Impact of Debt Maturity Structure on Firm Investments of Vietnam listed Companies in the Construction Industry

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ABSTRACT:
This study examines the impact of debt maturity structure on corporate investment of Vietnam listed companies in the construction industry. Using a set of panel data collected from 82 Vietnam listed construction companies from 2010 to 2016, we run Fixed Effects Model (FEM) and Random Effects Model (REM) regressions. We find evidence of a positive relationship between the amount of long term debts and investments in the construction industry. It implies that long term debts may play an important role in the growth of firms.

Keywords*: debt maturity structure, long term debt, investment efficiency, FEM, REM.*

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1. INTRODUCTION

Financing and investment decisions are important in Corporate Finance. All managers aim to make right decisions to increase firm value. It is their primary goal. In recent year, several empirical studies have investigated a relationship between the maturity structure of corporate debts and corporate investment (Aivazian et al. (2005), Viet A. Dang (2011), Aygun et al. (2014)). However, these studies reveal mixed results. The impact of firm's debt maturity structure on its investment has been significantly positive or negative.

In Vietnam, the topic of debt structure and its impact on investment was not fully investigated. No empirical study has explored an association of the effect of firm's debt maturity structure on its investment with a particular industry sector. This paper investigates the impact of debt maturity structure on firm investment in the construction industry in Vietnam. The main reason of choosing this industry is because this industry sector plays an important part in the state budget and the development of the Vietnamese economy. According to the General Statistics Office (GSO), the construction value in 2016 was $47.3 billion, an increase of 10.1 percent over in 2015. In addition, the development of firms in the construction industry has contributed to solve the unemployment problem and also help Vietnamese workers to improve their working skills. And this development is expected to invite domestic and foreign capitals to Vietnam and to support Vietnam to be industrialized by 2020. However, this industry has been exposed to many challenges. One of them is how to increase investments of firms to compete in domestic and foreign markets. We wonder whether a debt maturity structure may affect investment decisions, thereby maximizing corporate value in this construction industry. These firms, as a result, improve sustainability in the future and contribute to socio - economic development of Viet Nam.

We believe long term financing sources will stabilize firms in the industry and encourage them to consider investments. It is well known that a construction project starts with a large amount of debts because a project hosting firm generally does not have liquidity enough to start the project. The costs of construction are partially reimbursed as the project makes a progress. The hosting firm uses reimbursement to pay the debts and their interests which easily turn out to be additional financial burdens to the hosting firm. Under this situation, rather than short term debts, the firm may choose long term debts improving financial flexibility and stability as a source to investments. Long term debts may prompt investments in fixed assets and promote growth and competitiveness of firms in the capital-oriented construction industry. Thus we believe long term debts (debt maturity structure) may positively relate to investments.

Using eighty-two Vietnamese firms information in the construction industry, we explore the argument above and find a positive relationship between long term debts and investments in fixed assets. This finding shows the important role of debt maturity structure to support growth in the capital-oriented construction industry. It also implies that without long term financing sources, firms in the construction industry may be very limited to stay competitive and promote growth. Firms may need to develop long term financing sources.

The rest of the paper is organized as follows. Section 2 reviews the theoretical underpinnings of the linkage between debt maturity and firm investments. Section 3 presents research methodology. Section 4 presents results and discussion and Section 5 shows conclusion.

2. LITERATURE REVIEW

Miller & Modigliani (1958) argue that a firm's financing and investment decisions are independent in a perfect capital market. In an incomplete market, however, agency problems, the level of leverage, and its maturity composition cause under-investment or over-investment in which corporate financing decisions are interrelated.

Myers' under-investment hypothesis (1977) points out that debt maturity can affect corporate investment. Firms can resolve their under-investment problem by shortening of the maturity of debt to enable refinancing before the investment option expires. If the debt maturity shortens, firms will easily and flexibly adjust the capital structure to invest in positive NPV investment projects satisfying both bondholders and shareholders. Thus compared to firms with short-term debt maturity, firms with long-term maturity debt are less likely to tap into valuable growth opportunities.

Alternatively, Jensen (1986), Stulz (1990) and Hart and Moore (1995) argue that debt effectively restrain over-investment. By enlarging repayment obligations, increasing debts not only curtail free cash flow but also raise the possibility of corporate bankruptcies. The bankruptcy concern limits corporate managers from over-investing in risky projects but promotes selling off unprofitable business divisions.

