VNU Journal of Science: Economics and Business, Vol. 33, No. 5E (2017) 26-39

Institutional Quality Matters and Vietnamese Corporate Debt Maturity

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Received 4 December 2017
Revised 15 December 2017; Accepted 25 December 2017

Abstract: This article studies whether firm-level and country-level factors affect a corporation's debt maturity in the case of Vietnam or not. The paper adopts the balance panel data of 267 listed companies on the two Vietnamese trading boards, HOSE and HNX, in the period from 2008 to 2015, estimated by the FEM, REM, 2SLS and GMM method. For intrinsic factors, research results show that financial leverage and default risk control have a high positive statistical significance with debt maturity, but tangible assets are lower than those factors. In addition, growth opportunities and company quality have negative impacts on debt maturity. For external factors, the results point out that economic growth, stock market development and governmental regulation efficiency demonstrate a positive relationship with debt maturity with fairly low correlation levels. In spite of that, the inflation rate, financial development, the rule of law, corruption control and the rights of creditor factors have negative correlations with debt maturity.

Keywords: Debt maturity, long-term debt ratio, GMM system, firm-level factors, country-level factors.

1. Introduction

Vietnam - a Southeast Asian country - has increasingly had an intimate relationship with the world economy as the countries in the region have become more collaborative and economic institutions have developed. The IMF forecast Vietnam's GDP grow to be 6.5% in 2017 and at 6.3% in 2018. These predictions will attract foreign capital flows as well as the attention of global investors that will facilitate Vietnamese business financing. Planning capital structure, which plays a key role in corporate governance, is a factor directly impacting on business value and income increase for shareholders.

Recently, research on corporate finance management into the optimal debt ratio has continued and extended into decision on debt maturity structure. Such decisions play an important role in a company. They can both affect investment decisions in terms of the cost of capital and influence dividend decisions in terms of cash flow. At present, corporate debt maturity structure is studied in not only developed economies such as those of Barclay and Smith (1995) [1] and Terra et al. (2012) [2] but also in emerging economies such as those of Cai et al. (2008) [3], Deesomsak et al. (2009) [4], Wang et al. (2013) [5], Lemma and Negash (2012) [6] and Costa et al. (2014) [7].

Vietnamese economic environment integration and the important role of debt maturity structure motivate us to research the topic for Vietnamese listed companies to answer the question: Have firm-level and

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https://doi.org/10.25073/2588-1108/vnueab.4099

country-level factors impacted the debt maturity selection decisions of enterprises in Vietnam? If yes, how great are their impacts?

2. Literature review

2.1. Background theory

* Pecking order theory

Pecking order theory was introduced by Myers and Majluf (1984) [8] and expanded by Lucas and McDonald (1990) [9]. The theory says that corporates usually use available internal financing, mainly from retained profits, and prefer debt rather than equity when they need to finance from outside. The new equity issuance is often the last resort when their debt capacity has run out and financial default is threatening.

* Signaling theory

Signaling theory, introduced by Flannery (1986) [10] and Diamond (1991) [11], is based on the pecking order theory of Myers and Majluf (1984) [8] with a hypothesis about the asymmetric information between inside investors (shareholders, managers) and outside ones (debtors). Flannery (1986) [10] and Diamond (1991) [11] used different research methods, but came to the same conclusion. The conclusion is that high credit-rated and well-performed companies will prefer short-term liability. However, the most important difference between the two studies is a company classification in which Diamond (1991) [11] divided Flannery's inferior types into medium and low credit-rated companies. While Flannery (1986) [10] showed that both of the two types will prefer long-term debt, Diamond (1991) [11] indicated only the medium credit-rated companies would. The low credit-rated ones will initially be forced to borrow short-term debt because they have high risks.

* Maturity-matching theory

According to Morris (1976) [12], if debt maturity does not match asset maturity then that could cause liquidity problems. The shorter debt maturity could make the generated cash flow from assets not meet the due debt payments. The longer debt maturity would cause the problem of unavailable cash for paying debts when the assets are no longer profitable. Corporate solvency depends on the return on assets, so debt maturity should match asset maturity.

* The agency cost theory

Myers (1977) [13] and Barnea et al. (1980) [14] developed the agency cost theory of Jensen and Meckling (1976) [15]. While Myers (1977) [14] only focused on the conflict between shareholders and creditors, Barnea et al. (1980) [14] added the relationship between shareholders and CEOs. In spite of solving agency problem by various methods, both of them recognized that companies choose debt maturity structure to reduce agency costs.

* Institutional theory

Douglas North (1990) [16] said that institutions exist when people create the bindings or game rules to control their interactions in society, then written rules, laws and regulations and unwritten rules, and conventions are established. Companies will incur transaction costs and information costs from these rules. Institutional framework improvement reduces the cost of business. If institutions lack good operational organization, asymmetric information and exaggerative transaction costs will arise (Meyer, 2001) [17]. Therefore, institutional quality has an important influence on the capital structure of enterprises in a market economy, especially in emerging countries where the financial organization and institutional framework are developing.

2.2. Empirical research

* The relationship between firm-level factors and debt maturity

Barclay and Smith (1995) [1], Barclay, Marx, and Smith (2003) [18], Johnson (2003) [19], Antoniou et al. (2006) [20], Cai et al. (2008) [3], López-Gracia et al. (2011) [21], Custodio et al. (2013) [22], El Ghoul et al.

