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What do we Know about Corporate Debt Maturity Structure in Saudi Arabia?

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Abstract

This study examines the firm-specific and macroeconomic factors that influence corporate debt maturity structure in Saudi Arabia and explores whether existing theories can predict corporate debt maturity structure. The sample includes 121 listed non-financial firms operating in Saudi Arabia over the years 2010-2021 and employs a static ordinary least square (OLS) model before and after incorporating industry fixed effects. Approximately 52% of Saudi firms' total debt consists of long-term debt, which is higher than other firms' long-term debt usage, operating in emerging markets. Furthermore, the study finds that both firm-specific and macroeconomic factors are important determinants of Saudi firms' debt maturity structure decisions. The firm-specific determinants including leverage, profitability, size, liquidity, and asset maturity are positively related to corporate debt maturity choice. However, firms' risk is negatively associated with debt maturity structure. Economic growth (GDP) has a positive linkage with corporate debt maturity, while the interest rate negatively impacts long-term debt maturity. The results support the matching theory, while it does not support the agency and the signaling theories. At best, this is one of the earliest studies that investigate the influence of firm-specific and macroeconomic factors on Saudi firms' debt maturity structure decisions.

JEL classification numbers: G3, G32.
Keywords: Debt maturity, Firm-related factors, Macroeconomic factors, Saudi Arabia.

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1. Introduction

corporate debt maturity structure, the choice between long-term or short-term debt, is one of the most critical questions in finance. The importance of corporate debt maturity decisions is confirmed by debt maturity structure relevance to corporate survival and bankruptcy risk (Nguyen, 2022; Cai et al., 2008). Firms' liability structure can be utilized to alleviate corporate agency problems (Myers, 1977) and corporate debt maturity structure can signal the quality of the firm to stakeholders (Flannery, 1986). Further, corporate debt maturity structure is also linked to the firm's cost of financing, flexibility in funding and potential risk of refinancing (Hasan et al., 2022).

A plethora of studies, performed in developed and developing markets, showed that corporate debt maturity structure is explained by a set of firm-specific and macroeconomics-related determinants (Nguyen, 2022; Awartani et al., 2016; Alcock et al. 2012; Cai et al., 2008; Antoniou et al., 2006; Ozkan, 2002; Stohs & Mauer, 1996). The applied debt maturity structure determinants are justified by well-developed theories including the agency theory (Jensen & Meckling, 1976; Myers, 1977), the signaling theory (Flannery, 1986; Diamon, 1991), and the matching theory (Myers, 1977; Hart & Moore, 1994).

Despite the massive literature on corporate debt maturity structure, little is known about corporate debt maturity structure in Saudi Arabia, which is an interesting setting since it represents an important oil-driven economy worldwide. Therefore, the main purpose of this study is to investigate the usage between short-term and long-term debt for Saudi firms and to examine the firm-specific and macroeconomics-related factors that determine corporate debt maturity structure choice for listed firms operating in Saudi Arabia. Further, the study also aims to perform an empirical investigation into which theories can predict Saudi firms' debt maturity structure decisions.

As an emerging market which is considered as an oil-driven economy, Saudi Arabia is a major economy worldwide being one of the G20 members and the major producer and exporter of raw oil (Almaafi et al., 2023; Alnori, 2020). Further, Saudi Arabia has the largest and most developed capital market in the Middle East and North Africa region (i.e., The MENA). Due to remarkable development and reforms performed in the capital market of Saudi Arabia, the FTSE index provider upgraded the Saudi capital market to emerging market status in 2018 (Alnori, 2020). One of the key steps that occurred in the Saudi Capital market was the capital market liberalization for foreign investors. Thus, investigation into Saudi firms' debt maturity structure is important for both local and foreign investors.

The outcomes of this study report that more than 52% of Saudi firms' total debt consists of long-term debt. Further, the findings of this study indicate that Saudi firms' debt maturity structure is explained by a set of both firm-specific and macroeconomic factors. More specifically, the firm-specific determinants including leverage, profitability, size, liquidity, and assets maturity are positively related to corporate debt maturity choice, which implies that these factors positively increase

Saudi firms' long-term debt usage. However, firms' risk is negatively associated with debt maturity structure, which indicates that higher earnings volatility decreases firms' ability to use long-term debt. Concerning finance theory, the positive effect of leverage and profitability on Saudi firms' debt maturity structure is inconsistent with the agency and signaling theories, while the positive impact of assets maturity and assets tangibility on debt maturity is in line with the matching theory proposed by Myers (1977) and Hart and Moore (1994). The positive effect of the firm's size is consistent with the pecking order theory.

Besides the above-mentioned firm-specific determinants, the findings of this study explore that economic growth and interest rate are significantly related to corporate debt maturity structure. More specifically, economic growth (GDP) has a positive linkage with corporate debt maturity indicating that firms are more likely to issue long-term debt during times of good economic conditions and growth. However, the interest rate hurts long-term debt maturity since interest rate rises increase the cost of debt financing.

The remainder of this study is organized as follows: section 2 is the theoretical underpinning. Section 3 presents the literature and the research hypothesis. Section 4 describes the data and the methodology. Section 5 presents the results, and finally, section 6 concludes.

2. Theocratical Underpinnings

Following the irrelevance proposition of Stiglitz's (1974) on debt maturity decisions, a gradual development of theoretical studies focused on understanding the factors or determinants of debt maturity. Accordingly, Corporate finance researchers proposed well-established theoretical work to explain debt maturity choice (e.g., Myers, 1977; Barnea et al., 1980; Brick & Ravid, 1985; Diamond, 1991).

2.1 Agency Theory

Introduced by Jensen and Meckling (1976), agency theory describes the conflict of interest that arises among corporate owners and agents. As explained by Myers (1977), there are different types of interest among firm's insiders and outsiders including conflicts of interest between shareholders and managers, conflicts among equity holders and bondholders, large shareholders and small shareholders, and conflicts of interest between shareholders and non-financial agents (Nguyen, 2022). Jensen and Meckling (1976) postulate that the use of debt financing can mitigate agency problems by relying more on short-term debt maturity. This is because the usage of short-term debt can enable shareholders to continuously be monitored by external financers and increase managers' efficiency. This use of short-term debt to decrease agency problems is confirmed by Myers (1977) and Barnea et al. (1980).

