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BANKING & FINANCE | RESEARCH ARTICLE

Determinants of debt maturity structure: Evidence in Vietnam

Kim Quoc Trung Nguyen^{1*}

Abstract: This paper examines the determinants of debt maturity structure in listed small and medium enterprises in Vietnam from 2010 to 2019. Agency cost theory, signaling theory, tax-based theory, and matching theory are discussed as platform theories for determining the factors affecting corporate debt maturity structure. Based on those theories and previous research studies, combined with the two-step generalized method of moments regression model, the impact of lagged debt maturity structure, leverage ratio, profitability, firm size, growth opportunities, gross domestic product, and inflation has been demonstrated to be statistically significant at 5%. The contribution of this paper is to define the debt maturity structure of enterprises as dynamic, and the debt maturity structure is adjusted to the optimal structure at the speed of 46%.

Subjects: Economics; Finance; Entrepreneurial Finance

Keywords: Debt maturity structure; agency cost theory; signaling theory; tax-based theory; matching theory; generalised method of moments

JEL classification: D25; G32; L25



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PUBLIC INTEREST STATEMENT

Debt maturity structure is one issue related to corporate financing decisions, which has been a recent focus of scientists worldwide.

This paper examines the determinants of debt maturity structure in listed small and medium enterprises in Vietnam from 2010 to 2019. Agency cost theory, signaling theory, tax-based theory, and matching theory are discussed as platform theories for determining the factors affecting corporate debt maturity structure. Based on those theories and previous research studies, combined with the two-step generalized method of moments regression model, the impact of lagged debt maturity structure, leverage ratio, profitability, firm size, growth opportunities, gross domestic product, and inflation has been demonstrated to be statistically significant at 5%. The contribution of this paper is to define the debt maturity structure of enterprises as dynamic, and the debt maturity structure is adjusted to the optimal structure at the speed of 46%.

1. Introduction

Corporate finance encompasses all financial decisions made by a company to discover development policies that maximize the company's value. Investment, dividend, and financing decisions are examples of these decisions. Typically, the sources of debt financing, leverage ratio, and debt maturity structure are all factors in corporate financing decisions. Under which the choice of debt maturity structure affects both investment and dividend decisions because of changes in the cost of capital. As a result, when deciding about debt financing for a company, the debt maturity structure is always a consideration. A debt maturity structure aims to solve the agency problem, increase funding flexibility, and reduce funding costs and repayment risk by aligning the maturity structure of a company's assets with the maturity structure of its debt (Cai et al., 2008).

In the world, a number of studies have examined how firm-specific and macro-economic factors affect debt maturity structure, such as Demircuc-Kunt and Maksimovic (1999), Fan et al. (2012), Lemma and Negash (2012), and Cesario and Terra (2013), and Costa et al. (2014). Other studies by Barclay and Smith (1995), Ozkan (2000), and Antoniou et al. (2006) have focused on debt maturity structures in developed economies, such as the United States and the United Kingdom. Cai et al. (2008) and Wang et al. (2010) implemented their studies in China. Furthermore, other authors have extended their research in this area to developing economies, specifically in the Asia-Pacific region (Deesomsak et al., 2009), or in South America, Eastern Europe, and South Africa (Cesario & Terra, 2013; Terra & Amal, 2011).

In contrast to global trends, Vietnamese corporate finance research has recently focused on capital structure and leverage. The topic has been studied by D. Nguyen et al. (2012), Pham and Nguyen (2015), Tran (2015), and Luu and Nguyen (2016). They prove that listed companies in Vietnam, including equitized state-owned enterprises in Ho Chi Minh City, primarily use short-term debt. This shows that the debt maturity structure is important for businesses in Vietnam. However, the research on debt maturity structure at Vietnamese listed SMEs has not been updated yet.

Vietnam's economy is developing at a steady pace. Considering that the financial market in Vietnam is still not performing well and has several limitations, listed companies' debt maturity structures have become increasingly complicated. Given that debt term structure is a component of capital structure, deciding on debt financing is one way a company mobilizes capital for production or profit maximization and raises operational efficiency to an optimal level. According to the Government's Decree 39/2018/ND-CP dated 11 March 2018, SMEs are classified according to two sets of criteria: their field of operation and the number of employees, annual revenue, and income; or the number of employees and capital (Vietnam Government, 2018). SMEs often have a simple operating structure because the owner often functions as an enterprise manager (Adams et al., 2012; Lampadarios, 2016). The differences in size and industry between SMEs and large corporations imply differences in managerial incentives, asset structure, and level of financial and capital market access. Besides, the degree of informational asymmetry between managers and debt holders in SMEs creates limitations for them in finding finance for operations. Although the determinants of debt maturity structures in Vietnamese listed firms have been studied, there is a lack of studies about the debt maturity structures of SMEs, especially in the determination of the optimal debt maturity structure. Therefore, determining the debt maturity structure is important for SMEs to adjust the debt term structure to match the target debt term structure to identify suitable funding sources for SMEs' activities in Vietnam. When the SMEs approach the external fund, the debt structure still does not stay at the optimal level because of specific-firm factors (firm size, leverage, profit, liquidity, tangible assets, firm growth, income tax expense) and external factors (inflation and gross domestic product). In particular, the specific-firm factors are explained by agency theory, signaling theory, matching theory, and tax-based theory. In more detail, agency cost theory is the basis for extracting the relationship between firm size and debt maturity structure. The signaling theory is the basis for the effect of the leverage ratio, profitability, earnings volatility, and liquidity on the debt maturity structure in those studies. In these studies, tax-based theory mentions the relationship between taxes and debt maturity

structure. The matching theory explains the relationship between tangible assets and asset maturities. So, the paper focuses on the determinants of debt maturity structure and tests the dynamic debt maturity structure that supports the research to figure out the debt maturity structure adjustment speed. Because the speed permits firms to obtain the optimal debt maturity structure, which allows them to minimize agency costs and funding risks while taking advantage of tax shields and increasing transparency, businesses need to determine how quickly they adjust to their period structure.

Starting with the literature review involving debt maturity structures, the author discusses them briefly to set a background for building the model. The author suggests factors influencing debt maturity structure at Vietnamese listed SMEs in the second section, which mentions related studies. Those are the platforms from which the research hypotheses are proposed. The following section presents the methodology by which the author implements the generalized method of moments (GMM) to deal with endogeneity. In addition, the author interprets and discusses the findings in the next section. Finally, the author mentions some of the study's limitations based on the findings.

2. Literature review and hypothesis development

2.1. Debt maturity structure

Fama (1990) implies that the debt maturity structure reflects the incentive to provide contract-relevant information, monitoring, and bonding. High-quality enterprises, according to Flannery (1986), prefer short-term debt to communicate their excellence.

Debt maturity structure is one issue related to corporate financing decisions, which has been a recent focus of scientists worldwide. Limiting liquidity risks, resolving conflicts in agency issues, increasing flexibility in funding activities, and significantly reducing capital mobilization costs are important decisions to be made by a company. The debt maturity structure shows the correlation between long-term debt and total debt and is determined by the ratio of long-term debt to total debt (Nguyen, 2019). It is influenced by the interweaving of agency cost theories (Barnea et al., 1980; Myers, 1977), signaling theory (Diamond, 1991; Flannery, 1986), matching theory (Diamond, 1991; Flannery, 1986; Morris, 1976), and tax-based theory (Brick & Ravid, 1985, 1991).

The measurement of debt maturity structure is based on the studies by Barclay and Smith (1995), Cai et al. (2008), Lemma and Negash (2012), and Nguyen (2018) as follows: The ratio of long-term debt to total debt (short-term debt and long-term debt).

2.2. Theoretical framework involved in a firm's debt maturity structure

Flannery studied signaling theory in 1986 and later developed it with Kale and Noe (1990) and Diamond (1991). Besides, the matching theory was derived by Morris (1976) and Myers (1977). Agency cost theory was initially formed by Jensen and Meckling (1976), Myers (1977), and Barnea et al. (1980) explicitly studied the relationship between agency costs and debt maturity structure. Moreover, Brick and Ravid (1985) first proposed tax-based theory, then further developed it in 1991. Kane et al. (1985) also studied this theory. These theories will serve as the author's foundation for determining the factors influencing debt maturity structure.