Barclay and Smith (1995) examine determinants of financial leverage and debt maturity. Their findings show strong support for the contracting-cost hypothesis. Firms with low growth options tend to have more long-term debts in their capital structure than others with high growth opportunity. They document that a relationship between debt maturity and leverage is significantly negative. In addition the market to the book value ratio is a statistically significant determinant of debt maturity.

Stohs & Mauer (1996) show that firms trade off between benefits and costs of alternative debt maturity structures by considering under-investment costs of debt, signaling effects of debt, liquidity risk, asset maturity structure, and tax status. Debt maturity is negatively associated with a firm's effective tax rate and risk. Debt maturity is directly related to asset maturity. These results show strong support for Diamond's (1991) liquidity risk theory and the implied non-monotonic relationship between debt maturity structure and bond ratings.

However, most of these earlier studies focus on the factors that determine debt maturity in capital structure. These studies do not provide direct evidence on the effect of debt maturity on investment expenditures. The research of Aivazian et al. (2005a) is the first empirical study examining whether and to what extent debt maturity influences firm investment. They used a panel data set of US firms over the period 1982-2002. This study shows the maturity structure of a company's debt has a significant impact on its investment decisions. By controlling for the effect of financial leverage, they show that a company with a large proportion of long-term debts significantly reduces investment. The correlation between debt maturity and investment, by contrast, is not significant for firms with low growth opportunities. These results provide evidence supporting Myers' (1977) hypothesis that long maturity debt causes under-investment costs.

Dang (2011) investigates the effects of growth opportunities on leverage and debt maturity as well as the effects of financing decisions on firm investment, using data from 678 UK companies in the period from 1996 to 2003. He shows that firms with high growth opportunity tend to control under-investment incentives by reducing leverage rather than by shortening debt maturity. Leverage has an adverse effect on firm investment levels, which is consistent with the over-investment hypothesis regarding the disciplining role of leverage for firms with limited growth opportunities. In contrast with Aivazian et al. (2005a), this paper finds that debt maturity does not have a direct negative impact on investment.

Tekçe (2011) tests the relationship between the maturity of debt and investment level using data from Turkish firms listed in Istanbul stock exchange. This study uses panel data using 2SLS regression since debt maturity may cause endogeneity problem. Tekçe finds that debt maturity is positively associated with investment. However, this relationship holds only for low levered firms. Enterprises may solve under-investment problem by decreasing leverage rather than shortening debt maturity. Liquidity risk is another explanation on why companies prefer longer term maturity. Firms may try to finance their investments by longer term debt to immunize themselves from liquidity risk.

Rashedi and Zadeh (2015) examine the relationship between debt maturity and fixed assets investment, using the financial information of 113 industrial firms listed in Tehran Securities Exchange in the 2004 - 2014 period. They provide evidence that debt maturity structure has a significant effect on investment decisions. However, additional tests on high and low growth opportunities show that there is no meaningful relationship between debt maturity structure and fixed assets investment in low growth companies. But this relationship in high growth firms is significant at the 10% level.

In Vietnam, the number of empirical studies about the effect of the firm's debt maturity structure on investments is still limited. Many studies simply focus on the factors that determine debt maturity in capital structure. There has been very little research focusing on the effect of debt maturity on investments. Tran et al. (2013) analyze the effects of financing decisions on investment decisions and relationships among leverage, debt maturity structure, growth opportunity and investment. They use a system-based model with three structural equations of leverage, debt maturity and investment as endogenous variables. One hundred companies listed on HOSE and HNX during the period of 2007 to 2012 are tested. Their findings show that financial leverage in Vietnamese companies has a negative correlation with investment decision.