2.2 Signaling Theory

Flannery (1986) introduced the signaling theory of corporate debt maturity structure, which is based on the pecking order theory of Myers (1984) and Myers and Majluf

(1984). In brief, the pecking order theory predicts that informational asymmetry occurs between the firms' insiders (owners and managers) and outsiders (external financiers including creditors). To reduce the mentioned informational gap between the firms' insiders and outsiders, Flannery (1986) pointed out that firms' debt maturity structure decisions can importantly signal and reflect varying levels of low-quality and high-quality firms. More specifically, Flannery (1986) posts that firms' short-term debt will transfer a positive signal to lenders and investors, which can decrease the cost of borrowing. In contrast to short-term borrowing, long-term debt choice may signal bad information about the company's quality. Therefore, the signalling theory of Flannery (1986) describes that firms with optimal financing should mainly exhibit a debt maturity structure with short-term debt.

Following Flannery's (1986) signalling theory, Diamon (1991) developed another signalling theory to explain corporate debt maturity structure choices by considering a firm's credit rating. More specifically, Diamond (1991) suggests that firms' credit rating should better reveal corporate quality and hence corporate debt maturity decisions. Therefore, Diamond (1991) high credit rating firms (good firms) will largely utilize short-term debt financing, while low credit rating firms are more likely to be financing with long-term debt.

2.3 Matching Theory

The matching theory predicts that firms should achieve a matching between their debt and assets maturities to enable the firm to reduce the risk of insufficient liquidity when the principal must be paid. Myers (1977) claimed that the corporate underinvestment problem can be minimised by matching the maturities across the firm's assets and debt. Therefore, the firm level of debt financing should be reduced in proportion to the decrease in the firm's assets value. As suggested by Myers (1977), this matching between assets and debt can manage the conflict of interest between the firms' creditors and shareholders, hence decreasing the underinvestment issue. Further, the comparison between the time-to-maturity comparison objects to listing the firm's debt to match the anticipated decline in the value of the firm's assets. Following this thought, Hart and Moore (1994) pointed out that firms' debt should match the collateral's depreciation rate or income stream. Therefore, a matching between firms' debt and assets should occur.

3. Empirical Literature and Hypotheses

Existing literature performed in developed economies demonstrated that corporate debt maturity structure is importantly relevant to several firms-specific factors including the firm's size, assets tangibility, earnings volatility, growth, and tax rate (Alcock et al., 2012; Antoniou et al., 2006; Stohs & Mauer, 1996). For example, using a sample of US firms, Stohs and Mauer (1996) found that firm-specific factors, such as size and the amount of fixed assets are positively related to the usage of long-term debt, while earnings volatility reduces firms' long-term debt choice. Ozkan (2002) investigated the determinants of corporate debt maturity structure

using a sample of non-financial firms in the UK. His study confirmed the significant impact of firm-specific factors, such as size and assets maturity, agency cost and earnings volatility, on debt maturity. However, the study of Ozkan (2002) showed no support for the tax-based and signaling hypothesis. Further, Antoniou et al. (2006) investigated the internal factors that determine corporate debt maturity structure using a sample including three European countries including France, Germany, and the UK. The study of Antoniou et al. (2006) confirmed that debt maturity structure is influenced by firm-specific factors and country-related factors. Alcock et al. (2012) examined the factors influencing debt maturity using a sample including the largest 4000 corporations in Australia. They found that leverage and asset maturity has no significant impact on corporate debt maturity decision. Using a sample including a wide set of firms operating in European countries, Correia et al. (2014) showed that firms' size, leverage, and asset maturity are the internal factors that positively impact corporate debt maturity, while profitability reduces firms' tendency to use long-term debt. Further, Nguyen et al. (2020) performed another study on factors related to Australian firms' debt maturity choice and confirmed that a set of firm-related and macroeconomic factors are significantly relevant to debt maturity structure.

The literature of studying the corporate debt maturity determinants is remarkable in developing and emerging markets. In this light, Abdullah (2005) investigated the debt maturity structure using a sample including only 56 firms over the years 1995-2000. The results showed that firms' specific factors including size and growth are positively related to long-term debt, while assets maturity are negatively related to long-term debt. Further, the results of Abdullah (2005) indicated that firms' profit and liquidity have no impact on long-term debt. However, this study did not examine the role of macroeconomic factors influencing corporate debt maturity. Further, the sample period used in the study of Abdullah (2005) is from 1995-2000. After the year 2000, significant market development occurred after the sample period, such as the establishment of the capital markets authority in 2005 and the capital market liberalisation for foreign investors in 2016.

Lemma and Negash (2012) analyzed firm-specific factors that impact the debt maturity structure for a set of African firms. Their findings demonstrate that earnings volatility, assets maturity and leverage increase debt maturity structure. Further, Lemma and Negash (2012) showed that industry and macroeconomic factors are important related to African firms' debt maturity structure decisions. Further, Fan et al. (2012) investigated corporate debt maturity structure for firms operating in developing and developed economies. Fan et al. (2012) report that firms' debt maturity structure decisions are importantly relevant to a set of firm-specific characteristics but the taxation effect on debt maturity structure is weak.

In addition, using a sample of 10 countries located in the MENA region, Awartani et al. (2016) investigated the firm-specific and institutional factors that impact corporate debt maturity structure. They find that firms' usage of long-term debt is remarkably limited in the MENA region. Nevertheless, firm-specific factors are important related to debt maturity structure. More specifically, firms' assets

tangibility, size and leverage increase the usage of long-term debt, while default risk significantly decreases firms' long-term debt financing. Another study performed by Nguyen (2018) showed that macroeconomic factors including interest rate, inflation and GDP are significantly related to debt maturity structure. This importance of macroeconomic factors on corporate debt maturity is confirmed by Álvarez-Botas and González-Méndez (2019). Further, using a dynamic model, Nguyen (2022) examined the internal factors and external factors relevant to the debt maturity structure of listed firms in Vietnam. He showed that firms-specific factors positively influencing corporate debt maturity structure are liquidity, earnings volatility, firms' size, and assets tangibility.