(2014) [23] and Belkhir et al. (2014) [24] show that debt maturity has a positive correlation with business size and asset maturity. Although Stephan et al. (2011) [25], Goyal et al. (2009) [26] and Gonzalez et al. (2013) [27] find that there is a negative relationship between debt maturity and growth opportunities, Stohs and Mauer (1996) [28] and Scherr and Hulburt et al. (2001) [29] in the US, Magri (2010) [30] in Italy, Kirch and Terra (2012) [2] in five Latin American economies, and Orman, Köksal (2017) [31] in Turkey show the statistically insignificant relationship between them.

This group of authors found evidence in support of agency cost theory. They explain that a suitable debt maturity choice should be based on the interests of executives, shareholders and creditors. The company should recognize its characteristics, as well as the investment opportunities and asset lifecycle to minimize the agency problems that arise. However, Custodio et al. (2013) [22] argued that the theory of Myers (1977) [13] supposes short-term debt to reduce agency costs, but not the decline in debt maturities of small businesses. Besides that, Johnson (2003) [19], Kirch and Terra (2012) [2], Custodio et al. (2013) [22] and Awartani et al. (2016) [32] also show that large businesses have many advantages of low transaction and contract costs, little asymmetric information, and high credit quality to finance their activities by long-term debt instead of short-term debt. This latter group of authors found no evidence, to support the hypothesis of agency cost and explain that there are often more overinvestment companies than under-investment companies in their case studies.

Barclay, Marx, and Smith (2003) [18], Johnson (2003) [19], Antoniou et al. (2006, 2008) [33,34], Fan et al. (2012) [35], Custodio et al. (2013) [22], Goyal et al. (2013) [26], Gonzalez et al. (2013) [27] and Belkhir et al. (2014) [24] gave evidence of a positive relationship between debt maturity and leverage. The reason for this correlation is liquidity risk. Shortening debt maturities will cause higher liquidity risk for businesses which are having high leverage. To limit that risk, enterprises can be funded by longer maturity debt.

Antoniou et al. (2008) [34], Stephan et al. (2011) [25], Kirch and Terra (2012) [2], Awartani et al. (2016) [32] also found that the return of asset factor (ROA) reversely affected debt maturity. The result is consistent with the signaling theory, which says that short-term debt is a signal for a good financial situation with efficient operating investment projects. Besides that, Kirch and Terra (2012) [2], Fans et al. (2012) [35], Custodio et al. (2013) [22], Goyal et al. (2013) [26] and Belkhir et al. (2014) [24] show the result that businesses with low tangible assets have a declining trend in debt maturities. The more tangible assets the companies have, the more mortgage assets the companies have. This will create more confidence in the creditors in long-term loans.

Antoniou et al. (2008) [34] and Lopez-Gracia et al. (2011) [21] analyze the impact of effective tax rates on the debt maturity of small and medium enterprises. When the effective tax rate is reduced, these enterprises will tend to borrow long-term debts. They will annually benefit from tax deductibility more than from the accumulated transaction costs. Therefore, these authors concluded there was a negative correlation between the effective tax rate and debt maturity. The result is similar to Scherr and Hulburt (2001) [29], García-Teruel and Martínez-Solano (2007) [36], Gonzalez et al. (2013) [27], Antoniou et al. (2006) [33] and Stephan et al. (2011) [25].

* The relationship between country-level factors and debt maturity

Giannetti (2003) [37] investigated the influence of the firm-level factors and country-level factors such as legal regulations, financial development and creditors rights to debt maturity in eight European countries. The results are that leverage and assets' maturity have a positive correlation with long-term debt. In addition, companies will prefer long-term loans for profitable business in which countries

will protect creditors from the appropriation of property and non-compliance with the borrower obligations. Moreover, the author also said that a country with an underdeveloped stock market and loose laws would lead to more short-term debt structure in these companies. Diamond (2004) [38], Qian and Strahan (2007) [39] have strengthened the view of Giannetti (2013) [37], which is, if countries have a weak legal system and a lack of legal protection for creditors, they will limit the provision of long-term loans, for the purpose of controlling borrower's risk in the worst situation.

Antoniou et al. (2006) [33] also shows there is evidence that debt maturity is positively influenced by institutional factors such as the financial system, stock market conditions, and legal provisions in the UK and Germany, but not in France. Legal regulations have a significant effect on the funding decisions of enterprises, not only in countries with weak financial systems, but also in countries with developed financial systems.

Fans et al. (2012) [35] researched debt maturity and capital structure in 39 developing and developed countries. The authors of this study also found evidence that the institutional environment, such as the legal system, corruption and lender's incentives are also significant for debt maturity and capital structure. In countries with high corruption, companies prefer short-term debt rather than equity. This result coincides with Aris (2016) [40] and Orman et al. (2016) [41]. However, in countries with strict legal systems, companies prefer long-term debt to equity. In 2012, Zheng et al. [42], Kirch and Terra [2] also said that the national cultural and institutional background have a significant influence on the debt maturity. They assumed that the financial development system does not affect the decision on debt maturity which is strongly impacted by intrinsic factors such as the scale, leverage, tangible assets and assets' maturity.

