The influence of firm, industry and concentrated ownership on dynamic capital structure decision in emerging market

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Abstract

Purpose – This study aims to evaluate the impact of firm, industry level determinants and ownership concentration on the dynamic capital structure decision in Indonesia and analyses the governing theories.

Design/methodology/approach – This study uses the dynamic panel model of generalized method of moments-System (one-step and two-step) by using a panel data from 2000 to 2014 to examine the relationship between the determinants and leverage. The results are robust to the various definitions of leverage, heterogeneity, autocorrelation, multicollinearity and endogeneity concern.

Findings – Growing firms and firms operating in a highly concentrated industry use high level of debt, taking advantage of the tax shield (trade-off theory). However, if the firms are operating in a highly dynamic environment, they take on less debt as to avoid bankruptcy risk. Firms in Indonesia opt for debt financing perhaps to act as a controlling mechanism to mitigate agency conflicts that may exist between the large controlling shareholders and the minority. Aged and highly profitable firms with high tangible and intangible assets and liquidity level operating in a high dynamic environment follow the pecking order theory.

Research limitations/implications – This study does not perform each industry regression individually. All the industries are pooled together, as the main focus of this study is to examine the factors affecting leverage of firms in general without giving particular attention to individual industry.

Originality/value – The insights on the impact of ownership concentration and industry characteristics are novel especially on Indonesia, thus fill the gap in the literature.

Keywords Indonesia, Ownership, Emerging market, Capital structure, Thin capitalization

Paper type Research paper

1. Introduction

When a firm decides on its financial assistance methods either using debt or equity or even a combination of both, firms need to take into account several influencing factors in their capital structure. Capital structure is undoubtedly a crucial element in the operation of a firm which aims primarily at reducing cost of capital as well as achieving maximum firm value (Khaw, 2019; Musallam, 2020) and serve as strong pillars that lend competitive advantage to a firm (Kumar *et al.*, 2017; Zamzamin *et al.*, 2021). Recognized as an important subject matter of discussion because of its significant influence over firm value, it has been a highly debated issue among researchers and policymakers in the finance literature, covering the developed as

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well as the emerging markets over the decades worldwide (Haron, 2016; Kumar et al., 2017; Ramli et al., 2019; Khaw, 2019).

In the past few decades, researchers and policymakers realize the importance of capital structure studies in the emerging market. The body of knowledge starts to examine whether the emerging and developed market landscapes share similar atmosphere and influencing factors in their capital structure decision or are they expected to be different due to different institutional and country specific factors as well as its individual corporate governance system (De Jong et al., 2008; Muchtar et al., 2018; Khaw, 2019). Reacting to this, this study gives a particular attention to the emerging market, particularly in the East Asian region. History sees these markets been severely affected by the 1997 Asian financial crisis because of, as commonly reported, the mismanagement of the corporate governance system (Brahmana et al., 2019). Realizing this fact, there has been an urgent call for a comprehensive review and a post-mortem on the corporate governance system then to restructure the governance system and to look closely at each of its mechanism. Researchers and policymakers then agreed that one of the main mechanisms contributing to sound and effective corporate governance is the ownership structure; thus, this aspect needs to be scrutinized and studied even further (Utama et al., 2017; Khaw, 2019; Musallam, 2020). Claessens et al. (2002), Utama et al. (2017), Brahmana et al. (2019) and Musallam (2020) assert that the East Asian markets including Indonesia are popularly known as having a highly concentrated ownership structure and mostly are family controlled. This kind of environment can easily trigger agency problems between the controlling shareholder and minority shareholders and thus may have such prevalent influence and impact on the capital structure decision of the firms (Chen and Strange, 2005; Utama et al., 2017; Khaw, 2019). This situation offers intriguing setting for a capital structure study more so being an emerging market; thus, this study intends to do so.