3.1 Hypotheses

3.1.1 Leverage

The corporate capital structure measured by the leverage ratio indicates the amount of assets funded by debt financing including short-term and long-term debt (Alnori, 2023). The relationship between a firm's leverage and debt maturity structure is mixed. Existing studies report that firms with higher leverage ratios are more likely to issue longer-term debt to avoid bankruptcy and hence prefer longer debt maturity (Leland & Toft, 1996). In contrast, it is argued by Dennis et al. (2000) that leverage should be negatively related to the usage of long-term debt due to the agency problem caused by the underinvestment issue.

As mentioned, although several studies reported a negative linkage between leverage and debt maturity structure, it is remarkable that most studies performed in developed and emerging markets report a positive association between leverage and long-term debt maturity (e.g., Awartani et al., 2016; Correia et al., 2014; Antoniou et al., 2006). Therefore, the present study expects that leverage is importantly relevant to Saudi firms' long-term debt choice. More specifically, the present study expects a positive nexus between leverage and long-term debt.

3.1.2 Profitability

Existing evidence confirmed that firms' performance is an important factor influencing corporate debt maturity structure (Nguyen; 2022; Ozkan, 2002; Correia et al., 2014). As postulated by the signaling theory, profitability can reveal the quality of the firm's performance and good-quality firms are more likely to issue short-term debt. Following this line of thought, the signaling theory predicts that profitability should be negatively related to long-term debt usage. Empirically, the negative nexus between profitability and firms' long-term debt decisions is more dominant (Nguyen, 2022; Correia, 2014; Mateus & Terra, 2013). However, this negative relationship between profitability and firms' long-term debt might not be the case when most of the firm assets have long assets maturity (Nguyen, 2022). In sum, the present study expects that profitability is an important determinant of the Saudi firms' debt maturity structure and expects a negative profit-debt structure linkage.

3.1.3 Firm size

Corporate size can impact corporate debt maturity decision due to varying levels of firms' information asymmetry problem and agency cost across large and small firms (Nguyen, 2022; Awartani et al., 2016). Specifically, the informational asymmetry problem is less severe in larger firms in comparison to small firms. Therefore, large firms can access long-term debt financing better than small. In this light, Titman and Wessels (1988) post that small firms are more likely to use short-term debt due to the higher transaction cost, compared to large firms, when they issue long-term debt. Further, large firms have easier access to the debt market than small firms and can better access long-term debt due to their better financial condition (Johnson,2003). In general, most empirical studies tend to support the positive relation between the firm's size and its debt maturity structure when measured by long-term debt to total debt (Nguyen, 2022; Awartani et al., 2016; Correia et al., 2014). According, the present study expects that the positive linkage between size and debt maturity should be the case for Saudi corporations.

3.1.4 Assets tangibility

Existing studies consider asset tangibility as one of the key factors related to corporate debt maturity structure. Berglof and Von (1994) reported that tangible assets enable firms to use more long-term debt. Further, Myers and Rajan (1998) argue that asset tangibility can be used as collateral and hence make creditors less concerned about the loan value in the case of firms' liquidation. Therefore, higher tangible assets should be positively related to corporate debt maturity structure, measured by long-term debt. Following these lines of thought empirically, empirical studies showed that asset tangibility is positively related to long-term debt usage (Nguyen, 2022; Awartani et al., 2016; Correia et al., 2014). Therefore, it is more likely that asset tangibility is positively related to Saudi firms' long-term debt choice.

3.1.5 Liquidity

The linkage between corporate liquidity and debt maturity structure can be predicted by the liquidity risk hypothesis. The level of firms' liquidity is importantly related to the liquidity risk or credit rating (Bugshan et al., 2021). High credit-rating firms are likely to use short-term debt due to the lower interest charges, while law-rated firms are expected to use long-term debt. Following Myers and Rajan (1988), firms' high liquidity levels may limit the firm's ability to increase funds since unnecessary liquidity restricts managers from investing in profitable investments.

Empirically, the effect of corporate liquidity on debt maturity structure, measured by long-term debt, is not clear. Some studies found a positive relationship (e.g., Kalsie & Nagpal, 2018). In contrast, other studies demonstrated a negative association between corporate liquidity and long-term debt (Stephan et al., 2011). Accordingly, the present study expects liquidity to be importantly relevant to Saudi firms' debt maturity structure, but the direction of the relation is not clear.

3.1.6 Assets Maturity

Myers (1977) postulates that linking future values of the corporation's assets to debt repayments can lighten the underinvestment agency problem (i.e., matching between firms' maturity and assets maturity). Further, another view by Hart and Moore (1994) asserts that the effect debt repayment stream is importantly influenced by the firm's project cash inflows and the longevity of the project assets. Therefore, assets maturity should be positively related to debt maturity. More specifically, longer (shorter) term assets maturity should therefore result in the use of more long-term (short-term) financing (Nguyen, 2022; Awartani et al., 2016; Cai et al., 2008; Antoniou et al., 2006). Accordingly, the present study predicts a positive nexus between assets maturity and corporate debt maturity structure.

3.1.7 Growth opportunities

Existing literature demonstrates that corporate growth opportunities is importantly relevant to corporate choice between short-term or long-term debt (Hasan et al., 2022; Alnori & Alqhtani, 2019; Awartani et al., 2016). This is because firms' growth opportunities is expected to lessen the underinvestment issue caused by the conflict of interest between bondholders and shareholders by the usage of short-term debt financing (Myers, 1977). However, empirical work showed that the impact of growth opportunities on corporate debt maturity structure is not clear due to the conflicting conclusions. For instance, Awartani et al. (2016) and Hasan et al. (2022) showed a negative relation between growth and corporate debt maturity. In contrast, this relation is shown to be positive by prior studies performed by Nguyen, (2022). Therefore, the present study hypothesizes that future growth opportunities is relevant to Saudi firms 'debt maturity choice but the direction of the relation is not clear.

3.1.8 Firm Risk

Firm risk (i.e., earnings volatility) is viewed to be one of the reliable determinants of corporate debt maturity structure (Cai et al., 2008; Mitchell, 1993). Corporate lenders and creditors consider firms suffering from higher business risk to be associated with a higher risk of expected bankruptcy (Alnori, 2023). Kane et al. (1985) postulated that firms with higher volatile earnings are more likely to issue short-term debt to avoid the risk of financial distress. Therefore, it is less likely that firms with higher volatility in their earnings to have long-term debt maturity structures. Accordingly, the present study expects that earnings volatility to be negatively related to Saudi firms' debt maturity structure.