In contrast with the conclusions of Giannetti (2003) [37], Qian and Strahan (2007) [43], Antoniou et al. (2008) [34], and Fans et al. (2012) [35], Vig (2013) [44] and Cho et al. (2014) [45] believed that using debt would lead to reverse effects if creditor rights extend beyond a certain threshold level. Overall, the recent research shows a correlation between country-level factors and debt maturity, in which two prominent elements are the rule of law and the rights of creditors.

Debt maturity is new in academic research for Vietnam. Therefore, our paper will provide additional empirical evidence of the capital structure aspects in Vietnam and consider the impact of both internal and external factors on debt maturity. It also examines new elements such as the rule of law, effective regulations and corruption control in relationship with the debt maturities' decision of Vietnamese enterprises.

3. Research methodology

3.1. Data

Research data includes 267 non-financial companies listed on the HOSE and HNX in the period from 2008-2015. These companies have available data to calculate the debt maturity variable which served for the research purposes. Therefore, those companies without long-term debt data were excluded from our sample. The data was collected from the companies' financial statements, annual reports and from the websites: www.vietstock.vn and www.bvsc.com.vn. In addition information related to the economy and institutions was collected from the electronic database of the World Bank and the IMF.

The chosen companies in the sample needed to fulfill the condition of using long-term debt for at least 6 years in the research phase. We did not classify the sample according to the Blue-chip or Penny group because the capitalization value of these companies changes every year and that causes unbalanced data. As the category of Blue-chip and Penny changed in the research period, we conducted a Fixed-

effect and Random-effect model to control the difference in company characteristics according to Antoniou et al. (2006) [33] and El Ghoul et al. (2014) [23]. However, fixed-effect and random-effect models still have potential heteroscedasticity and autocorrelation which will make research results ineffective. Therefore, we kept using the two-stage least squares method and generalized method of moment to give a consistent result.

3.2. Variables

Based on recent researches such as that of Antoniou et al. (2006, 2008) [33,34], Fan et al. (2012) [35], Gonzalez et al. (2013) [27], Custodio et al. (2013) [22], Awartani et al. (2016) [32] and Orman and Köksal (2016) [41], this paper establishes variables including debt maturity (DMAT) as a dependent variable and independent variables representing firm-level factors and country-level factors. We measure debt maturities based on Barclay and Smith (1995) [1]. This is the ratio of long-term debt to total debt.

$$\text{DMAT} = \frac{\text{Long-term debt}}{\text{Total debt}}$$

Firm-level factor variables are as follows:

* Leverage (LEV)

Leverage plays an important role in a debt maturity structure. According to Antoniou et al. (2006) [33], Fan et al. (2012) [35] and Custodio et al. (2013) [22], high leverage indicates that enterprises tend to much use long-term debt to reduce liquidity risk.

$$\text{LEV} = \frac{\text{Total debt}}{\text{Total asset}}$$

* Enterprise size (SIZE)

That enterprise size is the determinant of debt maturity is described by a number of studies such as those of Johnson (2003) [19], Antoniou et al. (2006) [33], Custodio et al. (2013) [22] and Ghoul et al. (2014) [23]. The measure for this independent variable in these studies is the same, so we also base enterprise size on that calculation according to the following formula:

$$\text{SIZE} = \ln(\text{total asset})$$

* Growth opportunity (GROWTH)

Growth opportunity represents the investment opportunities in the future. If an enterprise has high agency costs, unexpected investments will appear. To improve the problem, the enterprise would release short-term debt. The growth opportunity is measured as follows:

$$\text{GROWTH} = \frac{\text{The market value of shares} + \text{The book value of debt}}{\text{Total asset}}$$

* Tangible assets (PPE)

According to Fan et al. (2012) [35], Custodio et al. (2013) [22] and Goyal et al. (2013) [26], tangible assets represent asymmetric information, and according to Kirch and Terra (2012) [2], tangible assets represent the role of mortgage assets. Therefore, the measure of tangible property will reflect part of the nature of the asymmetrical information and mortgage. In this study, we use the following formula:

$$\text{PPE} = \frac{\text{Net tangible asset}}{\text{Total asset}}$$

* Asset maturity (AMAT)

Asset maturity should match debt maturity to ensure the interests of the parties. The measure of asset maturity will show the effectiveness of the asset and the asset lifecycle.

$$\text{AMAT} = \frac{\text{Short-term asset} \times \text{MAT(short-term asset)} + \text{net tangible asset} \times \text{MAT(long-term asset)}}{\text{Short-term asset} + \text{net tangible asset}}$$

Where, MAT(short-term asset) is short-term asset maturity, calculated by:

$$\text{MAT(short-term asset)} = \frac{\text{Short-term asset}}{\text{Cost of goods sold}}$$

Stohs and Mauer (1996) [46] argued that short-term assets (e.g. inventory) support production and can be measured by the cost of goods sold. So, this ratio will reflect the speed of consumption of short-term assets (Cai, Fairchild, and Guney, 2008) [3].