2.2.1. Agency cost theory

The agency cost theory was first proposed by Jensen and Meckling (1976). Using internal and external funding for business activities will lead to conflicts among stakeholders due to information asymmetry. According to Myers (1977), agency costs arise because of conflicts between stakeholders and are divided into four types of conflicts, including: (1) conflicts between managers and shareholders; (2) conflicts between large shareholders and small shareholders; (3) conflicts between shareholders and creditors; and (4) conflicts between shareholders and related non-financial parties (Villalonga & Amit, 2006). According to Jensen and Meckling (1976), the way for

firms to mitigate agency costs is to increase the use of debt, which means shortening the debt maturity., 1976; Myers (1977); Barnea et al. (1980) have studied the relationship between agency costs and debt maturity structure. Agency costs can be addressed by shortening the debt maturity when firms use external financing (Myers, 1977). Barnea et al. (1980) only focused on studying two types of conflicts—those between managers and shareholders and those between shareholders and creditors. They argue that shortening debt maturity can be used as a tool to alleviate agency conflicts between shareholders and debt holders (Barnea et al., 1980).

Agency cost theory is the basis for extracting the relationship between firm size and debt maturity structure. Large firms are thought to have lower agency costs of debt (Ozkan, 2000; Whited, 1992; Yi, 2005) because they have easier access to capital markets and more negotiating power (they have a stronger position in debt negotiation than smaller firms). Furthermore, Smith and Warner (1979) claim that small businesses are more likely to face higher agency costs because of conflicts of interest between shareholders and debt holders. As a result, both arguments favor large companies issuing more long-term debt than smaller companies.

2.2.2. *Signaling theory*

Signaling theory (Flannery, 1986) is based on the arguments of the pecking order theory of S.C. Myers and Majluf (1984). The theory hypothesizes that information asymmetry exists between inside investors (managers and shareholders) and outside investors (creditors). Flannery (1986) suggests that signals of high-quality and low-quality firms are reflected in decisions about debt maturity structure. Flannery (1986) argues that outside investors will charge fees for long-term loans such that the expected loss from the entire long-term loan (both good and bad firms) is equal to zero. Therefore, outside investors will treat companies equally according to their perception of the average quality of the companies. Flannery (1986) concludes that good companies will transfer good information to the outside through short-term loans, thereby helping the company reduce borrowing costs. Bad companies show company quality through long-term loans. Flannery's signaling theory (Flannery, 1986) suggests that well-financed firms have a debt maturity structure with short-term loans predominating.

Diamond (1991) further developed signaling theory, focusing on analyzing a firm's debt maturity structure decisions by relying on information about the firm's credit rating. Companies with high credit ratings (good companies) will finance debt primarily with short-term debt. Companies with medium and low credit ratings will borrow long-term and short-term, respectively. However, Diamond (1991) said that the decision about when a company's debts are due is based on its credit rating, not its quality, as Flannery (1986) found.

Signaling theory is applied in empirical studies on the debt maturity structure of firms in developed economies (Antoniou et al., 2006; Barclay & Smith, 1995; García-Teruel & Martínez-Solano, 2007; Ozkan, 2000) and in countries with developing and emerging economies (Cai et al., 2008; Cesario & Terra, 2013; Costa et al., 2014; Deesomsak et al., 2009; Lemma & Negash, 2012). The theory is the platform for the effect of the leverage ratio, profitability, earnings volatility, and liquidity on debt maturity structure in those studies.

2.2.3. *Tax-based theory*

Brick and Ravid (1985) have developed a theoretical model that shows the relationship between taxes and debt maturity structure. They explain that taxes play a role in deciding between short-term and long-term debt. A firm's optimal debt maturity structure is a trade-off between the benefit of the tax shield for corporate debt and the disadvantages of agency costs.

Tax-based theory has been applied by many scientists worldwide in empirical studies on the debt maturity structure of companies in developed economies. Examples of these studies are those of Barclay and Smith (1995), Ozkan (2000), Antoniou et al. (2006), and García-Teruel and Martínez-Solano (2007), or countries with developing economies, as studied by Costa et al. (2014),

Lemma and Negash (2012), Cesario and Terra (2013), and Cai et al. (2008), and Deesomsak et al. (2009). In these studies, tax-based theory mentions the relationship between taxes and debt maturity structure.

2.2.4. Matching theory

Morris (1976) studied the risks associated with different debt maturities. Morris' model analyses how bond maturities (short- and long-term) affect changes in net income and the cost of equity. Morris (1976) argued that the correlation between net operating income and future interest rates will be the basis for helping shareholders determine when to break the fit by using asset maturities longer than the debt maturity.

Myers (1977) suggested that matching the maturities of assets and the debt maturity helps a firm control conflict between shareholders and creditors, contributing to minimising the under-investment problem. The level of debt should decrease in proportion to the decrease in the value of assets. According to Myers (1977), the time-to-maturity comparison aims at listing liabilities to match an expected decrease in an asset's value. In addition, Hart and Moore (1994) argued that debt should match the collateral's income stream or depreciation rate. Therefore, the maturity of assets and liabilities should match. Stohs and Mauer (1996) made similar conclusions about the suitability of debt maturities. When the maturity of a company's assets is longer than its liabilities, the cash flow from its assets will not be sufficient to meet its debt obligations. Demircuc-Kunt and Maksimovic (1999) added to the relationship between the maturity of assets and the maturity of debt, arguing that fixed assets make it easier to borrow when used as collateral.

Thus, matching theory suggests that firms need to achieve a good fit between the maturity of the debt and the maturity of the asset to help the company reduce its liquidity risk when the principal is due. The theory is used to explain the relationship between tangible assets and asset maturities.

2.3. Empirical studies

In Antoniou et al. (2006) and Deesomsak et al. (2009), they investigate the impact of internal and external factors on a firm's debt maturity structure in Thailand, Malaysia, Singapore, and Australia. According to the findings, firm size, debt ratio and liquidity, in particular, have a beneficial impact on the debt maturity of companies in the four countries. Other internal characteristics such as profitability, asset maturity, and income volatility have varying effects on different countries' debt maturity structures. Deesomsak et al.'s (Deesomsak et al., 2009) findings are consistent with that of Demircuc-Kunt and Maksimovic (1999) in the Asia-Pacific area. The latter found evidence that firms' debt maturity structures in Thailand, Malaysia, Singapore, and Australia are substantially related to economic factors. Economic growth, inflation, market capitalisation, bank size, and the term structure of interest rates influence a firm's debt maturity structure decision.

Fan et al. (2012) examine the debt maturity structure in developed and developing economies. The findings show that the impact of taxes on debt maturity structure is not as strong as other factors, like the legal system, degree of corruption, and incentives of capital providers. According to this study, in countries with high levels of corruption, firms tend to use more debt, mainly short-term debt. Research results support banks' preference for short-term lending, which, in countries with developed banking systems, companies use much short-term debt.

Lemma and Negash (2012) show that internal factors impact a firm's debt maturity structure. Their findings confirm that asset maturity, income volatility, and debt ratio positively affect the debt maturity structure. Besides examining company-specific characteristics, they explore the effect of the industry sector and characteristics of the economy on the decisions about the debt maturity structure of firms in African countries. Their studies have shown that the size of the economy has a positive effect on debt maturity structure; thus, firms in low-income countries tend

to use less long-term debt, whereas taxes and economic growth rate (GDP) have the opposite effect.

Correia et al. (2014) explore the factors affecting the debt maturity structure in European countries. Research results show that internal factors, including firm size, asset maturity, and leverage ratio, positively correlate with long-term debt, whereas profitability is negatively correlated with long-term debt. Their findings are in line with Lemma and Negash (2012); specifically, the larger the size of the banking system, the more these firms use short-term debt.