3.1.9 Economic Growth

Besides the above-mentioned firm-specific determinants, macroeconomic-related factors are shown to be relevant to debt maturity choice (Nguyen, 2022). During times of economic drop, corporate lenders become more risk-averse and prefer short-term debt to reduce the risk of firms' default (Alnori, 2023). In contrast,

during times of good economic conditions, the availability of cheaper funds increases, and lenders provide longer-term debt financing to corporations. Empirically, this positive linkage between GDP growth and corporate debt maturity structure is supported by most period-relevant studies (e.g., Nguyen, 2022; Alves & Francisco, 2015; Fan et al., 2012; Wang et al., 2010). Thus, the present study hypothesises that economic growth is positively related to Saudi-listed firms' debt maturity structure.

3.1.10 Interest Rate

The interest rate is one of the macroeconomic factors that represents the cost of corporate debt financing and therefore corporate debt choice between short-term and long-term debt structure (Cook & Tang, 2010; Korajczyk & Levy, 2003). High interest increases the cost of debt and therefore optimal financing decisions should avoid the usage of long-term debt. However, when the interest rate is relatively lower, firms are more likely to utilize cheaper debt financing. Therefore, the present study predicts a negative linkage between the interest rate and Saudi-listed firms' debt maturity structure.

4. Data and Method

4.1 Data and Sample

The sample used in this study includes all listed non-financial corporations operating in the Saudi Main Stock Exchange (TASI), over the years 2010-2021. The study began the analysis in 2010 because the data suffered from missing observations before the year 2008 and to isolate the study analysis from the global financial crisis that occurred during the years 2008 and 2009 (Alnori, 2023). The data applied in this are annual and the source of firm-specific related data is obtained from Thomson Reuters DataStream. Consistent with corporate finance studies, financial industries are excluded in our analysis (i.e., insurance and banks) since their financial decisions are largely influenced by regulations (Alnori, 2023; Nguyen, 2022). Further, all missing variables related to firms' debt maturity structure are dropped and negative values for total assets are removed. Following most corporate debt maturity relevant studies (e.g., Nguyen, 2022; Awartani et al., 2016), all variables are winsorised at the first and 99^{th}[2] percentile to reduce the distortions resulting from outliers and extreme values. Finally, after performing the mentioned management in the data, the final sample consists of 121 listed firms maintaining an unbalanced panel with a total of 1567 firm-year observations.

[2] The study also performed that analysis without winsorizing the variables, and still showed similar results.

4.2 Defining Corporate Debt Maturity

The dependent variable in the present study is debt maturity (denoted by DM). Following prior studies on corporate debt maturity structure performed in emerging markets (e.g., Nguyen, 2022; Awartani et al., 2016), the present study defined corporate debt maturity as the ratio of long-term debt divided by the sum of short-term and long-term debt. Details on the definitions of all variables used in this study are reported in Table 1.

4.3 Debt Maturity Factors Measurement

As mentioned, the present study includes a set of firm-specific and macroeconomic-related factors that are relevant to corporate debt maturity structure in previous studies (e.g., Hasan et al., 2022; Nguyen, 2022; Nguyen, 2018; Awartani et al., 2016; Fan et al., 2012; Cai et al., 2008; Antoniou et al., 2006; Ozkan, 2002). The firm-specific determinants of debt maturity structure, applied in the present study, include leverage, profitability, size, assets tangibility, liquidity, asset maturity, growth opportunities and earnings volatility. the macroeconomic-related factors used are economic growth and interest rate[3]. The definitions of all the mentioned firm-specific and macroeconomics-related determinants of debt maturity are described in Table 1.

Table 1: Variables Definitions and Measurements.

Variable	Acronyms	Measure
Debt Maturity	DM	Long-term debt / Long-term debt + short-term debt
Leverage	Lev	Total debt / total assets
Profitability	Profit	Earnings before interest and tax / total assets
Size (Size)	Size	Natural log of total assets
Tangibility	TANG	Net property plant and equipment/total assets
Liquidity	Liquid	Current assets/total current liabilities
Assets Maturity	AM	Net property plant & equipment / Depreciation
Growth	Growth	$Sales_t - Sales_{t-1} / Sales_{t-1}$
Risk	Risk	Standard deviation of earnings before interest and tax/ total assets over the recent 3 years[4]
GDP Growth	GDP	Growth in Real GDP
Interest Rate	IR	Percentage change in interest rate

This table shows the definitions and acronyms of all applied variables. Debt maturity (DM) is the dependent variable. All firms-specific variables are obtained from Thomson Reuters DataStream over the years 2010-2021.

[3] Several studies include inflation but due to the high correlation between inflation and interest rate, the present study excludes inflation from the analysis. [3]

[4] Also, the present study calculated this variable over the past 4 years and the results still unchanged.

4.4 Methodology

To investigate the effect of firms-specific and macroeconomics-related factors on Saudi firms' debt maturity choice, the current study applied OLS regression. The reason for applying the OLS specification is that the present study investigates a static relationship between debt maturity and its determinants[5]. The OLS regression is performed before and after controlling for industry-fixed effects. Further, to ensure that the outcomes of the study are consistent after and before including the macroeconomic-related factors (i.e., economic growth and interest rate), the study performed the regression analysis showing the firm-specific determinants for debt maturity. After this, the study performed the regression including both firm-specific and macroeconomic determinants. As shown in equations 1 and 2, The following empirical model is applied to investigate the firm-related factors explaining corporate debt maturity structure. The dependent variable in the following models is debt maturity (DM) and the independent variables are a set of firm-specific variables (i.e., leverage, profitability, size, assets tangibility, liquidity, asset maturity, growth opportunities and earnings volatility). The measurements of all the used variables are reported in Table 1.

$$DM_{it} = ß0 + ß1\ LEV_{it} + ß2profit_{it} + ß3Size_{it} + ß4tang_{it} + ß5liquid_{it} + ß6\ AM_{it} + ß7\ growth_{it} + ß8\ Risk_{it} + ß9\ year_t + \epsilon_{it} \quad (1)$$

$$DM_{it} = ß0 + ß_1\ LEV_{it} + ß_2profit_{it} + ß_3Size_{it} + ß_4tang_{it} + ß_5liquid_{it} + ß_6AM_{it} + ß_7\ growth_{it} + ß_8\ Risk_{it} + ß_9\ year_t + ß_{10}\ Industry + \epsilon_{it} \quad (2)$$