MAT (long-term asset) is long-term asset maturity (Hart and Moore, 1994), calculated by:

$$\text{MAT(long-term asset)} = \frac{\text{Net tangible asset}}{\text{Depreciation cost}}$$

* Default risk management (Z-core)

There are many mixed opinions on the impact of default risk on debt maturities' choice. As in an optimal debt policy model, Kane et al. (1985) [47] argued that companies would have optimal debt maturity longer when their profit and assets are less volatile. Custodio et al. (2013) [22] and Awartani et al. (2016) [32] show that banks will carefully review before making decisions on long-term loans when enterprises have a poor financial situation. In contrast, the signaling theory of Goyal et al. (2013) [26] says that low default risk enterprises will prefer short-term debt and vice versa.

In our paper, we measure default risk by the Z-score indicator of Altman (1983) [47] which is adjusted by Mackie-Mason (1990) [48]. The higher the Z-score is, the lower the default risk.

Z-SCORE = 3.3 (EBIT/Total asset) + 1.0 (Revenue/Total asset) + 1.4 (Retained profit/Total asset) + 1.2 (Floating capital/Total asset)

* Return of assets (ROA)

Profitability represents the quality of investment projects. Based on the signaling theory, most previous studies conclude that highly profitable enterprises will use less long-term debt. Thus, we base return of assets on the profitability of assets – ROA- to know the influence of a company on debt maturity.

$$\text{ROA} = \frac{\text{Profit after tax}}{\text{Average total asset}}$$

* Effective tax rate (ETR)

Based on Awartani et al. (2016) [32], we measure the effective tax by the following calculation:

$$\text{ETR} = \frac{\text{Corporate income tax}}{\text{EBT}}$$

Many other studies have different ways of measuring effective tax rates. Gonzalez et al. (2013) [27] use the ratio of income tax to total assets, whilst Lopez-Gracia (2011) [21] uses 2 ratios: income tax to cash flow operation and income tax to earnings before tax to check the robustness of their model. Both of them showed that the effective tax rate reversely effects debt maturity while Antoniou et al. (2006) [33] and Stephan (2011) [25] concluded the opposite.

Based on Awartani et al. (2016) [32], we categorize country-level factor variables into 3 groups: public management quality, financial development and creditor's right. Public administration quality includes rule of law, effective regulation, and corruption control. Each indicator will show the characteristics of national management.

* The rule of law (RL)

To measure the effectiveness of the rule of law, we use the index developed by the World Bank, according to Awartani et al. (2016) [32]. This index (RL) reflects the awareness of economic organizations of the quality of contract enforcement, police rights, the rights to ownership, as well as impartiality. RL ranges from -2.5 to 2.5, with larger values indicating a stronger rule of law.

* Effective regulations (RE)

We use the regulation quality indicator of the World Bank (RE) to consider the impact of regulatory effectiveness on the choice of enterprises' debt maturities. RE indices range from -2.5 to 2.5. The higher index will show the more effective regulation in the enactment and enforcement of laws aimed at improving the business environment and promoting entrepreneurship and investment.

* Corruption control (CORR)

We use the corruption control index of the World Bank (CORR) to assess the potential impact of corruption on debt maturity. This

index reflects the perception of what the Authority uses for personal purposes, including small and large forms of corruption, as well as the personal interests of government. CORR also varies from -2.5 to 2.5. The higher index shows there is powerful corruption control.

The group of financial development includes two measurements: financial intermediation development and stock market development.

* Financial intermediation development (FIND)

We use the ratio of domestic credit provided by the financial industry to GDP from the world development indicators (WDI) of the World Bank to measure the development of financial intermediaries as well as the extent to which banks and other financial companies are willing to extend credit to businesses.

* Stock market development (SMD)

To see the influence of the stock market development on debt maturities, we use the ratio of market capitalization to GDP from the world development indicators (WDI) of the World Bank to measure the development of the stock market.

Creditor rights (CR) demonstrate the ability of legal creditor protection from the appropriation of shareholders, especially in the case of a bankruptcy. We use the creditor rights index of Djankov et al. (2007) [50] to assess its impact on debt maturities. The index ranges from 0 to 4. The higher the number is, the more powerful creditor rights are.

In addition to the internal and external variables, we also consider the impact of the macro-economic environment on debt maturity through the 2 variables of real GDP growth and the inflation rate, which play roles as control variables.

3.3. Model

The model used in our analysis is as follows:

$$\boldsymbol{DMAT_{i,t}= \alpha + \beta X_{i,t} + \theta Z_t + \gamma_i + \gamma_s + \varepsilon_{i,t}}$$

Where:

* DMATi,t is the measure of debt maturity structure. It is calculated by the ratio of long-term loan to total debt for the company i in year t.

* $X_{i,t}$ is the vector of firm-level variables

* Z_t is the vector of macroeconomic and institutional variables in year t

* γ_i is the impact of unobserved characteristic variables due to the heterogeneity between companies

* γ_s is the vector of industry dummy variables to control the specific characteristics of each industry

* $\varepsilon_{i,t}$ is standard errors

To measure the impact of the firm-level factors on the debt maturity of Vietnamese corporations, this model is used for regression. However, to analyze the impact of external factors, the model will be classified into many small models in which each element is added to reduce multicollinearity between the elements as follows:

* The impact of intrinsic factors on debt maturity:

$$DMAT_{i,t} = \alpha + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROWTH_{i,t} + \beta_4 PPE_{i,t} + \beta_5 AMAT_{i,t} + \beta_6 ZSCORE_{i,t} + \beta_7 ROA_{i,t} + \beta_8 ETR_{i,t} + \gamma_i + \gamma_s + \varepsilon_{i,t} \quad (1)$$

