***		
	(0.000)		
GROP(t-1)			-2.710
			(0.367)
MAT(t)	0.0000		
	(0.977)		
MAT(t-1)		0.818***	0.102
		(0.000)	(0.521)
INV(t)	-0.0044	0.018	
	(0.437)	(0.717)	
INV(t-1)			0.225***
			(0.000)
CFVOL(t)		0.003**	
		(0.031)	
CFVOL(t-1)			-0.002*
			(0.056)
TANG(t)	0.0026	0.067	
	(0.186)	(0.599)	
Size(t)	-0.0016	0.036***	
	(0.167)	(0.000)	
PROF(t)	-0.011**	-0.426	
	(0.030)	(0.138)	
AMAT(t)		-0.000	
		(0.969)	

	Long-Term Debt	Asset Maturity Structure	Investment
TERM(t)		0.002	
		(0.196)	
OCF(t-1)			0.113
			(0.369)
TURN(t-1)			0.039
			(0.402)
TAX(t)		0.060	
		(0.000)	
GROP*LTD(t)		0.746	
		(0.159)	
GROP*LTD(t-1)			-11.67***
			(0.005)
GROP*STD (t)		-0.756	
		(0.261)	
GROP*STD(t-1)			-1.076
			(0.791)
GROP*MAT(t)	0.014		
	(0.329)		
GROP*MAT(t-1)			-0.839
			(0.263)
Estimators	GMM	GMM	GMM
Number of Observations	42658	42561	42842
Year Dummy	Yes	Yes	Yes
Country Dummy	Yes	Yes	Yes
AR(1) test	-4.62, (0.00)***	-10.77, (0.00)***	-19.62, (0.00)***
AR(2) test	-1.85, (0.06)*	-0.84, (0.04)**	-0.02, (0.98)

** p<0.10, ** p<0.05, *** p<0.01*

The first columns in Table 2 report the result for leverage equations. The coefficient on Short-Term Debt is found to be significantly negative at the 1% significance level and coefficient -0.834. This finding supports Dang (2011), who claimed that a firm with a short-term debt maturity structure faces a potential liquidity risk problem, which can be mitigated by adopting a low-leverage policy. In contrast, firms with long-term debt face a less severe liquidity risk and will be able to use more leverage. This finding supports our hypothesis H2b, i.e. there is a simultaneous negative relation between long-term debt and short-term debt. Previous research conducted by Dang (2011), using UK company data between 1996-2003, did not examine short-term debt relation to

Leverage, Debt Maturity and Investment in his model. Previous research used variable leverage that included both Short-Term and Long-Term Debt. Our research examined both of these variables separately to understand the impact of interaction between corporate financing and investment decision in a short term.

The GROP variable is significant at 1% and has 1.054 coefficient. Other than that, $GROP^2$ variable is negatively significant at 1% which has -0.346 coefficient. This result supports our H1, which states that 'there is a simultaneous non linear relation between long-term leverage and growth opportunities.' Leverage in developing countries will not be negatively affected by growth opportunity if the firms have lower leverage, but if they increase their leverage higher, their growth opportunity could negatively affect leverage. This is consistent with Ogden and Wu (2013), Wu and Yeung (2012) that there are trade-off benefits, and the cost of debt may alter considerably as the growth opportunities change. In previous research conducted by Dang (2011) in UK firms, Growth Opportunity had a significantly negative relation with Leverage. It means firms with growth opportunities control underinvestment problem by reducing their leverage without shortening debt maturity.

The second columns report the results for Debt Maturity equation. Short-Term Debt variable has significant positive effect on Debt maturity structure at 5% significance level and coefficient 1.191. This result is consistent with Myres (1977), who suggests Short-Term Debt as a possible solution to the Debt overhang problem. This extends the idea that, if all debt matures before investment opportunity, firms without debt can make investment decisions as if they were all-equity firms. Following this logic, debt that matures soon should have reduced overhang. So, it can be concluded that Short-Term Debt has a positive relation with Debt Maturity to reduce the Overhang Effect. Variable investment has positive relation but not significant. So, this result does not support our H2a hypothesis because there is no negative relationship between debt maturity and investment. Previous research only focused on the relation between Debt Maturity and Growth Opportunities and found that there was no significant relation between them, which is also consistent with our result.