With respect to the above background, this study sets four distinctive objectives. First is to examine the impact of firm level determinants on the dynamic capital structure of firms using a dynamic model of the generalized method of moments (GMM). This study focuses on an emerging market of Indonesia, being the largest economy in Southeast Asia (Soetanto and Liem, 2019) and the second largest emerging economy behind China (Brahmana et al., 2019). This study uses a set of longitudinal data over a period of 15 years from 2000 to 2014, covering 402 firms in Indonesia. Second is to examine the impact of industry characteristics on the capital structure of firms in Indonesia. Industry characteristics in this study include the industry dynamism, industry munificence and industry concentration. Third, acknowledging the argument made in previous findings that ownership structure is a crucial mechanism in corporate governance, this study intends to examine at how ownership structure influences the capital structure decisions of firms in Indonesia as well. Indonesia is featured by higher ownership concentration and family control (Claessens et al., 2002; Utama et al., 2017; Brahmana et al., 2019; Musallam, 2020), weaker legal system and investor protection and weaker disclosure requirements (La Porta et al., 1999; Claessens and Fan, 2002; Carney and Hart, 2015; Brahmana et al., 2019). Indonesia's capital market is thus a perfect setting to investigate further the impact of ownership on firm capital structure. This will enrich the literature covering the emerging market. Fourthly, this study then concludes its finding by analysing and identifying the governing capital structure theories to explain the behaviour of the capital structure of firms in Indonesia as depicted. These four objectives highlight the significance of this study comparative to others as it tackles four important aspects in a capital structure study using an emerging market background. It offers policy implications to take into account when choosing, deciding and implementing effective capital structure decision as well as a perfect corporate governance system of not just for emerging market but also other markets as well. To date, to the best of our knowledge, there is no similar study incorporating and analysing the impact of ownership structure plus the influence of industry characteristics on the financing decision of firms in Indonesia.

This study found growing firms and firms operating in a highly concentrated industry use high level of debt, taking advantage of the tax shield (trade-off theory [TOT]). However, if the firms are operating in a highly dynamic environment they take on less debt as to avoid bankruptcy risk. Firms in Indonesia opt for debt financing perhaps to act as a controlling mechanism to mitigate agency conflicts that may exist between the large controlling shareholders and the minority. Aged and highly profitable firms with high tangible and intangible assets and liquidity level operating in a high dynamic environment follow the pecking order theory (POT).

The structure of the study is as follows. The next section 2 looks at the literature review of related theories and previous studies on capital structure. Section 3 elaborates the determinants and hypotheses development and followed by the data and methodology in Section 4 . Section 5 explains the analysis of the findings and the discussion of the results while Section 6 concludes the study.

2. Literature review

Massive empirical analyses and evidences have been documented in the literature to understand the financing choices of firms. Modigliani and Miller (1958) first initiated the study of capital structure, later referred to as the MM irrelevance theory. The MM irrelevance theory argues that in an efficient and perfect market, capital structure is irrelevant to the value of the firm and firms should be indifferent in choosing between debt and equity financing. This proposition triggers various streams of capital structure studies in the body of knowledge contending the irrelevance theory of being unrealistic and highlighting that there are in reality unavoidable frictions such as taxes in the capital market. Acknowledging the argument, Modigliani and Miller then modify their theory by including tax in their 1963 study and interestingly report that the presence of tax shield on debt has significant influence on the value of firm. Modigliani and Miller (1963) findings reveal that when there is tax in the corporate income and interest from debts are tax deductible, higher firm value is more achievable using debt financing comparative to issuing equity. This means that highly leveraged firms are more valuable due to the interest tax shield (Brigham and Ehrhardt, 2015). This encourages firms to rely heavily on debt financing, as interest tax shield can minimize the amount of tax burden. To use the interest tax shield that comes with debt financing, firms come up with a tax planning strategy, known as thin capitalization. OECD (2018) defines thin capitalization as the strategy of a company to structure their financing with relatively high level of debt instead of equity as to reap the tax shield. This phenomenon definitely affects capital structure decision of firms. However, thin capitalization impacts government revenue significantly as the government spending on its operation and on the infrastructure relies on its revenue via tax regime. Therefore, the government introduces thin capitalization rules to limit the thin capitalization activity (Brigham and Ehrhardt, 2015).

As for the case of the country understudy, Indonesia first issues its thin capitalization rules in 1984. However, after six months of implementation, the Ministry has decided to postpone its implementation because of its threat to investment growth in Indonesia. In 2015, after 30 years of postponement, the thin capitalization rules are reintroduced with several new guidelines and definitions of debt and equity. The new rules are effective in the 2016 fiscal year (Pratama, 2017).

Following the inclusion of tax in the work of Modigliani and Miller (1963), the body of knowledge later introduces new capital structure theories to explain further the behaviour of capital structure across firms and countries. TOT highlights on the trade-off between the benefit of debt because of debt tax shield and the cost of bankruptcy. POT is in favour of the use of internal rather than external financing and secured rather than unsecured securities (Myers and Majluf, 1984; Khaw, 2019). Apparently, the credibility of the manager and the performance of the firm are reflected by the financing method chosen.