The impact of intrinsic factors, real GDP growth and inflation rate on debt maturity:

$$DMAT_{i,t} = \alpha + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROWTH_{i,t} + \beta_4 PPE_{i,t} + \beta_5 AMAT_{i,t} + \beta_6 ZSCORE_{i,t} + \beta_7 ROA_{i,t} + \beta_8 ETR_{i,t} + \theta_1 GDPG_t + \theta_2 INF_t + \gamma_i + \gamma_s + \varepsilon_{i,t} \quad (2)$$

The impact of intrinsic factors, real GDP growth, inflation rate and financial development on debt maturity:

$$DMAT_{i,t} = \alpha + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROWTH_{i,t} + \beta_4 PPE_{i,t} + \beta_5 AMAT_{i,t} + \beta_6 ZSCORE_{i,t} + \beta_7 ROA_{i,t} + \beta_8 ETR_{i,t} + \theta_1 GDPG_t + \theta_2 INF_t + \theta_3 \boldsymbol{FIND}_t + \theta_4 \boldsymbol{SMD}_t + \gamma_i + \gamma_s + \varepsilon_{i,t} \quad (3)$$

The impact of intrinsic factors, real GDP growth, inflation rate, financial development variables and effective regulations on debt maturity:

$$DMAT_{i,t} = \alpha + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROWTH_{i,t} + \beta_4 PPE_{i,t} + \beta_5 AMAT_{i,t} + \beta_6 ZSCORE_{i,t} + \beta_7 ROA_{i,t} + \beta_8 ETR_{i,t} + \theta_1 GDPG_t + \theta_2 INF_t + \theta_3 FIND_t + \theta_4 \boldsymbol{RE}_t + \gamma_i + \gamma_s + \varepsilon_{i,t} \quad (4)$$

The impact of intrinsic factors, real GDP growth, inflation rate, financial development variables and the rule of law on debt maturity:

$$DMAT_{i,t} = \alpha + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROWTH_{i,t} + \beta_4 PPE_{i,t} + \beta_5 AMAT_{i,t} + \beta_6 ZSCORE_{i,t} + \beta_7 ROA_{i,t} + \beta_8 ETR_{i,t} + \theta_1 GDPG_t + \theta_2 INF_t + \theta_3 FIND_t + \theta_4 \boldsymbol{RL}_t + \gamma_i + \gamma_s + \varepsilon_{i,t} \quad (5)$$

The impact of intrinsic factors, real GDP growth, inflation rate, financial development variables and corruption control on debt maturity:

$$DMAT_{i,t} = \alpha + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROWTH_{i,t} + \beta_4 PPE_{i,t} + \beta_5 AMAT_{i,t} + \beta_6 ZSCORE_{i,t} + \beta_7 ROA_{i,t} + \beta_8 ETR_{i,t} + \theta_1 GDPG_t + \theta_2 INF_t + \theta_3 FIND_t + \theta_4 \boldsymbol{CORR}_t + \gamma_i + \gamma_s + \varepsilon_{i,t} \quad (6)$$

The impact of intrinsic factors, real GDP growth, inflation rate, financial development variables and creditor rights on debt maturity:

$$DMAT_{i,t} = \alpha + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROWTH_{i,t} + \beta_4 PPE_{i,t} + \beta_5 AMAT_{i,t} + \beta_6 ZSCORE_{i,t} + \beta_7 ROA_{i,t} + \beta_8 ETR_{i,t} + \theta_1 GDPG_t + \theta_2 INF_t + \theta_3 FIND_t + \theta_4 \boldsymbol{CR}_t + \gamma_i + \gamma_s + \varepsilon_{i,t} \quad (7)$$

4. Results

4.1. Descriptive statistics

The effective tax rate has a relatively low oscillation with a 0.14 standard deviation. However, its high spread in the smallest and largest values shows that a small number of businesses have very low tax rates, and a small number of businesses have very high tax rates. This can come from the tax refund, tax-deferment and tax arrears.

RL is about -0.43 in the range from -2.5 to 2.5, which reflects that the application of law on economic governance is still low on average. Similarly, RE and CORR have not been powerful yet with -0608 and-0568 on average.

Table 1. Debt maturity and intrinsic factors descriptive statistics

	DMAT	LEV	SIZE	GROWTH	PPE	AMAT	Z-SCORE	ROA	ETR
Average	0.39	0.33	27.4	0.69	0.3	12.5	1.44	5.16	0.19
Mean	0.34	0.32	27.3	0.65	0.25	4.01	1.27	3.96	0.19
Standard deviation	0.32	0.17	1.4	0.35	0.23	34.8	0.88	5.94	0.14
Minimum	0	0	24.1	0.05	0	0.59	-0.06	-10.3	-0.15
Maximum	1	0.69	31	2.02	0.89	278.8	4.8	26	0.83
Observations	2,096	2,110	2,110	2,110	2,110	2,017	2,086	2,014	2,100

Table 2. External factors descriptive statistics

	RL	RE	CORR	FIND (%)	SMD (%)	CR	GDPG (%)	INF (%)
Average	-0.43	-0.6	-0.57	111.2	21.5	0.63	5.88	9.8
Mean	-0.48	-0.61	-0.55	111.5	24.1	1	5.82	8
Standard deviation	0.09	0.05	0.08	11.9	5.58	0.48	0.5	7
Minimum	-0.53	-0.7	-0.73	86.9	9.56	0	5.25	0.88
Maximum	-0.27	-0.5	-0.45	128.3	26.8	1	6.68	23.12
Observations	2,136	2,136	2,136	2,136	2,136	2,136	2,136	2,136

FIND and SMD show a high value with averages in turn of 111.22% and 21.52%, in which the financial intermediary development is stronger. CR seems to have kept at a low level during the period of the study.