Besides the above two equations (i.e., equations 1 and 2). Equations 3 and 4 show the present study empirical models used to investigate both firm-specific and macroeconomics-related factors influencing corporate debt maturity structure before controlling industry fixed effect, as shown in equation3, and after controlling for industry fixed effect in equation 4:

$$DM_{it} = ß0 + ß_1\ LEV_{it} + ß_2profit_{it} + ß_3Size_{it} + ß_4tang_{it} + ß_5liquid_{it} + ß_6AM_{it} + ß_7\ growth_{it} + ß_8\ Risk_{it} + + ß_9GDP_i + ß_{10}IR_t + ß_{11}\ year_t + \epsilon_{it} \quad (3)$$

$$DM_{it} = ß0 + ß_1\ LEV_{it} + ß_2profit_{it} + ß_3Size_{it} + ß_4tang_{it} + ß_5liquid_{it} + ß_6AM_{it} + ß_7\ growth_{it} + ß_8\ Risk_{it} + + ß_9GDP_i + ß_{10}IR_t + ß_{11}\ year_t + ß_{12}\ Industry + \epsilon_{it} \quad (4)$$

[5] The current study also considers applying a dynamic model, such as the GMM model introduced by Arellano and Bond (1991) and Arellano and Bover (1995). However, the tests of serial correlation are rejected at the 1% significant level. Accordingly, GMM procedure is not applicable in the present study. This issue is similar in several prior studies (e.g., Alnori, 2023; Flannery & Rangan, 2006).

Where:
$DM_{i,t}$: is the firm's debt maturity of firm I at time t.
$LEV_{i,t}$: is the firm's book leverage at time t.
$Profit_{i,t}$: is the firm's profitability at time t.
$Size_{i,t}$: is the firm's size at time t.
$Tang_{i,t}$: is the firm's tangibility of assets at time t.
$Liquid_{i,t}$: is the firm's liquidity at time t.
$AM_{i,t}$: is the firm's assets maturity at time t.
$Growth_{i,t}$: is the firm's growth opportunities at time t.
$Risk_{i,t}$: is the firm's earnings volatility at time t.
$GDP_{,t}$: is the country's economic growth at time t.
$IR_{i,t}$: is the interest rate at time t.

5. Empirical Results

5.1 Descriptive statistics

Table 2 reports the summary statistics of debt maturity and all independent variables applied in the study. The debt maturity structure mean value is 0.52 during the period 2010-2021, which indicates that more than 52% of Saudi firms' total debt represents long-term-financing. This also indicates that Saudi firms' debt structure choice relies more on long-term debt compared to other emerging markets, such as China at 23% (Cai et al., 2008), and Vietnam at 21% (Nguyen, 2022). Further, the 52% average debt maturity of Saudi firms indicate that the debt structure for Saudi corporation depends on both long-term and short-term debt. This reported usage of both long-term and short-term debt of Saudi corporations may indicate that the Saudi debt market is more developed than the debt market in other emerging markets (Alnori & Alqhtani, 2019). The summary statistics, shown in Table 2, indicate that cross-sectional dispersion for debt maturity is .34%. The maximum and minimum values for debt maturity in the study sample are 0.99 and 0, respectively.

The summary statistics show that the variable leverage (denoted by LEV), which proxies capital structure (Alnori, 2021) takes an average value of .36, which indicates that, on average, 36% of Saudi-listed corporations' total assets are financed by debt. Further, the mean value for the variable profit is .05 and there is a remarkable difference across Saudi firms' profitability since the minimum and maximum values for the variable profit range between -1.16 and 2.34.

The descriptive statistics show that the mean and median values for assets tangibility (Tang) are .40 and .37 respectively, while the mean and median values for corporate liquidity (liquid) are 2.81 and 1.71 respectively. The mean values for the variable liquidity reveal that, on average, Saudi firms own current assets 2.8 times more than their current liabilities to cover their current obligation and working capital needs, which indicates that Saudi firms seem to have no liquidity issues in the short-term (Bugshan et al., 2023). Further, the mean values of assets maturity (AM) and growth opportunities (Growth) are 4.11 and 0.147.

The macroeconomics variables, including economic growth (GDP) and interest rate (IR), have mean values of 3.18 and 2.41respectively, while the median values for GDP and IR equal 3.38 and 2.23. Finally, the descriptive statistics show that the minimum and maximum values for GDP during the period 2010-2021 range between -4.34 and 10.9.

Table 2: Descriptive Statistics

	N	Mean	Median	Std. dev	Min	Max
DM	1,200	.521	.600	.349	0	0.99
LEV	1,567	.367	.331	.241	0	2.34
Profit	1,404	.058	.064	.105	-1.16	.760
Size	1,567	12.5	12.4	1.89	7.53	17.3
Tang	1,559	.409	.376	.278	0	.994
Liquid	1,321	2.81	1.71	4.98	.009	97.9
AM	1,330	4.11	10.1	16.7	9.13	.561
Growth	1,224	.147	.060	.640	-.86	5.23
Risk	918	.037	.022	.041	.003	.276
GDP	1,567	3.18	3.38	3.48	-4.34	10.9
IR	1,567	2.41	2.23	1.45	.96	5.28

Summary statistics of the variables used in the study during the period 2010-2021. The complete definitions of all variables are described in Table 1.

5.2 Correlation

Table 3 reports the correlation matrix across all firms-specific variables used in the study and the variance inflation factors (FIV). Most variables are positively correlated with debt maturity except the variables profit and risk. Overall, the correlation matrix indicates that the independent variables applied in the current study are not highly correlated, suggesting that the issue of multicollinearity is unlikely in the regression analysis. Further, the inflation factors (VIF) confirm that all the variables applied have VIF below 2. Therefore, multicollinearity should not be a concern (Saeed et al., 2023; Alnori & Alqhtani, 2019).