The agency theory, on the other hand, looks at the mitigation of agency conflicts, conflicts that occur between the shareholders and managers. Alleviating the cost arising from such conflict is translated into achieving an optimal capital structure (Jensen and Meckling, 1976). As reported in the body of knowledge, mitigating agency conflicts require sound and effective corporate governance system, and being one of the crucial mechanisms in effective corporate governance system, ownership structure can assist in easing off the agency conflicts between the shareholders and managers. In a concentrated ownership structure such as Indonesia, wealth expropriation can occur where the controlling shareholder, being the largest party, has the advantage and bigger opportunity to expropriate the firm's wealth at the expense of the minority shareholders (Shleifer and Vishny, 1997; Brahmana et al., 2019). According to the agency theory, misalignments of interests between the controlling shareholders and minority shareholders may occur as the largest shareholder, being the controlling party has the privilege and advantage to enjoy substantial private benefit comparative to the minority shareholders. La Porta et al. (1999) and Khaw (2019) highlight this notion further by claiming that firms with highly concentrated ownership structure operating in less-developed markets with weaker minority shareholders protection are more susceptible to agency problems.

Baker and Wurgler (2002) argue that current capital structure is actually the cumulative outcome of past attempts to time the market. This argument introduces the market timing theory and stresses that market valuation persistently influences capital structure of firm.

2.1 Past studies on Indonesia

History witnesses Indonesia undergoing several significant reformations in its financial system because of its financial market activities then were sedentarily gloomy with massive flaws in the firm's financing choices. State-owned banks were seen dominating and monopolizing the debt market and over shadowing the capital market (Moosa and Li, 2012; Musallam, 2020). The gloomy atmosphere in the financial market then forces responsible parties to come out with robust financial deregulations and reformations. The reformation sees the government losing control over initial public offering, active capital raising exercises by firms in the equity market and healthy competition between the state and private banks (Musallam, 2020). After undergoing significant reformations, in the long-term perspective of 2016 to 2020, Indonesia's average real growth rate is predicted to remain high at 5.5% per year, higher than the average real growth rate of 5.2% among Association of Southeast Asian Nations (ASEAN) as reported by the Organisation for Economic Co-operation and Development (OECD) (OECD, 2018) and continue to remain the biggest economy in the Southeast Asia (Soetanto and Liem, 2019).

Several empirical and survey studies on Indonesia provide interesting findings in the literature. Ang et al. (1997) document good access to sources of funds such as debt and equities for firms in Indonesia based on the responses they received from their survey on capital structure and dividend policy on the Chief Effective Officers (CEOs) of 180 firms listed on the Indonesia Stock Exchange (IDX). The good access is reported to be due to the fairly reasonable interest rate and not because of information asymmetry, thus indicating of no POT influence in this case. Another study that does not provide evidence of POT influence in the capital structure of firms in Indonesia is by Ruslim (2009). He finds that profitability which is a stylized empirical fact representing the influence of POT has nevertheless no significant effect on the capital structure of 18 firms understudy in Indonesia within the period of six years from 2000 to 2006. Bunkanwanicha et al. (2008), on the other hand, include corporate governance structure in their study on Indonesia and report a high consumption of debt among firms with weaker corporate governance system especially during financial turmoil. They also acknowledge significant influence of country-level determinants on empirical results.

The effects of some firm level determinants on capital structure may not support the stylized empirical facts documented in the literature as revealed by Moosa and Li (2012). Their study on 162 publicly listed firms extracted from the 2009 annual reports reveals that not all important determinants in previous studies are important after all as in the case of Indonesia. Their study reveals only liquidity shows significant influence on capital structure. They argue that mixed result reported in the literature is perhaps due to different models and methods used in every empirical study done in the literature. They also discover that the financial reformation experienced by Indonesia have made positive impacts on the financial market and corporate financial policies and eliminated all inefficiencies during the dominance of state banks.

Using common important determinants in the study of capital structure, Saadah and Prijadi (2012) discover significant influence of TOT and POT in the capital structure decisions of 53 manufacturing firms in Indonesia during the study period from 2001–2008. This lends support to Myers (2003) testimonial that a collaboration of theories will better explain the capital structure behaviour in any market settings. Hardiyanto et al. (2014) conclude firms in Indonesia strive for target capital structure and maintain debt ratio to ensure high firm value. Using a panel data from year 2005 to 2011 on 228 companies, they argue that certain firm level determinants have significant influence on leverage thus to maintain the target leverage, managers must be aware of the cost that the firm may incur should they change or adjust their capital structure en-route value maximization.