3. RESEARCH METHODOLOGY

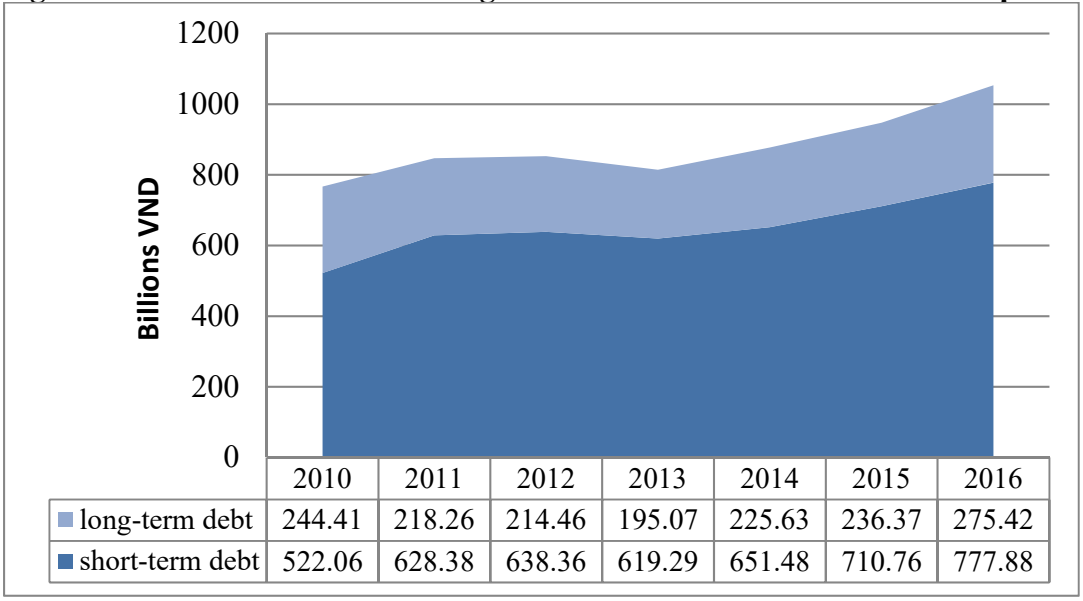
3.1 Methods of data processing

This study examines a sample of 82 Vietnam firms in the construction industry listed on Ho Chi Minh Stock Exchange (HOSE) and Hanoi Stock Exchange (HNX) over a period of 7 years (2010 - 2016). Data are collected from the firm's financial statements available in Stoxplus and www.vndirect.com.vn.

In the purpose of examining the impact of debt maturity structure on firm investments, this study uses panel data including two components: cross - section and time series. We use the Stata 12 software and two estimation methods in regression models: Random Effect Model (REM) and Fixed Effect Model (FEM).

3.2 Debt maturity structure of construction companies listed in the Vietnamese stock market

Figure 3.1 Short-term debt and long-term debt of listed construction companies



	2010	2011	2012	2013	2014	2015	2016
long-term debt	244.41	218.26	214.46	195.07	225.63	236.37	275.42
short-term debt	522.06	628.38	638.36	619.29	651.48	710.76	777.88

Source: Stoxplus and www.vndirect.com.vn

In Figure 3.1 long-term debts are loans and financial obligations lasting over one year. Short-term debts are borrowing due within one year. There is an upward trend in the size of debt over the period. An average total debt amounts of firms in the construction industry increased from 766.47 billion VND to about 1,053.30 billion VND. Interestingly this increase of total debt is caused by a sharp rise in the short-term debt amount, from 522.06 billion VND in 2010 to 777.88 billion VND in 2016. The ratio of short-term debt / total debt also increased from 68% to 74%. On the other hand long-term debt amounts accounted for a small proportion of total debt and show no big change during a 7-year period, ranging from 195.07 billion to 275 billion. Though not shown here, in 2016, fifteen firms out of eighty two firms had no long-term debt. It seems that many Vietnam construction firms prefer to use short-term debts over long-term debts. We believe this finding may reflect the character of construction business in which a construction project generally starts with debts. A project-hosting construction firm will be gradually reimbursed and pay debts as the project makes a progress. Thus the firm planning its work schedule may know when reimbursement will happen and prefer to use short term debts over long term debts to save financing costs.

3.2 Hypotheses and Research Model

Bülent Tekçe (2011) and Rashedi and Zadeh (2015) show that the maturity structure of a firm's debt has a positive effect on its investment decisions. But there are also empirical results indicating the negative correlation between debt maturity and firm investment (Aivazian et al., 2005a) or debt maturity does not directly affect the investment decision of firm (Viet A. Dang, 2011). However we believe in the construction industry firms need to do capital oriented investments for their growth. Short term debts may support daily operations and reduce financing costs whereas easily cause firms to be financially distressed when a construction project is not progressed or delayed. Short term debts also enforce firms to focus on liquidity, rather than

investments and growth. On the other hand long term debts may provide liquidity and financial flexibility but cause higher financing costs than short term debts. Thus if financing costs from long term debts are manageable, a firm may rely on long term debts for capital-oriented investments. We hypothesize long term debts may positively associate with investments whereas short terms debts do not in the construction industry which requires various capital-oriented investments.