Table 3: Correlation

	DM	LEV	Profit	Size	Tang	Liquid	AM	Growth	Risk	
DM	1									VIF
LEV	0.02	1								1.20
Profit	-0.17	-0.18	1							1.09
Size	0.26	-0.18	0.17	1						1.11
Tang	0.26	0.14	-0.01	-0.16	1					1.10
Liquid	0.15	-0.52	0.14	-0.13	-0.16	1				1.39
AM	0.09	-0.01	-0.02	0.04	0.13	0.01	1			1.03
Growth	0.01	0.003	0.03	0.01	0.01	-0.04	0.03	1		1.01
Risk	-0.29	-0.01	-0.36	-0.21	-0.08	0.02	-0.06	0.08	1	0.81

5.3 Regression Results

Table 4 summarizes the regression results for the firm-specific and macroeconomic factors influencing corporate debt maturity structure. The first and (second) columns report the firm-specific factors of debt maturity without (including) industry-fixed effects. In addition, columns 3 and 4 show both the firm-specific and macroeconomic determinants of corporate debt maturity including before and controlling industry fixed effect. The rationale for performing the regression analysis before and after the macroeconomics factors is to ensure that the effect of the firms-specific factors is consistent across all regression applied. As shown in Table 4, overall, the influence of all firm-specific factors on corporate debt maturity is mostly consistent across all regressions performed.

The regression results shown in Table 4 indicate that leverage is positively and significantly related to debt maturity structure, measured by long-term debt. This positive coefficient reveals that firms' leverage increases firms' long-term debt maturity. The estimated coefficient of leverage is 0.20, which means that a one-standard-deviation rise in the leverage ratio will result in a 0.20 increase in debt maturity structure. The positive linkage is consistent with the view that firms with higher leverage ratios are more likely to issue longer-term debt to avoid bankruptcy and hence prefer longer debt maturity (Leland & Toft, 1996), while the mentioned positive linkage does not support the view that leverage decreases the usage of long-term debt due to agency problem of underinvestment (Dennis et al., 2000). Empirically, the leverage-debt maturity positive relation found in the current study is consistent with most prior studies (e.g., Awartani et al., 2016; Correia et al., 2014; Antoniou et al., 2006). In contrast, the positive link between firms' leverages and debt maturity is inconsistent with Nguyen (2022).

Corporate profitability shows a positive impact on debt maturity structure and this relation is statistically significant at a 1% significance level. This indicates that profitable firms are more likely to use long-term debt maturity, which contradicts the perspective of the signalling theory as it posts that profitability can reveal the quality of the firm's performance and good-quality firms are more likely to issue short-term debt. Empirically, the positive association between corporate profit and long-term debt maturity, found in the present study, is confirmed by Cai et al. (2008). However, the positive association between corporate profit and long-term debt maturity is inconsistent with empirical evidence (Nguyen, 2022; Correia, 2014; Mateus & Terra, 2013).

In line with most prior empirical evidence (i.e., Nguyen, 2022; Awartani et al., 2016; Correia et al., 2014)., firm size has a positive and statistically significant influence on corporate debt maturity structure, indicating that the larger the firms the more usage of long-term debt. Our results on the size-debt maturity relationship accept the view that the informational asymmetry problem is less severe in larger firms in comparison to small firms. Therefore, large firms can access long-term debt financing better than small., Further, large firms have easier access to the debt market than small firms and can better access long-term debt due to their better

financial condition (Johnson,2003).

Further, assets tangibility positively increases firms' long-term debt choice. This positive relationship is significant at a 1% level and remains the same across all regression performed. This supports the view that tangible assets are relevant to firms' long-term debt since tangible assets can be used as collateral, which makes creditors less concerned about the loan value in the case of firms' liquidation (Berglof & Von, 1994; Myers & Rajan, 1998). The empirical results between assets tangibility and corporate debt maturity are consistent with prior evidence (Nguyen, 2022; Awartani et al., 2016; Correia et al., 2014).

The results shown in Table 4 report a positive and significant relation between liquidity and corporate debt maturity structure. This positive nexus accepts the view that liquidity is importantly relevant to firms' risk and therefore their ability to use long-term debt (Bugshan et al., 2021). However, the positive link between liquidity and debt maturity is not in line with the notion that firms' high liquidity levels may limit the firm's ability to increase funds since unnecessary liquidity restricts managers from investing in profitable investments (Myers & Rajan, 1998). Concerning prior empirical studies, the positive nexus between liquidity and debt maturity is consistent with Kalsie and Nagpal (2018), while it is not consistent with Stephan et al., (2011).

Corporate assets maturity is positively and significantly related to corporate debt maturity structure. As explained by Myers (1977), the positive relation between assets maturity and debt maturity indicates that linking future values of the corporation's assets to debt repayments can lighten the underinvestment agency problem Further, the study results on assets maturity and debt maturity show that the effect debt repayment stream is importantly influenced by the firm's project cash inflows and the longevity of the project assets (Hart & Moore, 1994). This result is confirmed by most empirical evidence (Nguyen, 2022; Awartani et al., 2016; Cai et al., 2008; Antoniou et al., 2006). In addition, the results summarized in Table 4 show that firms' growth has no significant effect on corporate debt maturity structure. These results show that firms' growth does not provide any significant impact on debt maturity choices for Saudi corporations.

As for the RISK variable, the coefficient is negative and significant at 1% in all regressions performed. This implies that a firm with higher earnings volatility employs less long-term debt. This implies that lenders and creditors are more concerned with long-term borrowing for risky highly financially distressed firms, which is consistent with the view that firms with higher volatile earnings are more likely to issue short-term debt to avoid the risk of financial distress (Kane et al., 1985).

Regarding the macroeconomic factors impact on corporate debt maturity structure, Table 4 columns 3 and 4 indicate that that economic growth is positive and statistically significant. This implies that Saudi firms issue more long-term debt during times of high economic growth and development. This indicates that macroeconomic condition is important and relevant to corporate debt maturity structure decisions in Saudi Arabia. This positive effect of GDP on debt maturity is

consistent with prior studies performed in Australia, Thailand, Singapore, Vietnam, and Malaysia (Nguyen, 2022; Alves & Francisco, 2015; Fan et al., 2012). However, the interest rate has a negative coefficient and is statistically significant. This implies that firms issue less long-term debt when interest rates increase, to avoid the higher cost associated with long-term debt financing. Therefore, during times of high interest rates, firms will rely less on long-term debt and use internal financing more likely (Bugshan et al., 2023; Nguyen, 2022; Alnori & Alqhtani, 2019).