Ramli et al. (2019) report significant influence of several determinants on the capital structure decision of 90 Indonesian firms from 1990 to 2010, whereas Haron (2016) reports on the financing decisions of 365 listed companies from 2000 to 2011, and Haron and Adeyemi (2016) on a smaller sample size of 290 listed firms from 2000 to 2014. POT seems to play substantial role in explaining the capital structure decision as well, resulting from financial deregulations where internal financing is also substantially preferred in financing investments and projects, not merely bank loan as previously discussed. Firms are also seemed to time their equity issuance indicating a market timing theory of capital structure as explained by Baker and Wurgler (2002).

Nevertheless, most of these studies reviewed above are not fit to represent the general idea of the behaviour of capital structure of the firms in Indonesia, partly due to small sample firms and not controlling for endogeneity. For instance, Ruslim (2009) uses a rather small sample of 18 firms in his study, and Moosa and Li (2012) takes only cross sectional data in the year 2009 to conclude on the capital structure of the firms. A recent study by Ramli et al. (2019) only cover 90 firms for a study period 1990–2010 and not addressing endogeneity problem, despite endogeneity being a major concern in panel data (Soetanto and Liem, 2019; Musallam, 2020). Responding to these limitations, this study examines a wider span of study period from 2000 to 2014 and uses 402 firms as sample. Manually collected data on ownership structure from the annual reports covering the period from 2000 to 2014 are gathered and thorough examinations carried out on the capital structure of firms in Indonesia offers useful and comprehensive insights and can be of good reference for future research thus fills the gap in the literature.

The body of knowledge also witnesses empirical evidences where firms with highly concentrated ownership in Indonesia often face agency problems between controlling shareholders and the minority shareholders as well (Driffield et al., 2007; Siregar and Utama, 2008; Carney and Hart, 2015; Utama et al., 2017; Brahmana et al., 2019; Musallam, 2020). Referring closely with the findings from related studies and the manually collected data from annual reports of firms throughout the study period, this study investigates further the impact of ownership structure especially highly concentrated ownership on the capital structure of firms in Indonesia. The findings from this study will be of useful reference to other countries which share similar ownership landscape especially among the emerging market thus enriches the literature.

3. Determinants of capital structure and hypotheses development

This study incorporates firm- and industry-level determinants plus ownership structure to understand further the capital structure of firms in Indonesia.

3.1 Non-debt tax shield

Frank and Goyal (2009), Ameer (2010) and Khaw (2019) assert that non-debt tax shield (NDTS) should be negatively correlated with leverage as NDTS is the alternative to tax shields that comes with debt financing. Annual depreciation expenses to total asset represent NDTS in this study following Frank and Goyal (2009) and Khaw (2019). The hypothesis is that:

> *H1.* NDTS has a negative influence on capital structure.

3.2 Firm size

Being less affected by information asymmetry problem, larger firms are expected to have better access to higher debt consumption. Larger firms are also more diversified thus the tendency to fail is slimmer comparatively. This indicates a positive relationship with leverage supporting the TOT (De Jong *et al.*, 2008; Ameer, 2010; Ramli *et al.*, 2019; Khaw, 2019). Nevertheless, in the case of Haron (2016), he depicts a significant negative relationship between size and leverage for Indonesian firms, claiming that the negative relationship is the after effect of the financial deregulation taken place where large firms are encouraged to issue equity over debt. Firm size is measured by log of total asset (Deesomsak *et al.*, 2009; Haron, 2014; Khaw, 2019; Musallam, 2020). The hypothesis is that:

> *H2.* Firm size has a positive influence on capital structure.

3.3 Business risk

Business risk of firms is related to its earnings volatility. Higher earnings volatility may be translated to an increase of default risk on debt payments. Hence, debt financing is not an option indicating a negative relationship with leverage as supported by Ameer (2010), Haron (2016) and Ramli *et al.* (2019). Equity issuance is more preferred for business expansion by firms with high degree of risk. Business risk is represented by yearly change in the firm EBIT (Deesomsak *et al.*, 2009; Haron, 2016; Kumar *et al.*, 2017). For this variable, the hypothesis is:

> *H3.* Business risk has a negative influence on capital structure.