The table presents Pearson correlations between variables at equal or less than a 5% statistical significance level. Debt maturity has positive correlation with LEV, SIZE, PPE, AMAT, and negative correlation with Z-SCORE, that is similar with the prediction of previous research. However, the relationships between debt maturity and GROWTH and ROA are contrary to the predictions of agency cost theory. There is also a positive correlation between debt maturity and CR, but negative correlations with CORR. The correlation coefficients are mostly smaller than 0.8, which indicates the correlation between the elements is quite low.

4.2. Estimation results

GDPG correlates inversely with DMAT at a significance level of 1% in model 2 and 3, but the inflation rate reflects positive correlation. FIND has a negative impact and SMD has a positive impact with debt maturity at a significance level of 1% in model 3. RE correlates positively with DMAT at a statistical significance level of 1% in model 4. RL also has positive correlation in model 5. It is the same with CR in model 7, but inversely with CORR in model 6. The Hausman test shows the value p-value as less than 0.05, so we refute the null hypothesis. This means FEM models are better than REM models. The results are as follows:

Table 3. Pearson correlation

	DMAT	LEV	SIZE	GROWTH	PPE	AMAT	Z-SCORE	ROA	ETR	GDPG	INF	FIND	SMD	RE	RL	CORR	CR
DMAT	1																
LEV	0.062*	1															
SIZE	0.202*	0.202*	1														
GROWTH	0.148*	0.220*	0.23*	1													
PPE	0.412*	0.316*	-0.003	0.206*	1												
AMAT	0.238*	0.095*	0.100*	0.06*	0.210*	1											
Z-SCORE	-0.248*	-0.161*	-0.213*	0.177*	-0.179*	-0.233*	1										
ROA	0.060*	-0.338*	-0.016	0.459*	0.032	-0.052*	0.55*	1									
ETR	-0.03	-0.024	0.010	-0.103*	-0.110*	-0.036	-0.023	-0.091*	1								
GDPG	0.008	0.006	0.072*	0.096*	0.000	0.000	0.017	0.037	0.032	1							
INF	0.041	-0.024	-0.132*	-0.186*	0.015	-0.004	0.084*	0.085*	-0.041	-0.170*	1						
FIND	-0.01	0.038	0.125*	0.223*	-0.012	-0.006	-0.034	0.014	0.051*	0.655*	-0.762*	1					
SMD	-0.023	0.031	0.115*	0.24*	-0.015	0.001	-0.061*	-0.014	0.043	0.248*	-0.946*	0.869*	1				
RE	0.008	-0.017	0.059*	0.061*	0.002	0.005	-0.009	0.005	-0.004	0.811*	-0.291*	0.513*	0.222*	1			
RL	-0.024	-0.031	0.064*	-0.005	0.003	0.024	-0.045*	-0.087*	-0.019	0.424*	-0.358*	0.185*	0.134*	0.78*	1		
CORR	-0.048*	0.032	0.151*	0.12*	-0.014	0.002	-0.098*	-0.141*	0.038	0.162*	-0.92*	0.683*	0.81*	0.391*	0.475*	1	
CR	0.064*	0.004	-0.132*	-0.032	0.013	-0.003	0.087*	0.180*	-0.06*	-0.229*	0.661*	-0.363*	-0.48*	-0.45*	-0.67*	-0.71*	

Table 4. The estimation results of FEM and REM

Variables	Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	FEM	REM	FEM	REM	FEM	REM	FEM	REM	FEM	REM	FEM	REM
LEV	0.061	0.03	0.061	0.03	0.061	0.03	0.061	0.03	0.061	0.03	0.061	0.03
SIZE	0.106***	0.055***	0.106***	0.055***	0.106***	0.055***	0.106***	0.055***	0.106***	0.055***	0.106***	0.054***
GROWTH	-0.022	-0.001	-0.022	-0.001	-0.022	-0.001	-0.022	-0.001	-0.022	-0.001	-0.022	-0.001
PPE	0.377***	0.456***	0.377***	0.456***	0.377***	0.456***	0.377***	0.456***	0.377***	0.456***	0.377***	0.456***
AMAT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZSCORE	0.028*	-0.009	0.028*	-0.008	0.028*	-0.008	0.028*	-0.008	0.028*	-0.008	0.028*	-0.008
ROA	-0.002	0.001	-0.002	0.001	-0.002	0.001	-0.002	0.001	-0.002	0.0012	-0.002	0.001
ETR	-0.042	-0.034	-0.042	-0.034	-0.042	-0.034	-0.042	-0.034	-0.042	-0.0341	-0.042	-0.034
GDPG	-0.059***	-0.041**	-0.125**	-0.112**	0.137***	0.072	0.085*	0.035	-2.858***	-2.031***	0.064	0.021
INF	0.001	0.000	0.073***	0.054***	-0.028***	-0.017***	-0.011**	-0.005	0.166***	0.119***	-0.015***	-0.007
FIND			-0.013***	-0.007**	-0.014***	-0.008***	0.004	0.004	0.143***	0.102***	-0.008***	-0.004
SMD			0.096***	0.067***								
RE					3.450***	2.422***						
RL							3.170***	2.226***				
CORR									-9.382***	-6.587***		
CR											0.184***	0.124***
Constant	-2.267***	-0.937***	-3.354***	-0.748***	0.621	1.016**	-1.875***	-0.736***	-9.509***	-6.096***	-2.075***	-0.872***
Observations	1,913	1,913	1,913	1,913	1,913	1,913	1,913	1,913	1,913	1,913	1,913	1,913
Hausman test	Prob>chi2 =	0.000	Prob>chi2 =	0.000	Prob>chi2 =	0.000	Prob>chi2 =	0.000	Prob>chi2 =	0.000	Prob>chi2 =	0.000