In Vietnam, Nguyen (2018) shows that the debt maturity structure of companies in Vietnam is dynamic. The author examines the internal and external factors that influence the debt maturity structure of Vietnamese enterprises. Internal characteristics, such as earnings volatility, liquidity, tangible assets, and firm size, positively affect debt maturity structure. In Vietnam, physical assets are the most important intrinsic factor affecting long-term debt. External circumstances impact a firm's debt term structure. In contrast, institutional quality and economic growth had no effect, and interest rate term structure, inflation, and the level of financial development, which included the intermediary financial system and financial markets, were all positively connected.

Another study by Nguyen (2019) investigates the impact of firm characteristics on the debt maturity structure of Vietnamese real estate enterprises, a study from the static model to the dynamic model. The research results using the SGMM approach demonstrate that these real estate companies do not modify their debt maturity structures, and their debt maturity structure decisions are influenced by firm size, growth opportunities, and liquidity.

Pham (2017) analyses the debt maturity structure of real estate businesses listed on the Vietnamese stock exchange. According to the findings, leverage ratio, firm size, asset structure, liquidity, and profit volatility are among the elements that influence the debt maturity structure of those businesses. Corporate income tax is statistically insignificant in terms of growth potential. Subsequently, Pham (2020) conducts another study regarding the capital structure and debt maturity structures of Vietnamese real estate investment and business firms. The findings of the study suggest that institutions hurt debt term structure decisions. Liquidity, business risk, firm size, financial development, and inflation affect debt maturity structure choice.

2.4. Factors affecting debt maturity structure and hypothesis development

2.4.1. Leverage ratio

Leverage ratios are used to determine the degree of financial risk assumed by a business. The ratio indicates an optimal capital structure, showing that banks have equity ratios and creditors. The debt-to-assets ratio shows the proportion of assets financed by debt by comparing total liabilities (short- and long-term debt) to total assets (Drake & Fabozzi, 2010). The ratio of total liabilities to total assets is shown to complement equity holders' residual claims.

Morris (1992) suggests that firms with more debt tend to issue longer-term debt to delay bankruptcy risk. Firms with higher leverage also choose longer maturity (Leland & Toft, 1996). However, Mitchell (1991) and Dennis et al. (2000) argue that leverage and maturity should be inversely related because the agency costs of underinvestment can be mitigated by reducing leverage and shortening debt maturity. As a result, the nature of the relationship between leverage and debt maturity is still controversial. Demirgüç-Kunt and Maksimovic (1999) explore legal and institutional differences among countries that explain a large part of firms' leverage and debt maturity choices. The findings of Fan et al. (2012) are consistent with the research results of Demirgüç-Kunt and Maksimovic (1999). Barclay et al. (2003) argue that, given a set of exogenous firm characteristics, a firm chooses leverage and debt maturity to maximize its value. Their

findings suggest that capital structure and debt maturity can be used interchangeably to solve financial problems.

Based on signal theory, leverage ratio has a positive impact on debt maturity structure, according to Barclay and Smith (1995), Antoniou et al. (2006), Deesomsak et al. (2009), Terra and Amal (2011), and Lemma and Negash (2012), and Cesario and Terra (2013), and Correia et al. (2014), and Hussain et al. (2018). According to Cesario and Terra (2013), the relationship between these two factors can be positive or negative (Pham, 2020).

Based on the above discussions, the following hypothesis is proposed.

Hypothesis 1 (H_1): Leverage ratio influences debt maturity structure of listed SMEs in Vietnam.

2.4.2. Profitability

Originating from signal theory, profitability is an index to measure a firm's performance quality and hurts the debt maturity structure (Pham, 2020). When studying Europe, Correia et al. (2014) discovers that profitability negatively impacts debt maturity structure (as measured by the ratio of long-term debts to total debts).

In an empirical study, Ozkan (2000) shows that companies with high profitability and growth opportunities use substantial short-term debt. Conversely, a company will use a substantial amount of long-term debt when it has a long asset maturity. In addition, Barclay and Smith (1995), Ozkan (2000), Terra and Amal (2011), Cesario and Terra (2013), and García-Teruel and Martínez-Solano (2007), and Costa et al. (2014) demonstrate the impact of profitability on debt maturity structure. However, the level of impact and the direction of impact differ between countries.

Based on the above discussions, the following hypothesis is proposed.

Hypothesis 2 (H_2): Profitability influences debt maturity structure of listed SMEs in Vietnam.

2.4.3. Liquidity

A company's ability to meet its debt obligations determines whether it takes on short-term or long-term debt. Firms may prefer short-term debt because of the lower interest rates, but they may face liquidity risk if they cannot pay when the debt matures (Diamond, 1991). The relationship between liquidity and debt maturity structure can be inferred using the liquidity risk hypothesis. Liquidity risk is a function of a firm's liquidity level; credit ratings or firm quality are based on perceived liquidity risk. According to Diamond (1991), in credit ratings, which also imply investor confidence, highly rated firms are expected to choose short-term debt. In contrast, low-rated firms are expected to choose long-term debt, subject to accessibility. Thus, two companies are likely to use short-term debt: those with a high rating and those with a low rating. According to Stewart C. Myers and Rajan (1998), a high liquidity ratio may limit a firm's ability to raise funds because excessive liquidity limits managers' ability to commit credibly to investment activity.

Correia et al. (2014) use credit quality and ratings as proxies and found a significant negative association, implying that low-quality or low-rated firms have more extended maturity structures. Furthermore, as expected, Stephan et al. (2011) and Khan et al. (2015) find a significant negative relationship. In contrast, positive correlations are found by Cai et al. (2008), Terra and Amal (2011), Deesomsak et al. (2009), and Kalsie and Nagpal (2018), and Pham (2020). However, Taleb and Al-Shubiri (2011) conclude that liquidity does not affect the debt maturity structure.

Based on the above discussions, the following hypothesis is proposed.

Hypothesis 3 (H₃): Liquidity influences debt maturity structure of listed SMEs in Vietnam.

2.4.4. Tangible assets

The fixed-assets ratio to total assets on a company's balance sheet is tangible assets. Given that tangible assets could be used as collateral for debtors, having a high proportion of collateralized tangible assets may reduce conflict between managers and shareholders, as managers will not have as much free cash to invest in wasteful projects (Almeida & Campello, 2007). Moreover, considering the possibility of liquidation in the event of default, tangible assets tend to reduce financial distress costs.

Given information asymmetry, lenders often require borrowers to have assets to guarantee their loans. Long-term assets are considered collateral needed to secure long-term debts. Thus, firms with more tangible assets can obtain better collateral, lower bankruptcy costs, and therefore can borrow with longer maturities. By conducting empirical studies, Majumdar (2010), Kirch and Terra (2012) find a positive correlation between fixed assets and a firm's debt maturity structure. However, Cesario and Terra (2013), Costa et al. (2014) find no evidence to support this correlation.

In this article, tangible assets are determined by the ratio between net fixed assets and total assets of the firms.

$$\text{Tangible assets} = \frac{\text{Net fixed assets}}{\text{Total assets}}$$

Hence the following hypothesis is proposed.

Hypothesis 4 (H₄): Tangible assets have a positive effect on debt maturity structure of listed SMEs in Vietnam.

2.4.5. Asset maturity

The match between the maturity of the debt and the maturity of assets is critical. It is widely accepted because it helps a company control the risk and cost of financial distress (Lemma & Negash, 2012). The matching between the maturity of debt and the maturity of assets helps a firm avoid the risk of cash payments (Morris, 1976; Stohs & Mauer, 1996), but it can also help the company minimize the underinvestment problem (Myers, 1977). When deciding whether to issue short-term or long-term debt, Graham and Harvey (2001) show that matching the maturity of liabilities and assets is critical. As a result, they expect a positive relationship between debt maturity structure and asset maturity. Ozkan (2002) argues that agency costs arise when a firm has a conflict between the asset maturity structure (short-term and long-term assets) and the debt maturity structure. To mitigate this issue, businesses typically align the maturity structure of their debt with the maturity of existing assets. Companies whose assets are particularly long-term will increase their use of long-term debt because these liabilities can be used to purchase long-term assets.

A company can hedge interest rate risk by matching the duration of liabilities with assets formed from debts. Ideally, assets and liabilities should have the same maturity. If a company uses a large number of short-term debts, the company will run the risk of refinancing those short-term loans, which is a significant risk for the business. So, companies with uncertain incomes prefer long-term debt to avoid a bad liquidity situation (Cai et al., 2008; Costa et al., 2014; Demircug-Kunt & Maksimovic, 1999; Ozkan, 2000; Pham, 2020; Terra & Amal, 2011).