3.4 Tangibility

A positive relationship is expected between tangible assets and leverage as firms with high tangible assets are seen as less risky to lenders. Tangible assets are easier to repossess in bankruptcy, as explained by TOT and supported by Bunkanwanicha *et al.* (2008), Moosa and Li (2012), Ramli *et al.* (2019) and Khaw (2019). Degryse *et al.* (2010) claim that tangible assets are used to secure long-term debt and this explains the positive effect of tangibility on leverage. Nevertheless, firms with high tangible assets appear to rely more on internal funds generated from these assets as explained by the POT, and hence a negative relationship with leverage (Haron, 2016). Supporting this explanation, Degryse *et al.* (2010) and Qamar *et al.* (2016) argue that short-term debt is negatively related with asset tangibility. Tangible asset is represented by net fixed asset over total asset (Rajan and Zingales, 1995; Haron, 2016; Khaw, 2019). The hypothesis developed is that:

> *H4.* Asset tangibility has a positive influence on capital structure.

3.5 Liquidity

A liquid firm usually enjoys substantial internal funds as explained by POT and thus does not rely on debt financing as they can opt to their huge retained earnings to fund their operations and investments. Therefore, a negative relationship is expected between liquidity and leverage. Firm liquidity is represented by current asset to current liabilities (Deesomsak *et al.*, 2009; Moosa and Li, 2012; Kumar *et al.*, 2017; Yadav *et al.*, 2020). The hypothesis is that:

H5. Firm liquidity has a negative influence on capital structure.

3.6 Profitability

Firms will strive to avoid asymmetric information problem as it affects the financing choice of a firm tremendously. Managers of highly profitable firms and cash flow seem to prefer internal resources as their first preference, being the cheapest funds rather than using external financing, either debt or equity to finance their investments to mitigate and avoid asymmetric information problem (Myers and Majluf, 1984). Profitability is anticipated to affect leverage negatively as explained by POT (Bunkanwanicha *et al.*, 2008; Haron, 2016; Khaw, 2019). Firm's profitability is represented by EBIT over total asset (Rajan and Zingales, 1995; Haron, 2016). Thus, the hypothesis for this variable is:

H6. Firm profitability has a negative influence on capital structure.

3.7 Intangibility

Intangible assets such as copyright, goodwill, patent, trade mark and research and development costs have significant impact on capital structure of firms (Rajan and Zingales, 1995). POT predicts that firms with high intangible assets face more asymmetric information problems thus rely more on debt financing to mitigate the problems. This indicates a positive relationship between intangible assets and leverage. Loumioti (2011) confirms that intangible assets help firms in the USA in facing information asymmetry problems as intangible assets such as goodwill is capable to increase borrower's access to debt as mitigating measure. The TOT and the agency theory however suggest a negative association between intangible assets and leverage. Intangibility is measured by the ratio of intangible assets to total assets (Chen and Strange, 2005; Haron, 2016). The hypothesis is as follows:

H7. Intangibility has a positive influence on capital structure.

3.8 Growth

Rapid growth firms need substantial funds to expand further. According to the agency theory, equity issuance will be the preferred method of financing to convey signals to outsiders that they are free from any underinvestment and asset substitution issues. The investors will not hesitate to invest and consequently greater expansion to the firm, hence suggesting a negative relationship with leverage. POT also predicts a negative relationship as good growth firms are deemed to have huge retained earnings. Growing firms with huge retained earnings comparative to its investments and growth expenses will consequently reduce its debt ratio (Myers and Majluf, 1984; De Jong *et al.*, 2008; Khaw, 2019). Growth is represented by market value of equity over book value of equity (Rajan and Zingales, 1995; Kumar *et al.*, 2017; Khaw, 2019). Following literature:

H8. Firm growth has a negative influence on capital structure.

3.9 Age

Aged firms normally have accumulated rather huge funds over the years thus less needs for debt financing either long or short-term debt. Aged firms usually have longer and impressive track record which is translated to higher reputational value. Therefore age is expected to negatively relate to leverage (Chen and Strange, 2005; Khaw, 2019). Conversely, new and young firms may not accumulate enough funds thus may rely on debt to finance their operations and expansion. Age of firm is measured from the year of listing on the stock exchange (Chen and Strange, 2005; Haron, 2016; Musallam, 2020). Hence:

    H9. Firm age has a negative influence on capital structure.