*Note: *, **, and *** denote significance level of 10%, 5% and 1% respectively*

We also conducted a robustness check by a multicollinearity test, a heteroscedasticity test, and an autocorrelation test. The results show failure. Therefore, we applied two methods, 2SLS and GMM, as alternative regression to give consistent results for these models.

In Table 5, 2SLS is made to handle endogenous phenomenon in the model. We use the asset growth rate (AGROWTH) as an instrument variable.

* In the first stage, the endogenous variable LEV has a strong correlation with AGROWTH when its coefficients are statistically significant and F-statistic values are greater than 10 in all models.

* In the second stage, LEV is said to have an endogenous positive impact with debt maturities at a significance level of 5%. SIZE, PPE, Z-SCORE, AMAT and ROA have a strong positive correlation with DMAT at a significance level of 1%. GDPG has a negative correlation at a significance level of 1% in model 5, but INF shows positive correlations at 5%. FIND also shows fairly high correlation at 5% in models 5 and SMD also finds this correlation in the model 2. The RL, RE and CR all have positive correlation with DMAT, meanwhile CORR shows the reverse effect.

To overcome the endogenous phenomenon of multicollinearity, heteroscedasticity, and autocorrelation, we use GMM to give the most reliable estimates for the models. Table 6 below shows that LEV and Z-SCORE have positive correlation with DMAT at a significance level of 1%. PPE also demonstrates positive correlations at 10%. Furthermore, GROWTH and ROA have statistically negative correlation with DMAT. These results are consistent with previous researches such as that of Barclay, Marx and Smith (2003) [18], Johnson (2003) [19], Goyal et al. (2013) [26], Stephan et al. (2011) [25], Kirch and Terra (2012) [2] and Awartani et al. (2016) [32].

For external factors, while GDPG performs a positive relationship with debt maturity, INF shows a statistically negative relationship.

Table 5. 2SLS estimation results

Variables	First Stage	Second Stage	First Stage	Second Stage	First Stage	Second Stage	First Stage	Second Stage	First Stage	Second Stage	First Stage	Second Stage
	LEV	MAT	LEV	DMAT	LEV	DMAT	LEV	DMAT	LEV	DMAT	LEV	DMAT
	(a)	(1)	(b)	(2)	(c)	(3)	(d)	(4)	(e)	(5)	(f)	(6)
LEV		0.585**		0.585**		0.585**		0.585**		0.585**		0.585**
SIZE	0.02***	0.025***	0.02***	0.025***	0.02***	0.025***	0.02***	0.025***	0.02***	0.025***	0.02***	0.025***
GROWTH	0.172***	-0.056	0.172***	-0.056	0.172***	-0.056	0.172***	-0.0563	0.172***	-0.056	0.172***	-0.056
PPE	0.242***	0.361***	0.242***	0.361***	0.242***	0.361***	0.242***	0.361***	0.242***	0.361***	0.242***	0.361***
AMAT	-0.000	0.000***	-0.000	0.000***	-0.000	0.000***	-0.000	0.000***	-0.000	0.000***	-0.000	0.000***
ZSCORE	0.035***	-0.059***	0.035***	-0.059***	0.035***	-0.059***	0.035***	-0.059***	0.035***	-0.059***	0.035***	-0.059***
ROA	-0.019***	0.014***	-0.019***	0.014***	-0.019***	0.014***	-0.019***	0.014***	-0.019***	0.014***	-0.019***	0.014***
ETR	0.027	-0.014	0.027	-0.014	0.027	-0.014	0.027	-0.014	0.027	-0.014	0.027	-0.014
GDPG	-0.012	-0.027	-0.063*	-0.064	-.056	0.0384	-0.058**	0.018	-0.136	-1.125**	-0.058*	0.01
INF	-0.000	0.001	0.008	0.031**	0.005	-0.009	0.006*	-0.002	0.0105	0.067**	0.006*	-0.003
FIND			0.003	-0.004	0.003	-0.005	0.003*	0.002	-0.007	0.057**	0.003*	-0.002
SMD			0.003	0.037**								
RE					0. 091	1.341**						
RL							0.084	1.232**				
CORR									-0.248	-3.646**		
CR											0.014	0.06*
AGROWTH	0.084***		0.084***		0.084***		0.084***		0.084***		0.084***	
Constant	-0.279	-0.405**	-0.460***	-0.861***	-0.355	0.684	-0.421***	-0.286	-0.623	-3.253***	-0.435***	-0.352
Observations	1,913	1,913	1,913	1,913	1,913	1,913	1,913	1,913	1,913	1,913	1,913	1,913
R-squared	0.439	0.312	0.4394	0.312	0.4394	0.312	0.4394	0.312	0.4394	0.312	0.4394	0.312
F- statistic	59.17		59.17		59.17		59.17		59.17		59.17	