According to empirical research findings in developed and emerging economies, large and small businesses agree that asset maturity has a positive relationship with debt maturity structure (Cai et al., 2008; Correia et al., 2014; Demircuc-Kunt & Maksimovic, 1999; Lemma & Negash, 2012; Ozkan, 2000; Wang et al., 2010). Other empirical studies support the above relationship, such as Stohs and Mauer (1996), Ozkan (2002), Stephan et al. (2011), Lemma and Negash (2012), and Hajiha and Akhlaghi (2012), and Terra and Amal (2011).

In this paper, the ratio of net property, plant and equipment to depreciation is used to determine asset maturity (Antoniou et al., 2006).

Hypothesis 5 (H_5): Asset maturity has a positive effect on debt maturity structure of listed SMEs in Vietnam.

2.4.6. Firm size

Large firms may have less asymmetric information and agency problems, allowing them to engage in future investment opportunities with more tangible assets and easily approach long-term debt markets. By contrast, small businesses are forced to use short-term debt for various reasons, including higher failure rates and a lack of economies of scale in raising long-term public debt. Large companies also use more long-term debt because of their ongoing financial needs (Jalilvand & Harris, 1984). Small businesses may face severe agency issues between shareholders and lenders. In addition, bondholders try to restrict the risk of lending to small businesses by limiting debt maturities. As a result, large (small) businesses are expected to have a higher proportion of long (short)-term debt in their capital structure.

Small businesses are also prone to information asymmetry due to their inability to exploit economies of scale in producing and disseminating information (Deesomsak et al., 2009). The solution to this problem is to use short-term debt (Barnea et al., 1980). However, small businesses can be constrained by significant transaction costs with the issuance or redemption of long-term debt (Titman & Wessels, 1988), resulting in short-term financing. Many researchers assert a significant positive relationship between firm size and debt maturity structure (Cai et al., 2008; Correia et al., 2014; Custodio et al., 2013; Deesomsak et al., 2009; Khan et al., 2015; Körner, 2007; Orman & Koksai, 2016; Rozali & Omar, 2011; Shah & Khan, 2011; Stephan et al., 2011; Taleb & Al-Shubiri, 2011; Terra & Amal, 2011). In contrast, other researchers, such as Heyman et al. (2003), Soekirman (2015), and Kalsie and Nagpal (2018), have confirmed the opposite relationship.

In this paper, firm size is measured by the logarithm of firms' total assets.

Hence, the following hypothesis is proposed.

Hypothesis 6 (H_6): Firm size has a positive effect on debt maturity structure of listed SMEs in Vietnam.

2.4.7. Growth opportunities

According to agency cost theory, the impact of growth opportunities on debt maturity structure is unclear because the agency cost regarding debt in a firm will be examined from underinvestment and overinvestment. To minimize agency costs, with underinvestment, firms with high growth opportunities will use more short-term debt (Barnea et al., 1980; Myers, 1977) and vice versa. In the scenario of overinvestment, agency cost theory hypothesizes that firms with many growth opportunities will use more long-term debt (Hart & Moore, 1994).

On the liquidity risk hypothesis, the relationship between growth opportunities and debt maturity structure is proven by Diamond (1991). In the growth stage, firms have many investment

opportunities to oppose default risks on debts from suboptimal projects, especially those with financed funds. To mitigate risks, firms prefer long-term debt over short-term debt maturity. By choosing a long-term debt maturity, overinvestment is reduced (Hart & Moore, 1994). Some studies find significant positive relationships, such as those of Correia et al. (2014), Orman and Koksai (2016), Rozali and Omar (2011), and Taleb and Al-Shubiri (2011), and Mitchell (1991) also finds that companies with many growth opportunities are more likely to issue short-term debt, whereas companies with high-quality projects are more likely to use short-term debt. According to Barclay and Smith (1995), large firms have few growth options and are more likely to be financed by long-term debt. A study conducted by Varouj et al. (2005) involved the underinvestment hypothesis, which predicts that the debt maturity structure after a firm's growth opportunities expires prevents investment incentives. As a result, reducing debt maturity is one effective way to reduce such incentives while increasing firm investment. The existing literature focuses on how companies adjust debt maturity structures in response to growth opportunities.

Datta et al. (2000) investigates the relationship between debt maturity structure and future growth opportunities and discovered a negative relationship. Firms with many growth opportunities use more short-term debt, according to Barclay and Smith (1995), Ozkan (2000), and Wang et al. (2010), whereas García-Teruel and Martínez-Solano (2007) find contradictory results. Other studies, such as those of Cai et al. (2008), Lemma and Negash (2012), and Kirch and Terra (2012), find no linkage between growth opportunity and debt maturity structure.

In this paper, the ratio of a company's total liabilities and market value of capital to its total assets determines the company's growth opportunities. Hence, the following hypothesis is proposed.

Hypothesis 7 (H₇): Growth opportunities influence debt maturity structure of listed SMEs in Vietnam.

2.4.8. Tax

Tax-based theory suggests that because of the trade-off between the benefits of the tax shield and the costs of bankruptcy, debt maturity is positively related to issuance costs and negatively related to tax shield benefits. The amount of tax shield benefit from long-term debt depends not on the amount of debt but on tax-deductible factors such as depreciation or tax credits. As the values of these factors increase, the taxable income will decrease, so the tax benefit will decrease. However, the experimental results are not precise. However, Ozkan (2000), Fan et al. (2012), Cesario and Terra (2013), and Costa et al. (2014) find that the more tax benefits a company receives, the more debt it takes on in the long run, Cai et al. (2008), Kirch and Terra (2012) give the opposite conclusions.

In this paper, the ratio of corporate income tax to income before tax is used as an index of measurement of tax.

$$\text{Tax} = \frac{\text{Corporate income tax}}{\text{Income before tax}}$$

Hence, the following hypothesis is proposed.

Hypothesis 8 (H₈): Tax has a positive effect on debt maturity structure of listed SMEs in Vietnam.

2.4.9. Economic growth

Economic growth is a measure of the overall economic performance of a country, determined by the annual value of goods and services produced by a country using its resources. Wang et al. (2010) argues that asymmetric information and agency costs in a well-developed economy will be

much lower than in a non-developed economy. When the economy goes into a recession, the maturity of the debt will be longer, and the creditors will face more risks. Hence, the creditors prefer to choose short-term loans to minimize risks, and vice versa. Furthermore, in empirical research in China, Wang et al. (2010) find evidence to support the above argument that the economic growth rate is positively correlated to debt maturity structure. Besides, Jong et al. (2008), Deesomsak et al. (2009), Fan et al. (2012), and Lemma and Negash (2012), and Alves and Francisco (2015) prove that economic growth has a positive relationship with debt maturity structure. It implies that more enterprises' business activities in the developing economy will use more long-term debt (Pham, 2020). However, Lemma and Negash (2012) find the opposite correlation between economic growth and debt maturity structure.

This paper determines economic growth by the GDP growth rate index collected from the World Bank's data source.

Hence, the following hypothesis is proposed.

Hypothesis 9 (H_9): Economic growth has a positive effect on debt maturity structure of listed SMEs in Vietnam.

2.4.10. Inflation

The inflation rate is the annual percentage growth of several popular indexes of money prices, most commonly measured by the percentage increase in the consumer price index (CPI; White, 1999). Moreover, the inflation rate represents the growth rate of the economy's price level.

An increase in the inflation rate will increase a company's risks, such as liquidity risk and bankruptcy risk. Hence, companies will limit long-term debt when the inflation rate increases. However, the results of experimental studies are not evident. Although Demircug-Kunt and Maksimovic (1999), Wang et al. (2010), and Pham (2020) show that rising inflation rates cause a company to use more short-term debt, while Deesomsak et al. (2009) gets ambiguous results for different samples. In addition, Fan et al. (2012) show no evidence for a correlation between the inflation rate and debt maturity structure.