Basing on the research of Aivazian et al. (2005a) and Odit & Chittoo (2008), we propose the following model to test our hypothesis below:

$$INV_{i,t} = \alpha_0 + \alpha_1 MAT_{i,t-1} + \alpha_2 INV_{i,t-1} + \alpha_3 SALE_{i,t-1} + \alpha_4 LEV_{i,t-1} + \alpha_5 ROA_{i,t-1} + \alpha_6 LIQ_{i,t-1} + \alpha_7 CFO_{i,t} + \alpha_8 SIZE_{i,t-1} + \varepsilon_i$$

Following Lang et al. (1996), Aivazian et al. (2005a), Odit & Chittoo (2008), Viet A. Dang (2011), Trang & Quyen (2013), and Rashedi & Zadeh (2015), we use (net) investments in fixed assets (INVi,t) as a proxy for investments in the construction industry. INV is measured by a ratio of purchase price minus residual value of Fixed Assets minus depreciation to Net Fixed Assets.

The explanatory variable representing the maturity structure of a firm is MATi,t-1, measured by a ratio of Long-Term Debts to total Debts.

A lagged variable of INV (INVi,t-1) controls firm's investment pattern. Firms tend to consider past investment decisions and outcomes as references for future investment decisions. If an investment in the previous year ends up with great success, a firm would step up their following-up investments to meet an expected coming demand. Studies conducted by Aivazian et al. (2005a) and Viet A. Dang (2011) have shown empirical results confirming that the previous year's investment has a positive impact on the investment decision next year. On the other hand if a firm realizes a market is saturated or does not intend to expand production due to some reasons, the investment may be slow down. Hovakimian & Titman (2003) supported this finding by showing evidence that a past investment negatively related with a future investment. There are also the following control variables: SALEi,t-1 (Fixed Assets Turnover, measured by a ratio of net revenue to Net Fixed Assets), LEVi,t-1 (Leverage, measured by a ratio of Total Liabilities to Total Assets), ROAi,t-1 (Return On Assets, measured by a ratio of Net Profit after Tax to Total Assets), LIQi,t-1 (Liquidity, measured by a ratio of Short-term Assets to Short-term Debt), CFOi,t (Operating Cash Flow, measured by a ratio of Operating Cash Flow to Net Fixed assets in the previous year) and SIZEi,t-1 (Measured by the natural logarithm of Total Assets).

4. RESULTS AND DISCUSSION

4.1. Descriptive Statistics

The information on mean, standard deviation, minimum value and maximum value of the research variables in model 1 is shown in Table 4.1.

Table 4.1. Descriptive Statistics for model 1

Variable	Obs	Mean	Std. Dev	Min	Max
INV	574	0.0633237	0.7931105	-2.066367	13.93256
MAT	574	0.1570378	0.2009432	0	0.9476046
SALE	574	10.90345	20.08923	0.1605299	210.3296
LEV	574	0.6721177	0.1722901	0.073379	0. 9918127
LIQ	574	1.414288	0.5846287	0.2646478	5.284931
ROA	574	0.0273115	0.0492424	-0.4174652	0.2273578

CFO	574	0.0519376	3.943864	-38.38071	39.12276
SIZE	574	26.95907	1.264476	23.88595	31.08692

Debt maturity structure (MAT) has a relatively low average value (only about 15%), which confirms that firms operating in the construction industry primarily rely on short-term debts. The average value of INV is much smaller than its standard deviation. It suggests that during this period many of the firms had a wide range of investment amounts.

4.2. Correlation coefficient

Table 4.2 provide the correlation coefficient between variables in the model. According to Dong & Minh (2013), the coefficient of correlation between variables has an absolute value greater than 0.8 can be considered as a multi-collinear model. However, the results from Table 4.2 show that the correlation between variables is acceptable because no correlation coefficient is too large.