Table 4 summarizes the OLS regression analysis examining the factors influencing debt maturity (DM). Statistics are based on annual data over the years 2010-2021. Columns 1 (2) presents the regression results controlling for time dummies, and Column 2 shows the regression results controlling for both time and industry dummies. Columns 3 (4) report the regression results after including macroeconomic factors without (with) industry fixed effects and the numbers in parentheses are the standard error. All variables definitions are explained in Table 1.

Table 4: OLS regression analysis

	(1)	(2)	(3)	(4)
VARIABLES	**Firms-Specific Factors**		**Firms & Macro Factors**	
LEV	0.208***	0.216***	0.205***	0.210***
	(0.06)	(0.06)	(0.06)	(0.06)
Profit	0.379***	0.357***	0.371***	0.347***
	(0.09)	(0.09)	(0.09)	(0.09)
Size	0.055***	0.040***	0.055***	0.041***
	(0.01)	(0.01)	(0.01)	(0.01)
Tang	0.386***	0.523***	0.379***	0.515***
	(0.04)	(0.05)	(0.04)	(0.05)
Liquid	0.069***	0.077***	0.069***	0.077***
	(0.01)	(0.01)	(0.01)	(0.01)
AM	0.003***	0.002**	0.002***	0.002**
	(0.00)	(0.00)	(0.00)	(0.00)
Growth	0.001	0.001	0.001	0.001
	(0.00)	(0.00)	(0.00)	(0.00)
Risk	-1.592***	-1.354***	-1.58***	-1.35***
	(0.27)	(0.28)	(0.27)	(0.28)
GDP			0.006**	0.007***
			(0.00)	(0.00)
Interest Rate			-0.065**	-0.050*
			(0.03)	(0.03)
Constant	-0.670***	-0.474***	-0.360***	-0.252*
	(0.09)	(0.10)	(0.14)	(0.14)
Time dummy	Yes	Yes	Yes	Yes
Industry dummy	No	Yes	No	Yes
Observations	838	838	838	838
R-squared	0.27	0.35	0.28	0.36

* denotes significant at the 10% level, ** significant at the 5% level; *** significant at the 1% level. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

6. Conclusion

This paper extends the literature by examining the firm-specific and macroeconomic factors related to corporate debt maturity structure in Saudi Arabia, which is one of the major oil-based economies worldwide. Using a sample of 121 listed firms over the 2010-2021 period, the present study that more than half of Saudi firms' total debt consists of long-term debt (i.e.,52%). Further, the present study findings showed that both firm-specific and macroeconomic factors are important determinants of Saudi firms' debt maturity choices.

In terms of firms-related factors, the present study found that the factors leverage, profitability, size, liquidity, and asset maturity are positively related to corporate debt maturity choice, which implies that these factors positively increase Saudi firms' long-term debt usage. However, firms' risk is negatively associated with debt maturity structure, which indicates that higher earnings volatility decreases firms' ability to use long-term debt.

In terms of macroeconomic factors, the findings of this study explore that economic growth and interest rate are significantly related to corporate debt maturity structure, but they have opposite influence on Saudi firms' debt maturity decisions. More specifically, economic growth (GDP) has a positive linkage with corporate debt maturity indicating that firms are more likely to issue long-term debt during times of good economic conditions and growth. However, the interest rate harms long-term debt maturity since interest rate rises increase the cost of debt financing.

The present study offers important implications for policymakers, corporate managers and lenders. First, Policymakers should make more effort to develop the capital market, particularly the debt markets in Saudi Arabia, to provide financing channels for corporations to fund their positive NPV project and hence support economic growth. Corporate managers and lenders, such as banks, should consider the importance of both firm-specific and macroeconomic factors on firms' short-term and long-term debt maturity choices. Finally, future research may investigate the factors related to debt maturity structure across petrochemical and non-petrochemical industries.

References

[1] Alcock, J., Finn, F., & Tan, K. J. K. (2012). The determinants of debt maturity in Australian firms. *Accounting & finance*, *52*(2), 313-341

[2] Almaafi, A., Bajaba, S., & Alnori, F. (2023). Stock price prediction using ARIMA versus XGBoost models: the case of the largest telecommunication company in the Middle East. *International Journal of Information Technology*, *15*(4), 1813-1818.

[3] Álvarez-Botas, C., & González-Méndez, V. M. (2019). Corporate debt maturity and economic development. *International Journal of Managerial Finance*, *15*(5), 669-687.

[4] Alves, P., & Francisco, P. (2015). The impact of institutional environment on the capital structure of firms during recent financial crises. *The quarterly review of economics and finance*, *57*, 129-146.
[5] A. M. Abdullah, "Capital Structure and Debt Maturity: Evidence from Listed Companies in Saudi Arabia.", Journal of Business & Economics, Vol.11 May, pp.15-33, 2005.
[6] Antoniou, A., Guney, Y., & Paudyal, K. (2006). The determinants of debt maturity structure: evidence from France, Germany and the UK. *European Financial Management*, *12*(2), 161-194.
[7] Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, *58*(2), 277-297.
[8] Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of econometrics*, *68*(1), 29-51.
[9] Awartani, B., Belkhir, M., Boubaker, S., & Maghyereh, A. (2016). Corporate debt maturity in the MENA region: does institutional quality matter?. *International Review of Financial Analysis*, *46*, 309-325.
[10] Alnori, F. (2021). Exploring nonlinear linkage between profitability and leverage: US multinational versus domestic corporations. *Journal of International Financial Management & Accounting*, *32*(3), 311-335.
[11] Alnori, F. (2023). Financial shock and the United States multinational and domestic corporations leverage. *Cogent Economics & Finance*, *11*(1), 2210364.
[12] Alnori, F. (2020). Cash holdings: Do they boost or hurt firms' performance? Evidence from listed non-financial firms in Saudi Arabia. *International Journal of Islamic and Middle Eastern Finance and Management*, *13*(5), 919-934.
[13] Alnori, F., & Alqahtani, F. (2019). Capital structure and speed of adjustment in non-financial firms: Does sharia compliance matter? Evidence from Saudi Arabia. *Emerging Markets Review*, *39*, 50-67.
[14] Barnea, A., Haugen, R. A., & Senbet, L. W. (1980). A rationale for debt maturity structure and call provisions in the agency theoretic framework. *the Journal of Finance*, *35*(5), 1223-1234.
[15] Berglöf, E., & Von Thadden, E. L. (1994). Short-term versus long-term interests: Capital structure with multiple investors. *The quarterly journal of economics*, *109*(4), 1055-1084.
[16] Brick, I. E., & Ravid, S. A. (1985). On the relevance of debt maturity structure. *The journal of Finance*, *40*(5), 1423-1437.
[17] Bugshan, A., Alnori, F., & Bakry, W. (2021). Shariah compliance and corporate cash holdings. *Research in International Business and Finance*, *56*, 101383.
[18] Bugshan, A., Alnori, F., & Ananzeh, H. (2023). Corporate net working capital: evidence from Shariah compliance. *International Journal of Emerging Markets*.