This paper uses the CPI in the measurement of inflation collected from data sources by the World Bank. Hence, the following hypothesis is proposed hypothesis.

Hypothesis 10 (H_{10}): Inflation has a negative effect on debt maturity structure of listed SMEs in Vietnam.

3. Research methodology

3.1. Sample

The paper collects the research sample of non-financial firms listed on the Hanoi Stock Exchange and Ho Chi Minh City Stock Exchange. Given the availability of information connected to these firms from 2010 to 2019, the sample consists of 176 firms. The Arellano-Bond estimator (Arellano & Bond, 1991) is appropriate for a dataset with a large number of enterprises and a limited number of years. Our research was based on secondary data from 176 firms (spatial range-N) between 2010 and 2019 (time range-T), with $T < N$. After deleting missing data, the total number of observations is 1,760. The FiinPro database is used to collect data on firm-specific factors affecting the debt maturity structure of companies, whereas the World Bank's statistical data are used to extract the inflation rate and GDP growth.

3.2. Research model

In this paper, the author uses a sample of 176 listed firms with 1,760 observations from 2010 to 2019. The research is based on the theories of debt maturity structure, which include agency costs (proxied by growth opportunities and firm size), the matching principle (proxied by asset maturity), signaling theory, liquidity risk (proxied by leverage) and tax effects (proxied by tax). By combining the empirical studies, the author proposes the model below:

$$dms_{it} = \alpha_0 + \sum \alpha_i \text{internal_factors}_{it} + \sum \alpha_k \text{macroeconomic_factors}_{it} + \varepsilon \quad (1)$$

The proposed model [1] is modified as follows (Table 1 presents the details of each variable).

$$dms_{it} = \alpha_0 + \alpha_1 dms_{it-1} + \alpha_2 lev_{it} + \alpha_3 pro_{it} + \alpha_4 liq_{it} + \alpha_5 tan_{it} + \alpha_6 asm_{it} + \alpha_7 size_{it} + \alpha_8 tax_{it} + \alpha_9 gro_{it} + \alpha_{10} gdp_t + \alpha_{11} inf_t + \varepsilon \quad (2)$$

where:

dms_{it} : debt maturity structure of firm i at time t

dms_{it-1} : lagged debt maturity structure of firm i at time $t-1$

lev_{it} : leverage ratio of firm i at time t

pro_{it} : profitability of firm i at time t

liq_{it} : liquidity ratio of firm i at time t

tan_{it} : tangible assets of firm i at time t

asm_{it} : asset maturity of firm i at time t

$size_{it}$: size of firm i at time t

tax_{it} : tax of firm i at time t

gro_{it} : growth opportunities of firm i at time t

gdp_t : GDP at time t

inf_t : inflation rate at time t

3.3. Research method

A simultaneous relationship exists between the debt maturity structure and the leverage ratio; thus, endogeneity occurs (Awartani et al., 2016; Kirch & Terra, 2012). To solve the endogeneity, the GMM method has been used to check the robustness of the findings. Moreover, Nguyen (2018) finds evidence that companies in Vietnam have a dynamic debt maturity structure, and the firms will adjust the debt maturity structure towards the target debt maturity structure. Besides, Ullah et al. (2018) provides two main reasons causing latent endogeneity in the debt maturity model, namely simultaneity and omitted variables. Hence, GMM is a suitable method for regression.

In sum, the article uses the SGMM method combined with performing Sargan and Arellano-Bond, which is adopted and developed by Blundell and Bond (1998). Therefore, an efficient two-step SGMM estimator is suitable for obtaining reliable and unbiased results in small samples. The method is applied for dynamic models to examine the existence of dynamic debt maturity structures of companies in Vietnam. To overcome the endogeneity, the author uses the

Table 1. Variables in the model

	Variables	Index	Formula/Source data	Related studies
Dependent variables				
debtmaturitystructure _{it}	dms	dms _{it}	$\frac{\text{Long} - \text{term debt}}{\text{Short} - \text{term debt} + \text{Long} - \text{term debt}}$	Barclay and Smith (1995), Cai et al. (2008), Lemma and Negash (2012), Nguyen (2018)
Independent variables				
internal_factor _{it}	leverage ratio	lev _{it}	$\text{leverage ratio} = \frac{\text{Total liabilities}}{\text{Total assets}}$	Morris (1992), Barclay and Smith (1995), Leland and Toft (1996), Demirgüç-Kunt and Maksimovic (1999), Dennis et al. (2000), Deesomsak et al. (2009), Terra and Amal (2011), Lemma and Negash (2012), Fan et al. (2012), Correia et al. (2014), Hussain et al. (2018), Pham (2020)
	profitability	pro _{it}	$\frac{\text{Earnings before interest and tax}}{\text{Total assets}}$	Barclay and Smith (1995), Ozkan (2000), García-Teruel and Martínez-Solano (2007), Deesomsak et al. (2009), Terra and Amal (2011), Cesario and Terra (2013), Correia et al. (2014)
	liquidity ratio	liq _{it}	$\frac{\text{Current assets}}{\text{Current liabilities}}$	Diamond (1991), Stewart C. Myers and Rajan (1998), Cai et al. (2008), Terra and Amal (2011), Deesomsak et al. (2009), Kalsie and Nagpal (2018), Taleb and Al-Shubiri (2011), Stephan et al. (2011), Correia et al. (2014), Khan et al. (2015), Pham (2020)

(Continued)

Table 1. (Continued)

	Variables	Index	Formula/Source data	Related studies
	tangible assets	tan_{it}	$\frac{\text{Net fixed assets}}{\text{Total assets}}$	Almeida and Campello (2007), Mojumdar (2010), Kirch and Terra (2012), Cesario and Terra (2013), Costa et al. (2014)
	asset maturity	asm_{it}	$\frac{\text{Net property, plant and equipment to Depreciation}}$	Morris (1976), Stohs and Mauer (1996), Myers (1977), Graham and Harvey (2001), Ozkan (2002), Lemma and Negash (2012), Demirguc-Kunt and Maksimovic (1999), Cai et al. (2008), Wang et al. (2010), Lemma and Negash (2012), Correia et al. (2014), Stephan et al. (2011), Lemma and Negash (2012), Hajiha and Akhlaghi (2012), Terra and Amal (2011), Pham (2020)
	firm size	$size_{it}$	$\ln(\text{total assets})$	Smith and Warner (1979), Jailivand and Harris (1984), Deesomsak et al. (2009), Körner (2007), Shah and Khan (2011), Razali and Omar (2011), Cai et al. (2008), Terra and Amal (2011), Deesomsak et al. (2009), Taleb and Al-Shubiri (2011), Stephan et al. (2011), Custodio et al. (2013), Correia et al. (2014), Khan et al. (2015), Orman and Koksai (2016), Heyman et al. (2003), Kalsie and Nagpal (2018)
	tax	tax_{it}	$\frac{\text{Corporate income tax}}{\text{Income before tax}}$	Ozkan (2000), Fan et al. (2012), Cesario and Terra (2013), Costa et al. (2014), Cai et al. (2008), Kirch and Terra (2012)

(Continued)

Table 1. (Continued)

	Variables	Index	Formula/Source data	Related studies
	growth opportunities	gro_{it}	$\frac{\text{Liabilities} + \text{market value of capital}}{\text{Total assets}}$	Barnea et al. (1980), Myers (1977), Titman and Wessels (1988), Mitchell (1991), Barclay and Smith (1995), Varouj et al. (2005), Datta et al. (2000), Ozkan (2000), Wang et al. (2010), Garcia-Teruel and Martinez-Salano (2007), Pham (2020)
macroeconomics _{it}	Inflation rate	inf_t	World Bank	Demircuc-Kunt and Maksimovic (1999), Deesomsak et al. (2009), Wang et al. (2010), Pham (2020)
	GDP growth rate	gdp_t		Jong et al. (2008), Deesomsak et al. (2009), Fan et al. (2012), Lemma and Negash (2012), Alves and Francisco (2015), Pham (2020)
Instrumentvariable _{it}	$ldms$	dms_{it-1}		Ozkan (2000), Aivazian et al. (2005), Deesomsak et al. (2009), Terra and Amal (2011), Kirch and Terra (2012), Cesario and Terra (2013), Mohammed and Mubi (2020), Nguyen (2018)

Arellano–Bond two-step difference SGMM estimation with robust standard errors (Arellano & Bond, 1991). The Arellano–Bond estimation is used with the available lagged of the dependent variables (debt maturity structure) as instruments variable. The number of instruments is always kept below the number of groups in all our SGMM specifications (Roodman, 2009).