*Note: *, ** and *** denote significance level of 10%, 5% and 1% respectively.*

Table 6. GMM estimation results

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	DMAT	DMAT	DMAT	DMAT	DMAT	DMAT
LEV	0.861**	1.246***	1.560***	1.560***	1.560***	1.632***
	(0.412)	(0.469)	(0.416)	(0.416)	(0.416)	(0.435)
SIZE	-0.082	0.077	0.07	0.07	0.07	0.028
	(0.159)	(0.139)	(0.201)	(0.201)	(0.201)	(0.213)
GROWTH	-0.284*	-0.114	-0.385**	-0.385**	-0.385**	-0.367*
	(0.169)	(0.136)	(0.195)	(0.195)	(0.195)	(0.201)
PPE	0.755*	0.107	0.199	0.199	0.199	0.190
	(0.448)	(0.357)	(0.426)	(0.426)	(0.426)	(0.436)
AMAT	0.001	-0.000	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ZSCORE	0.303***	0.296**	0.543***	0.543***	0.543***	0.559***
	(0.109)	(0.139)	(0.171)	(0.171)	(0.171)	(0.176)
ROA	-0.021***	-0.025**	-0.042***	-0.042***	-0.042***	-0.044***
	(0.008)	(0.012)	(0.016)	(0.016)	(0.016)	(0.016)
ETR	0.075	0.224	0.059	0.059	0.059	0.094
	(0.326)	(0.245)	(0.237)	(0.237)	(0.237)	(0.246)
GDPG	-0.073	0.094	-0.133	0.491**	0.390**	0.134
	(0.066)	(0.068)	(0.182)	(0.202)	(0.151)	(0.084)
INF	-0.028**	0.008	-0.0123**	-0.033**	-0.125*	-0.0084
	(0.014)	(0.008)	(0.006)	(0.014)	(0.064)	(0.006)
FIND		-0.005	-0.036**	-0.027**	0.006	-0.007

		(0.005)	(0.016)	(0.012)	(0.01)	(0.006)
SMD		0.025**				
		(0.012)				
RE			6.318*			
			(3.532)			
RL				-0.913*		
				(0.510)		
CORR					-14.21*	
					(7.947)	
CR						-0.045*
						(0.026)
Arellano-Bond test AR(2)	z = -0.64 Pr > z = 0.522	z = -0.25 Pr > z = 0.802	z = -0.32 Pr > z = 0.749	z = -0.32 Pr > z = 0.749	z = -0.32 Pr > z = 0.749	z = -0.31 Pr > z = 0.758
Sargan test	$Chi^2(18)$ = 21.37 Prob > Chi^2 = 0.261	$Chi^2(18)$ = 31.57 Prob > Chi^2 = 0.538	Chi^2 (27) = 25.25 Prob > Chi^2 = 0.560	Chi^2 (27) = 25.25 Prob > Chi^2 = 0.560	Chi^2 (27) = 25.25 Prob > Chi^2 = 0.560	Chi^2 (26) = 23.63 Prob > Chi^2 = 0.597
Observations	727	1,191	960	960	960	960
Number of n	264	266	265	265	265	265

*Note: *, ** and *** denote significance level of 10%, 5%, and 1% respectively.*

This implies that businesses have more opportunities to use long-term debt in a situation of high economic growth and use restrictions in the case of high inflation. The institutional quality variables such as FIND and SMD show negative correlation with debt maturity. RE positively correlates at a significance level of 10% while RL, CORR and CR express negative correlation. The Arellano-Bond test and Sargan test are both passed, so the regression results are consistent.

5. Conclusions

The firm-level factors have an impact on debt maturity. The paper gives evidence consistently with the signaling theory about the positive impact of tangible assets on debt maturity, in line with Awartani et al. (2016) [32]. This positive impact is also reflected in leverage and default risk control insolvency with high support for liquidity risk theory, while the reverse impact of growth opportunities on debt maturity also expresses high consistency with agency cost theory. The quality of the company also has a statistical reverse effect on debt maturity and these results support the signaling theory. Assets' maturity, business scale and effective tax rates do not reflect their impact as in the previous research.

For external factors, regulation effectiveness shows a positive impact and corruption control has an inverse effect on debt maturities, which is consistent with the prediction of Awartani et al. (2016) [32], while the rule of law and creditor rights have negative effects that are the inverse of the findings of Awartani et al. (2016) [32]. Financial intermediary development has a negative correlation that is consistent with Awartani et al. (2016) [32]. However, stock market development has a positive correlation that is consistent with institutional theory, but not consistent with Awartani et al. (2016) [32].

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