[19] Cai, K., Fairchild, R., & Guney, Y. (2008). Debt maturity structure of Chinese companies. *Pacific-Basin Finance Journal*, *16*(3), 268-297.
[20] Cook, D. O., & Tang, T. (2010). Macroeconomic conditions and capital structure adjustment speed. *Journal of corporate finance*, *16*(1), 73-87.
[21] Correia, S., Brito, P., & Brandão, E. (2014). *Corporate Debt Maturity-An international comparison of firm debt maturity choices* (No. 544). Universidade do Porto, Faculdade de Economia do Porto.
[22] Dennis, S., Nandy, D., & Sharpe, L. G. (2000). The determinants of contract terms in bank revolving credit agreements. *Journal of financial and quantitative analysis*, *35*(1), 87-110.
[23] Diamond, D. W. (1991). Debt maturity structure and liquidity risk. *the Quarterly Journal of economics*, *106*(3), 709-737.
[24] Fan, J. P., Titman, S., & Twite, G. (2012). An international comparison of capital structure and debt maturity choices. *Journal of Financial and quantitative Analysis*, *47*(1), 23-56.
[25] Flannery, M. J. (1986). Asymmetric information and risky debt maturity choice. *The Journal of Finance*, *41*(1), 19-37.
[26] Flannery, M. J., & Rangan, K. P. (2006). Partial adjustment toward target capital structures. *Journal of financial economics*, *79*(3), 469-506.
[27] Hart, O., & Moore, J. (1994). A theory of debt based on the inalienability of human capital. *The Quarterly Journal of Economics*, *109*(4), 841-879.
[28] Hasan, M. M., Asad, S., & Wong, J. B. (2022). Oil price uncertainty and corporate debt maturity structure. *Finance Research Letters*, *46*, 102278.
[29] Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics*, *3*(4), 305-360.
[30] Johnson, S. A. (2003). Debt maturity and the effects of growth opportunities and liquidity risk on leverage. *the review of Financial studies*, *16*(1), 209-236.
[31] Kane, A., Marcus, A. J., & McDonald, R. L. (1985). Debt policy and the rate of return premium to leverage. *Journal of Financial and Quantitative Analysis*, *20*(4), 479-499.
[32] Kalsie, A., & Nagpal, A. (2018). The determinants of corporate debt maturity for nse-listed corporates. *FIIB Business Review*, *7*(1), 43-56.
[33] Korajczyk, R. A., & Levy, A. (2003). Capital structure choice: macroeconomic conditions and financial constraints. *Journal of financial economics*, *68*(1), 75-109.
[34] Lemma, T. T., & Negash, M. (2012). Debt maturity choice of a firm: evidence from African countries. *Journal of Business and Policy Research*, *7*(2), 60-92.
[35] Leland, H. E., & Toft, K. B. (1996). Optimal capital structure, endogenous bankruptcy, and the term structure of credit spreads. *The journal of finance*, *51*(3), 987-1019.
[36] Mateus, C., & Terra, P. R. S. (2013). Leverage and the maturity structure of debt in emerging markets. *Journal of mathematical finance. California. Vol. 3, n. 3A (Oct. 2013), p. 46-59.*

[37] Mitchell, K. (1993). The debt maturity choice: an empirical investigation. *Journal of Financial Research*, *16*(4), 309-320.
[38] Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of financial economics*, *5*(2), 147-175.
[39] Myers, S. C. (1984). Capital structure puzzle. J. Finance, 39(3), 574-592.
[40] Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, *13*(2), 187- 221.
[41] Myers, S. C., & Rajan, R. G. (1998). The paradox of liquidity. *The Quarterly Journal of Economics*, *113*(3), 733-771.
[42] Nguyen, K. Q. T. (2022). Determinants of debt maturity structure: Evidence in Vietnam. *Cogent Business & Management*, *9*(1), 2094588.
[43] Nguyen, T. N. (2018). Factors affecting debt maturity structure of the companies in Vietnam. Ph.D thesis. University of Economics Ho Chi Minh City.
[44] Nguyen, V. H., Choi, B., & Agbola, F. W. (2020). Corporate social responsibility and debt maturity: Australian evidence. *Pacific-Basin Finance Journal*, *62*, 101374.
[45] Ozkan, A. (2002). The determinants of corporate debt maturity: evidence from UK firms. *Applied Financial Economics*, *12*(1), 19-24.
[46] Saeed, A., Alnori, F., & Yaqoob, G. (2023). Corporate social responsibility, industry concentration, and firm performance: Evidence from emerging Asian economies. *Research in International Business and Finance*, *64*, 101864.
[47] Stiglitz, J. (1974). Perfect and imperfect capital markets. mimeo Oxford University.
[48] Stephan, Andreas, Oleksandr Talavera, and Andriy Tsapin. "Corporate debt maturity choice in emerging financial markets." *The Quarterly Review of Economics and Finance* 51, no. 2 (2011): 141-151.
[49] Stohs, M. H., & Mauer, D. C. (1996). The determinants of corporate debt maturity structure. *Journal of business*, 279-312.
[50] Titman, S., & Wessels, R. (1988). The determinants of capital structure choice. *The Journal of finance*, *43*(1), 1-19.
[51] Wang, Y., Sun, Y., & Lv, Q. (2010). Empirical study on the debt maturity structure based on the macroeconomic variables. *International Journal of Business and Management*, *5*(12), 135-140.