AR(1) and AR(2) are the Arellano–Bond tests for the first- and second-order autocorrelations of the residuals, respectively. One should reject the null hypothesis of no first-order serial correlation and not reject the null hypothesis of no second-order serial correlation of the residuals. The test for AR(2) errors shows that endogeneity problem is solved at the AR(2) level. According to the Sargan test statistics, the null hypothesis is that the over-identifying restrictions are valid. The Wald (joint) test chi-square statistics (Bekana, 2021) show that the overall model of SGMM is fit.

4. Research results and discussions

4.1. Research results

The basic characteristics of the collected data in Table 2, including the mean, standard deviation and minimum and maximum values of the dependent and independent variables, are described in this step. Afterward, the paper examines the correlation between these variables to see any evidence of multicollinearity. The mean value of debt maturity structure is 0.217, which means that listed SMEs in Vietnam use average long-term debts of 0.217 during the period 2010–2019. Owing to the specific constraints on SMEs, they frequently use short-term funds to finance short-term assets. Descriptive statistics results show that the ratio of using long-term debt of these enterprises in Vietnam is relatively low, which is consistent with the current empirical practices in Vietnam. This finding means that Vietnamese companies use more short-term debt in their debt structure. In addition, given that the Vietnamese financial market is still underdeveloped, companies have fewer opportunities to approach differentiated and diversified funding sources to finance their activities. Hence, they mainly depend on bank loans. By granting loans, commercial banks must also comply with the regulations of the State Bank on the ratio of capital sources for different term loans. Medium and long-term sources of capital, such as bond issuance, are still new in Vietnam and has strict regulations for issuing companies. Hence, SMEs can access more short-term debts. The minimum and maximum values of the debt maturity structure are 0.000 and 0.990, respectively.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
dms	1,621	0.217	0.242	0.000	0.990
lev	1,621	0.601	0.206	0.000	0.980
pro	1,621	0.060	0.064	−0.580	0.480
liq	1,621	3.471	52.742	0.260	2121.490
tan	1,621	0.087	0.110	0.000	0.860
asm	1,621	2.349	1.127	−5.096	7.976
size	1,621	27.542	1.460	21.670	33.630
tax	1,621	0.217	0.185	−1.520	2.920
gro	1,621	0.197	0.649	−0.840	11.440
gdp	1,621	0.062	0.007	0.050	0.070
inf	1,621	0.060	0.048	0.010	0.190

Leverage ratio has the mean value of 0.601, and its minimum and maximum values are 0.000 and 0.980, respectively. The minimum values of profitability and liquidity variables are -0.580 and 0.260. However, their maximum values are 0.480, 2121.490. The mean values of tangible assets and asset maturity are 0.087, 2.349. Besides, the minimum and maximum of tangible asset variable is 0.000, 0.860. Simultaneously, the minimum and maximum value of asset maturity is -5.096, 7.976, respectively. Firm size takes the mean, maximum and minimum values corresponding to 27.542, 33.630 and 21.670.

The mean values of involved tax and growth opportunities variables are 0.217 and 0.197. The mean value of macro-economic variables including GDP and inflation are 0.062 and 0.060, respectively. The maximum value of GDP is 0.07, and the minimum value is 0.05. However, inflation ratio obtains maximum and minimum values of 0.190 and 0.010, respectively.

The next section presents the test of multi-collinear phenomenon, autocorrelation and heteroskedasticity after running the OLS between debt maturity structure (dependent variable) and all independent variables. Firstly, based on the OLS regression results, the multi-collinear phenomenon is tested through the variance inflation factor (VIF). Hair et al. (1995) demonstrated that a VIF coefficient of less than 10 is acceptable. As a rule, if any VIF value exceeds 10, then the estimated regression coefficients are underestimated due to multicollinearity (Montgomery et al., 2001). The VIF values for the formative indicators in this paper are well below the required threshold value of 10 (Table 3). Hence, the multicollinearity issue does not exist in the research model. However, to have strong evidence about the absence of multicollinearity, the author uses the correlation matrix to determine the dependence between all multiple variables in the model (Table 3).

As shown in Table 3, after removing the variables that have correlation coefficients greater than 0.8, the remaining correlation coefficients are all less than 0.8. Thus, the model has no defects of multicollinearity. Table 4 presents the results of the autocorrelation and heteroskedasticity tests. These tests are used to claim that the residuals are independent of each other, and no systematic change is evident in the spread of the residuals over the range of measured values.

In the Wooldridge test for autocorrelation in the panel data, the p-value is smaller than 5%; thus, we have enough evidence to reject H_0 : "There is no autocorrelation". It means the model contains the autocorrelation issue. Furthermore, the p-value of variance change test (Breusch-Pagan/Cook-Weisberg test) has a value smaller than 5%; thus, H_0 : "Residuals with variance unchanged" has sufficient evidence to be rejected. Therefore, heteroskedasticity exists in the model.

As mentioned above, the SGMM model will be used in the estimation of instrument variables. According to Arellano and Bond (1991), the autocorrelation phenomenon between the lag of the dependent variable and error can be fixed by using the valid instrument variables into the dynamic panel data (Awartani et al., 2016; Kirch & Terra, 2012).

i at time *t*; *dms_{it-1}*: lagged of debt maturity structure of firm *i* at time *t-1*; *lev_{it}*: leverage ratio of firm *i* at time *t*; *pro_{it}*: profitability of firm *i* at time *t*; *liq_{it}*: liquidity ratio of firm *i* at time *t*; *tan_{it}*: tangible assets of firm *i* at time *t*; *asm_{it}*: asset maturity of firm *i* at time *t*; *size_{it}*: size of firm *i* at time *t*; *tax_{it}*: tax of firm *i* at time *t*; *gro_{it}*: growth opportunities of firm *i* at time *t*; *gdp_t*: GDP at time *t*; *inf_t*: inflation rate at time *t*.

The author uses the Arellano and Bond tests to check the condition of no correlation in the error term. The AR(2) error test is rejected in the Arellano-Bond model because the p-value is 0.114, which is larger than 0.05; hence, the null hypothesis is H_0 : "Autocorrelation does not exist". This result means that the probability of AR(2) is insignificant at 5%. Therefore, the absence of serial autocorrelation in the errors in the model can be confirmed.

Table 3. Correlation matrix

	dms	lev	pro	liq	tan	asm	size	tax	gro	gdp	inf	VIF
dms	1.000											
lev	−0.154	1.000										1.29
pro	0.061	−0.011	1.000									1.10
liq	−0.016	0.035	−0.003	1.000								1.24
tan	0.048	−0.040	0.007	−0.010	1.000							1.06
asm	0.237	0.023	0.066	−0.024	−0.023	1.000						1.12
size	0.238	−0.053	0.053	−0.033	0.033	−0.031	1.000					1.09
tax	−0.049	−0.193	0.010	−0.040	−0.021	−0.045	0.106	1.000				1.03
gro	0.010	0.065	−0.004	0.047	0.106	−0.048	0.070	−0.022	1.000			1.04
gdp	−0.016	0.329	0.448	0.024	−0.007	0.037	−0.162	−0.287	0.059	1.000		1.31
inf	−0.047	0.074	−0.060	0.015	−0.008	−0.028	−0.194	−0.154	−0.012	0.371	1.000	1.31

Table 4. Test for autocorrelation and heteroskedasticity

No.	Test	F-statistic	p-values	H0
1	Wooldridge test for autocorrelation in panel data	111.642	0.000	Reject
2	Breusch–Pagan/ Cook–Weisberg test for heteroskedasticity	318.45	0.000	Reject

The following section discusses the Sargan and Hansen tests (Table 5), which aim to detect an overidentifying restriction problem related to the heterogeneity of the subsets of the instrumental variables and support the validity and reliability of the SGMM 2-step results. In this model, the p-value in the Sargan test (under the “H0: overidentifying restrictions are valid” hypothesis) is large (p-value = 0.394). Therefore, no sufficient evidence exists to reject hypothesis H0.