The third columns report the results for Investment equation. Lagged Long-Term Debt has a weakly influence on investment because it has 10% significance level and 6.031 coefficient. This result supports our hypothesis H4 that long-term debt has non-linear effects on investment decision. Myres (1977) mentioned that the variability of debt overhang or underinvestment problem may depend on the long-term debt level. At a certain level of long-term debt, an underinvestment problem can occur. But, if the long-term debt level is below the certain level, underinvestment will not occur. Previous research shows that Lagged leverage is negatively related to firm investment at 1% significance level, which supports the prediction of agency theory. Previous research used variable leverage that is measured by total debt divided by market value plus book value of debt, whereas we use long-term debt only to examine the individual relation to investment.

Lagged investment is positively significant at 5% significance level, supporting the existence of an accelerator effect in which current investment is determined by past investment. Our results are consistent with the previous research by Dang (2011). However, the other variables that have a negatively significant relation to investment at 1% significance level and coefficient -11.67 are Lagged Growth Opportunities x Lagged Long-Term Debt. This result supports the previous research by Dang (2011) and Myres (1977) that Growth opportunities and Long-Term Leverage should have negative relation to investment. Myres (1977) demonstrates that in high-growth firms with risky debt managers acting in the interest of shareholders may forgo positive Net Present Value projects, because the payoff of these projects would at least partially accrue to debt-holders, hence leading to an underinvestment or Debt Overhang Problem. Lagged Short-Term Debt has positive effect on investment but not significant. This finding does not support our hypothesis H3.

4.4 Robustness Test

We divide firms based on the median of size. When the size is bigger than the median, we regard it as a big firm. When the size is smaller than the median, we classify this as a small firm. In this section, we conduct robustness test for size. We mostly obtain similar results to the main result. It means that each variable on the robustness test shows the same direction of each coefficient with the main result. However, differences are of the significant value for several variables. First, Long-Term Debt equation for a small size, variable Grop*Mat(t) is significantly positive at 5 %, whereas our empirical result finds that interaction between growth opportunity and Debt Maturity has positive but not significant relation toward the long-term leverage. Second, the robustness test on both small and big size in the Debt Maturity Equation shows that several variables are significant toward Debt Maturity, otherwise in our main result, Short-Term Debt is the only significant variable toward Debt Maturity. In the investment equation, the lagged Debt Maturity variable is significant at 5% but our main result shows that such a variable is insignificant. The interaction variable between growth opportunity and lagged Long-term debt is significantly negative at 1% in our regression result. On the other hand, the variable of interaction between growth opportunity and lagged long-term debt in our robustness test in insignificant.

5. Conclusions

This paper examines the simultaneous interaction of long-term & short-term leverage, debt maturity, and investment in emerging markets (Bangladesh, Brazil, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Pakistan, Philippines, Russia, South Africa, Thailand, Turkey, Ukraine, Venezuela, Vietnam, and Argentina). Previous research has already examined the interaction of corporate financing and investment decisions in developed markets.

Our results show some points of view. Using the company data in emerging countries over the period 2006 – 2016 we find that: First, firms in emerging markets prefer to use short-term debt to long-term debt to minimize the underinvestment problem. Second, there is a simultaneous nonlinear relation between long-term leverage and growth opportunities in a firm in an emerging market. Third, long-term debt has nonlinear effects on the investment decision in emerging market firms. Our results reinforce the view of La Porta et al. (1999) that firms in emerging markets are characterized by highly concentrated ownership and have relatively limited options for long-term debts. It can be concluded that firms in emerging markets have different characteristics with regard to their capabilities to manage the interaction between leverage, maturity and investment compared to developed markets.

5.1 Managerial Implications

Based on the results, managers in high-growth firms can mitigate the underinvestment problem without lowering their leverage, but they need to use short-term debt instead of long-term debt. Debt matures before investment opportunity, so they can take the investment opportunity because there is no debt to bear. Managers in high-growth firms do not have to worry about long-term leverage, because long-term leverage and growth opportunities have a non linear relation. As long as their long-term debt is below a certain level, it would not lead to the underinvestment problem.

5.2 Limitation

However, we also realize that our study has a particular limitation and it still needs further exploration in broader contexts. Our research does not examine the macroeconomic conditions and legal differences among each country in emerging markets. It would be worth expanding the topic into macroeconomic and legal regulations for future research.