Table 4.2. Correlation matrix for variables in model 1

	INV	MAT	SALE	LEV	LIQ	ROA	CFO	SIZE
INV	1.0000							
MAT	0.0847	1.0000						
SALE	-0.0680	-0.2263	1.0000					
LEV	-0.0263	0.2407	0.0846	1.0000				
LIQ	-0.0846	0.1170	-0.0431	-0.5153	1.0000			
ROA	0.0913	-0.1029	-0.0687	-0.3940	0.1543	1.0000		
CFO	0.0301	-0.0733	0.1677	-0.0098	-0.1861	0.0003	1.0000	
SIZE	0.0506	0.3725	-0.0669	0.4562	-0.2985	-0.0850	-0.0272	1.0000

4.3. Empirical results

4.3.1. The linear impact of debt maturity structure on firm investments

To test our hypothesis, a regression model is used for all sample. Table 4.3 show the results of the Hausman test: Prob> chi2 = 0.0002 <0.05. In this case, we can affirm that FEM is more appropriate than REM to assess the impact of debt maturity structure on corporate investment.

Table 4.3. Regression results of all sample

	FEM	REM
MAT(-1)	0.9716169	0.4581712
	(0.005)	(0.004)
INV(-1)	- 0.020806	- 0.0004079
	(0.002)	(0.205)
SALE(-1)	0.0044928	0.003386
	(0.048)	(0.031)
LEV(-1)	- 0.9985611	- 0.6716617

	(0.110)	(0.003)
LIQ(-1)	- 0.2886961	- 0.1405746
	(0.002)	(0.021)
ROA(-1)	- 0.0965545	- 0.2154783
	(0.910)	(0.737)
CFO	0.1342354	- 0.0052476
	(0.592)	(0.429)
SIZE(-1)	0.3136138	0.0174633
	(0.018)	(0.449)
Observations	492	492
Hausman Test	chi2 =	29.79
	Prob>chi2 =	0.0002

The regression result of all sample in Table 4.3 indicates that MAT variable has a positive influence on INV variable. This finding has statistical significance at 5% and supports our hypothesis. Specifically, MAT has a coefficient of 0.9716169 in the FEM model. In fact, if firms use more their long-term debts than short-term debts, they can maintain financial sustainability and flexibility for investments in long-term assets such as fixed assets. We believe this argument may well fit to the construction industry in which needs large capital investments in fixed assets to promote growth. This finding is also supported by the studies of Tekçe (2011), Aygun et al. (2014). However, it contradicts the empirical result of Aivazian et al. (2005a) showing debt maturity structure has a negative impact on firm investments. This difference may come from the characteristics of the construction firms in Vietnam. Investment projects often take place over a long period. Using short-term debt can cause firms to face liquidity risk. Therefore, if a firm appropriately uses long-term debts, there will be positive impacts on investments.

In terms of the control variables in the model, the lagged INV (-1) variable has a negative impact on the on INV variable. It is statistically significant at 5%. The coefficient of the INV (-1) in the FEM model was -0.020806. This means that there is no accelerator effect *on* investment for firms in this industry. SALE (-1) (Fixed Assets Turnover) has a positive impact on investments at the 5% significance level. The estimated coefficient of SALE (-1) is 0.0044928, which implies that firms tend to increase investments (in fixed assets) when the profitability improvement of the previous year are noticed. SIZE (-1) variable has a positive effect on the INV variable. At a significance level of 5%, the coefficient of the SIZE (-1) in the FEM model is 0.3136138 and statistically significant. This result is consistent with an empirical study of Bülent Tekçe's (2011). Large-size firms often have more internal cash flows than small-size ones and have an advantage to accessing to a large amount of their collaterals and easily inviting external capitals.

Meanwhile, with a significance level at 5%, the remaining control variables, LEV (-1) and ROA (-1) have negative impacts on firm investments whereas CFO has a positive influence. However, these variables have no statistical significance in the model.

5. CONCLUSION

This study examines the effect of debt maturity structures on investment decisions of 82 Vietnam listed construction companies during the period of 2010 to 2016. Our empirical results indicate that debt maturity structure (long term debts) has a positive impact on firm investment in construction industry. Based on the results of this study, we recommend that firms in the research group should to consider long term financing sources to improve investments and associated

growth opportunities in the construction industry. However, firm managers need to consider the analysis of financing costs and other factors to find a suitable structure for the industry.

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