Where dms_{it} : debt maturity structure of firm Table 5 shows the difference-in-Hansen tests of the exogeneity of instrument subsets under the null hypothesis of the joint validity of a specific instrument subset. The test statistics are asymptotically chi-square distribution with degrees of freedom equal to the number of questionable instrumental variables (T. Nguyen et al., 2015). Roodman (2009) discusses the best practices in implementing the SGMM estimation and applying the difference-in-Hansen test to the subsets of SGMM-type instruments and standard instrumental variables for the level equation. Table 5 also presents difference-in-Hansen tests of the exogeneity of instrument subsets under the null hypothesis (H0) of the joint validity of a given instrument subset. As a result of statistical evidence at 5%, the null hypothesis cannot be rejected. This finding suggests that the subsets of instruments are econometrically exogenous. In this paper, the number of instruments is 26, which is less than the number of observations at 1,422. Therefore, the rule of thumb suggested by Roodman (2009) and Al Marzouqi et al. (2015) is satisfied. Hence, the instrument variables are adequate to deal with the endogeneity.

4.2. Discussions and implications

The regression results in Table 5 show seven statistically significant variables at 5%, including the lagged debt maturity structure, leverage, profitability, firm size, growth opportunities, GDP and

Table 5. GMM results

dms	Coef.	P > z
ldms	0.538	0.000
lev	-0.004	0.000
pro	-0.109	0.038
size	0.011	0.002
gro	0.362	0.005
gdp	0.001	0.000
inf	-0.256	0.003
Arellano-Bond test for AR(1) in first differences: $z = -5.29$ $Pr > z = 0.000$		
Arellano-Bond test for AR(2) in first differences: $z = -1.58$ $Pr > z = 0.114$		
Sargan test of overid. restrictions: $\chi^2(14) = 14.78$ $Prob > \chi^2 = 0.394$		
Hansen test of overid. restrictions: $\chi^2(14) = 9.58$ $Prob > \chi^2 = 0.792$		
Number of instruments = 26		
Number of groups = 176		

inflation. Among these factors, the lagged debt maturity structure, firm size, growth opportunities and GDP positively affect the debt maturity structure, whereas the remaining factors have a reverse relationship to the debt maturity structure.

First, the lag debt maturity structure has a coefficient larger than 0 (0.538); hence, it positively affects the debt maturity structure. This result is consistent with the findings of Ozkan (2000), Aivazian et al. (2005), Deesomsak et al. (2009), Terra and Amal (2011), Kirch and Terra (2012), and Cesario and Terra (2013), and Mohammed and Mubi (2020), and Nguyen (2018). According to theory and empirical studies, a significant, positive, and less than a unit coefficient of the lagged debt maturity structure suggests that the firms have a target optimal debt maturity structure. However, the coefficient is greater than one, which means that the company has no target ratio (Antoniou et al., 2006).

The research results obtained by conducting SGMM show that the debt maturity structure of listed firms in Vietnam is dynamic. Thus, SMEs partially adjust their debt maturity structure towards the target optimal debt maturity structure. In addition, the results reveal that although companies have adjusted the debt term structure, the speed is not high and only at a level of 0.462 (1-0.538). This result proves that the cost for debt maturity adjustment is relatively high. The reason for the high cost in Vietnam is that the cost resulting from the debt term structure adjustment is greater than the cost resulting from the debt term structure deviation. Therefore, to limit these costs, the company needs to study and propose the debt maturity structure carefully.

According to Muriithi (2017) and Ngoc Xuan et al. (2020), SMEs have no unified definition, and that each country and organisation has a different definition based on classification criteria. However, Tewari et al. (2013) stated that SMEs frequently use the following primary criteria: employee count, annual revenue/assets/level of investment and industry of operation (ownership). In Vietnam, according to the Government's Decree 39/2018/ND-CP dated 11 March 2018, SMEs are classified according to two sets of criteria: their field of operation and the number of employees, annual revenue and income; or the number of employees and capital (Vietnam Government, 2018). SMEs often have a simple operating structure because the owner often functions as an enterprise manager (Adams et al., 2012; Lampadarios, 2016). Given the constraints on resources,

SMEs must try to obtain differentiated funds to finance their activities and utilise alternative means of increasing performance.

The researchers demonstrate a target debt maturity structure in firms. Firms need to determine the long-term debt ratio and the short-term debt ratio such that the cost of using loan utilisation is the lowest (Antoniou et al., 2006; Ozkan, 2000). In addition, Modigliani and Miller (1958) showed that the debt maturity structure has a particular influence on a firm's value; hence, adjusting the actual debt maturity structure to match the target debt maturity structure is necessary. The results of these studies prove that a dynamic debt maturity structure exists in developed countries and developing countries (Thailand, Malaysia). Accordingly, the adjustment speed of the debt maturity structure of firms in Thailand is 54%, and 48% in Malaysia, which is slower than that of companies in Singapore at 62% and in Australia by 70%. According to empirical research, Ozkan (2000) has shown that the rate of adjustment of the debt maturity structure of UK firms is 45%. Antoniou et al. (2006) recognizes that making adjustments to the target debt maturity structure is a costly and non-immediate adjustment for firms in France, Germany and the UK (this adjustment ratio ranges from 34% to 55%). Lopez-Gracia and Mestre-Barberá (2013) conclude that SMEs in Spain had adjusted their debt maturity structure at a rate of about 37% per year. In this paper, the rate of adjustment of the debt maturity structure of SMEs in Vietnam is approximately 46%. The rate shows that the speed of adjusting the debt term structure of enterprises in different countries varies, depending on the characteristics of the economy and the development of each country.

Demirguc-Kunt and Maksimovic (1999) find evidence that firms in developed countries use more long-term debt than firms in developing countries, and large firms also use more long-term debt than small ones. These authors explain that this is because of the impact of the legal system. Firms will use much long-term debt in countries with sound legal systems and invest in assets with longer maturities. Given that the legal system is not synchronised in Vietnam, the stock market is not transparent, and the market size is limited. Hence, the decision on debt maturity of enterprises, especially SMEs, is strongly affected. Usually, depending on the size of the enterprise, the corresponding short term is preferred (Scherr & Hulburt, 2001). SMEs are still limited in terms of size, reputation, brand name and some other limitations regarding management qualifications, production and business capacity. Hence, their ability to access credit is limited. Therefore, the choice of debt term structure for SMEs in Vietnam has important implications for the operational efficiency of these enterprises and affects the development of the macro-economy. Therefore, the Vietnamese government has issued policies and regulations to create favourable conditions for the operation of SMEs. For example, Decree No. 39/2018/ND-CP dated 11 March 2018, on guidelines for Law on support for SMEs; Decree No. 38/2018/ND-CP dated 11 March 2018 on investments in small and medium-sized startup companies; Decree No. 34/2018/ND-CP dated 8 March 2018, on the establishment, organisation and operation of credit guarantee funds for SMEs; Decree No. 39/2019/ND-CP dated 10 May 2019, Organization and Operation of Small and Medium Enterprise Development Fund; and Decree No. 55/2019/ND-CP dated 24 June 2019, which provides legal assistance for SMEs.

Therefore, commercial banks have been implementing programmes and supporting credit packages for SMEs in 2020–2021 at ACB, BIDV, VPB¹ ... However, given the above limitations, SMEs can often only access short-term loan packages. Moreover, short-term loans heavily pressure companies' repayment ability on maturity day. The empirical research of debt maturity structure in Vietnam is consistent with the results of Queen and Roll (1987), Diamond (1991). Concretely, Queen and Roll (1987) and Diamond (1991). They claim that small firms have higher failure rates than do larger firms; thus, short-term finance is an available option for small firms. In addition, with different levels of asymmetric information, SMEs have less information about their operations and prospects (Petersen & Rajan, 1994; Pettit & Singer, 1985). Credible signals, including those associated with the debt maturity choice, are thus more important for small firms.