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Appendix

TABLE 5. **Robustness Test for Size**

	Long Term Debt (1) (Small)	Long Term Debt (2) (Big)	Debt Maturity Structure (1) (Small)	Debt Maturity Structure (2) (Big)	Investment (1) (Small)	Investment (2) (Small)
LTD(*t*)			0.658***	0.153		
			(0.000)	(0.419)		
LTD (*t*-1)	0.0371***	0.032***			4.344	9.173
	(0.000)	(0.000)			(0.185)	(0.261)
LTD^2(*t*-1)					9.059	-2.176
					(0.152)	(0.691)
STD(*t*)	-0.942***	-0.987***	1.131***	0.461**		
	(0.000)	(0.000)	(0.000)	(0.030)		
STD(*t*-1)					3.000	6.221
					(0.438)	(0.316)
GROP(*t*)	1.236***	1.459***	-0.713***	-0.400**		
	(0.000)	(0.000)	(0.000)	(0.016)		
GROP^2(*t*)	-0.466	-0.696***				
	(0.000)	(0.000)				
GROP(*t*-1)					-2.037	-4.227
					(0.469)	(0.566)
MAT(*t*)	-0.000	0.003				
	(0.782)	(0.012)				
MAT(*t*-1)			0.782***	0.840***	0.164	0.229**
			(0.000)	(0.000)	(0.231)	(0.042)
INV(*t*)	0.000	0.000	0.015	-0.074**		
	(0.961)	(0.382)	(0.427)	(0.006)		
INV(*t*-1)					0.237***	0.213***
					(0.000)	(0.000)
CFVOL(*t*)			0.001	0.002		
			(0.382)	(0.073)		
CFVOL(*t*-1)					-0.003**	-0.001
					(0.065)	(0.564)
TANG(*t*)	-0.008	-0.012***				
	(0.020)	(0.004)				
Size(*t*)	-0.005***	-0.008***	0.020***	0.014***		
	(0.001)	(0.000)	(0.000)	(0.006)		
PROF(*t*)	-0.003	0.004				
	(0.626)	(0.545)				
AMAT(*t*)			0.000	0.001***		
			(0.366)	(0.000)		
TERM(*t*)			0.002*	0.001		
			(0.074)	(0.429)		
OCF(*t*-1)					0.190**	-0.084
					(0.085)	(0.652)
TURN(*t*-1)					0.003	0.049
					(0.946)	(0.322)
TAX(*t*)			0.012	0.032***		
			(0.283)	(0.010)		
GROP*LTD(*t*)			0.399**	0.368**		
			(0.022)	(0.024)		
GROP*LTD(*t*-1)					-10.84**	-3.905
					(0.022)	(0.348)
GROP*STD (*t*)			-0.973***	-0.051		
			(0.000)	(0.799)		
GROP*STD(*t*-1)					0.196	-2.460
					(0.959)	(0.550)
GROP*MAT(*t*)	0.054**	0.014				
	(0.044)	(0.193)				
GROP*MAT(*t*-1)					-0.266	-1.532*
					(0.720)	(0.027)
Estimator	GMM	GMM	GMM	GMM	GMM	GMM
Number of Observations	21,225	21,433	21,273	21,288	21,317	21525
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummy	Yes	Yes	Yes	Yes	Yes	Yes
AR(1) test	-3.54 ,Pr= 0.00***	-3.94,Pr= 0.00***	-7.10, Pr=0.00***	-9.09, Pr= 0.00***	-14.91, Pr= 0.00***	-12.26,Pr= 0.00***
AR(2) test	-1.48,Pr= 0.14	-3.24,Pr= 0.001***	-0.21, Pr= 0.83	-0.96, Pr= 0.33	0.44,Pr= 0.66	-0.87,Pr= 0.38

* p<0.10, ** p<0.05, *** p<0.01

TABLE 6: **Variable Definitions**

No.	Variable	Definition
Panel A: Leverage Equation		
1	Long-term debt [LTD]	Book value of long-term debt divided by the market value of equity plus book value of debt;
2	Growth Opportunities [GROP]	Market value of equity plus book value of debt divided by total assets;
3	Asset Tangibility [TANG]	Net property, plant, and equipment (PPE) divided by total assets;
4	Profitability [PROF]	Earnings before interest and tax plus depreciation (EBITD) divided by total assets;
5	Size [SIZE]	Log of sales.
Panel B: Maturity Equation		
1	Debt maturity [MAT]	Long-term debt that matures after one year divided by total debt;
2	Asset maturity structure [AMAT]	Net property, plant and equipment(PPE) divided by depreciation;
3	Term structure [TERM]	Difference between 10-year government bond and 1 year government bond;
4	Tax rate [TAX]	Total tax charge divided by pre-tax income;
5	Cash flow volatility [CFVOL]	Difference between annual % change in EBITD and average of this change.
Panel C : Investment Equation		
1	Investment [INV]	Capital expenditure less depreciation divided by lagged PPE;
2	Operating cash flow [OCF]	EBIT plus depreciation divided by total assets;
3 4	Efficiency of investment [TURN] Short-term debt [STD]	Sales divided by total assets; Book value of short-term debt divided by total assets.