Second, the results show that leverage level hurts debt maturity structure at the 5% significance level. The estimated coefficient of leverage is -0.004 , which implies that a one-standard-deviation increase in the leverage level will lead to a 0.004 decrease in debt maturity structure. Mitchell (1991) and Dennis et al. (2000) demonstrate the reverse relationship between leverage and debt maturity structure. They argue that leverage and debt maturity structure should be negatively related because the agency costs of underinvestment can be mitigated by reducing leverage as well as by shortening the debt maturity. Besides, in terms of tax and agency theories, leverage has an opposite effect on debt maturity structure (Körner, 2007). However, firms must balance financial leverage against financial risk and agency costs to determine the best corporate debt maturity structure.

Third, although in the previous studies, profitability is a firm-specific variable that has an unclear influence on debt maturity structure (Antoniou et al., 2006; Cai et al., 2008; Cesario & Terra, 2013; Kirch & Terra, 2012; Lemma & Negash, 2012), however in this study, the author finds a statistically significant effect of profitability on debt maturity structure. It has a coefficient of -0.109 , which is smaller than zero. Thus, it affects debt maturity structure negatively, which implies that a one-standard-deviation increase in the profitability will lead to a 0.109 decrease in debt maturity structure. The findings are consistent with the results demonstrated by Lemma and Negash (2012), Correia et al. (2014), and Pham (2020). Underinvestment situation, liabilities always account for a large proportion in the capital structure, creating a conflict between debtors and shareholders. Hence, businesses are always looking for projects with good returns and prioritising debt maturity structures in the short-term to ensure the interests of debtors and shareholders.

Fourth, firm size has a coefficient of 0.011 , which is larger than zero; thus, it affects debt maturity structure positively. The result implies that a one-standard-deviation increase in the firm size will lead to a 0.011 increase in debt maturity structure. Findings are consistent with the studies by Barclay and Smith (1995), Stohs and Mauer (1996), Körner (2007), Shah and Khan (2011), Wang et al. (2010), Rozali and Omar (2011), and Cai et al. (2008), and Terra and Amal (2011), and Deesomsak et al. (2009), and Taleb and Al-Shubiri (2011), Stephan et al. (2011), Custodio et al. (2013), Correia et al. (2014), and Khan et al. (2015), and Orman and Koksak (2016). They demonstrate that firm size is positively related to debt maturity structure. Moreover, SMEs may face severe agency issues between shareholders and lenders. These firms are also prone to information asymmetry because of their limitation of resources and inability to exploit economies of scale in producing and disseminating information (Deesomsak et al., 2009). These above problems have caused SMEs to have high failure rates in raising long-term debts. Hence, SMEs are forced to use short-term debt to finance their activities (Jalilvand & Harris, 1984). Furthermore, creditors try to restrict the risk of lending to SMEs by limiting debt maturities. As a result, small firms are expected to have a higher proportion of short-term debt in their capital structure than large firms.

Given the constraints on resources, SMEs must try to obtain differentiated funds to finance their activities and utilise alternative means of increasing performance. Small firms and large firms have distinctions in ownership, economies scale, financial marketing access and disclosure of information asymmetry, which lead to differences in debt maturity structure. Depending on the operational types in businesses, the financial strategy of each company varies (Ang, 1991). Almost all small firms have a higher percentage of short-term assets than long-term ones, especially in retailing or wholesaling. Most studies find that default risk causes higher failure rates in small firms than large firms (Queen & Roll, 1987). Thus, with existing higher risk from small firms, short-term finance is suitable because of adverse selection problems (Diamond, 1991). In addition, lack of market access could lead smaller firms to shorter debt maturity. It means the level of asymmetric information is different between large and small firms. Small firms show less information about their operations and prospects through their reports (Petersen & Rajan, 1994; Pettit & Singer, 1985), which lead to a less credible communication of their prospects to lenders compared with large firms. Thus, credible signals, including those associated with the debt maturity choice, are more important for small firms. According to agency theory, small firms are likely to have shorter

maturity structure than large firms. The findings of this work support agency theory and is in line with the results of Körner (2007), Shah and Khan (2011), Rozali and Omar (2011), Terra and Amal (2011), Taleb and Al-Shubiri (2011), and Zohreh and Hassan (2013), and Correia et al. (2014), and Khan et al. (2015). They find positive significant relationships between firm size and debt maturity and contrary to the findings of Heyman et al. (2003) and Soekirman (2015) who find a significant negative relationship.

Fifth, growth opportunities have a coefficient of 0.362, which is larger than 0. Thus, growth opportunities positively affect the debt maturity structure. The result provides sufficient evidence at a 5% level of significance because the p-value of the factor equals 0.005 (less than 0.05). The results are consistent with the findings of Correia et al. (2014), Orman and Koksall (2016), Rozali and Omar (2011), and Taleb and Al-Shubiri (2011). Companies with high growth likely use long-term debt and reduce the overinvestment problems following the liquidity risk hypothesis and agency cost theory (Hart & Moore, 1994). However, because of available constraints, small firms only access short-term debt maturities that lead to reduced growth opportunities.

Finally, macro-economic factors, including GDP and inflation, are related to the debt maturity structure of Vietnamese listed firms. Concretely, Demircug-Kunt and Maksimovic (1999) find evidence that the debt maturity structure of firms in Thailand, Malaysia, Singapore and Australia is strongly related to economic characteristics. To measure economic growth, GDP is used as a standard index. Accordingly, GDP and inflation have an impact on a company's decision on debt maturity. GDP factor has a coefficient higher than zero (0.001); hence, this factor positively affects the debt maturity structure of Vietnamese listed firms (SMEs). Besides, a p-value is smaller than 5% (0.000), so there is evidence that GDP is a statistically significant factor related to debt maturity structure. The research study is consistent with the findings of Jong et al. (2008), Deesomsak et al. (2009), Fan et al. (2012), Lemma and Negash (2012), and Alves and Francisco (2015), and Pham (2020). They prove that GDP has a positive relationship with debt maturity structure. The result implies that the more the economy develops, so do the business activities of enterprises, and enterprises will use more long-term debt to finance their activities (Pham, 2020).

Given that inflation has a negative coefficient (−0.256), it has an inverse relationship with the debt maturity structure. The results have been demonstrated in the studies of Demircug-Kunt and Maksimovic (1999), Wang et al. (2010), and Pham (2020). According to these authors, an increase in inflation will lead to the expansion of the money supply, consequently leading companies to rely heavily on short-term debt. An increase in inflation rate will create risks for a company, such as liquidity and bankruptcy. Therefore, during periods of high inflation, companies will limit long-term debt and effectively focus on using internal funding sources.

5. Conclusions and limitations

The findings of this paper infer that all following factors are significant predictors of debt maturity structure in Vietnamese listed firms, namely the lagged debt maturity structure, leverage ratio, profitability, firm size, growth opportunities, GDP, and inflation. In detail, the results prove debt maturity structure is positively correlated with the lagged debt maturity structure, firm size, growth opportunities and GDP under agency cost theory, while signaling theory creates the ground for the negative effects of the profitability and leverage on debt maturity structure from 2010 to 2019 under GMM method.

Especially, the debt maturity structure adjustment speed is highlighted aims to obtain the optimal structure for minimizing agency costs, taking advantage of tax shields, and increasing transparency at the speed of 46%, which is also a reference for government agencies and policy makers. It means that government concerns the required regulations in binding the terms of bank loans for SMEs.

Although the results of this study document evidence that significant predictors of debt maturity structure, the study has limitations. First, the article has not performed a regression of internal factors affecting the debt maturity structure of SMEs by a group of industries. Second, the study explores the results without considering the effect of the COVID-19 pandemic. Practically, those firms are burdened with the interests and principals' payments at the maturity date since the pandemic period. Finally, other macro factors such as national governance quality and systematic risk are not proposed in the model. So, the future studies can overcome the limitations to figure out the new contributions for the specific nation or cross-countries.

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Note

1. ACB: Asia Commercial Bank; BIDV: Joint Stock Commercial Bank for Investment and Development of Vietnam; VPB: Vietnam Prosperity Joint-Stock Commercial Bank.

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