3.10 Share price performance

According to the market timing theory, when a firm is able to accumulate a strong share price performance with the present market value relatively higher than past market values, the firm may issue equity to finance their operation rather than debt and will repurchase equity if the situation is otherwise. This situation indicates a negative relationship between share price performance and leverage and is empirically evidenced by Setyawan and Budi (2012) and Haron (2016). Share price performance is represented by yearly change in year-end share price (Deesomsak *et al.*, 2009; Haron, 2016). The hypothesis for this variable is that:

    H10. Share price performance has a negative influence on capital structure.

3.11 Ownership concentration

In a concentrated ownership structure, large shareholders act as the controlling shareholder and thus have the function to monitor and control the action of managers (Shleifer and Vishny, 1997; Khaw, 2019; Musallam, 2020). They may use debt as a controlling mechanism to curb managers from taking advantage by adjusting the capital structure according to their own self-interests (Khaw, 2019). Furthermore, controlling shareholders choose debt over equity to avoid ownership dilution as to retain control on the firm. Controlling shareholder may also manipulate the use of debt and adopt thin capitalization concept as to reap the interest tax shield that comes with debt financing (Brigham and Ehrhardt, 2015). All these suggest a positive relationship between concentrated ownership and leverage (Driffield *et al.*, 2007; Li *et al.*, 2009; Cespedes *et al.*, 2010; Khaw, 2019).

Contrastingly, controlling shareholders in a concentrated ownership can act as disciplinary mechanism to monitor management activities, as it is much cheaper comparative to using debt (Jensen and Meckling, 1976). Thus a negative relationship between ownership concentration and leverage is expected. Ownership concentration is measured based on the shareholdings greater than 5% (Siregar and Utama, 2008; Utama *et al.*, 2017). The hypothesis for this variable is that:

    H11. Ownership concentration has a positive influence on capital structure.

3.12 Industry munificence

Munificence is the ability of the environment in the industry to ensure durability and sustainability of a firm (Kayo and Kimura, 2011). A firm operating in a high munificence industry has plenty of resources but with low competition, hence reaping high profitability. Kayo and Kimura (2011) suggest a parallel comparison between munificence-profitability with profitability-leverage and record a negative relationship thus supporting the POT prediction. Munificence for the year is measured by first, regressing time against sales of an industry over the five years period under analysis to generate the regression slope

coefficient and second, taking the ratio of the regression slope coefficient to the mean value of sales over the same period (Kayo and Kimura, 2011; Haron and Adeyemi, 2016). Following literature:

H12. Industry munificence has a negative influence on capital structure.

3.13 Industry dynamism

Ferri and Jones (1979) describe industry dynamism as risk, as it reflects the degree of instability or unpredictability of an industry. According to the TOT prediction, firms operating in an unpredictable industry environment would consume a very minimum debt. The more dynamic the industry, the riskier it gets, the lower the debt engagement of the firm (Ferri and Jones, 1979). Kayo and Kimura (2011) report a negative relationship between industry dynamism and leverage. Industry dynamism is measured by dividing the standard error of the munificence regression with the mean value of sales over the same period (Kayo and Kimura, 2011; Haron and Adeyemi, 2016). The hypothesis is that:

H13. Industry dynamism has a negative influence on capital structure.

3.14 Industry concentration

The Herfindahl–Hirschman Index (HHI) is commonly used to calculate the degree of industry concentration. MacKay and Phillips (2005) explain that the higher the HHI, where significant entry barriers exist, the higher the debt consumption. MacKay and Phillips (2005) also claim that profitability, size and risk are higher in a highly concentrated industry. Firms pursue higher return when investing in high risk projects with high level of debt indicating a positive relationship between HHI and leverage as explained by the TOT. Kayo and Kimura (2011) on the other hand find a negative relationship between HHI and leverage, implying that highly concentrated industry does not encourage firms to use higher debt, as it may be exposed to higher bankruptcy risk. HHI is measured based on the sum of the squares of market shares (sales) of firms within a given industry for the year (Kayo and Kimura, 2011; Haron and Adeyemi, 2016; Wang *et al.*, 2018). Based on literature, the hypothesis is:

H14. Industry concentration (HHI) has significant effect on capital structure.

Table 1 summarize the variables, measurement, hypotheses and the expected signs of the relationships.

4. Data and methodology

4.1 Data

This study analyses 402 non-financial listed Indonesian firms between 2000 and 2014 with firm data extracted from the Datastream, whereas data on ownership is manually collected from the annual reports of firms. Financial firms (banks, insurance companies and investments trusts) are excluded from the sample, following the literature (Khaw, 2019). The 402 sample firms consist of 75% out of 537 listed firms on the IDX (as at November, 2016), and this proportion could be regarded as the whole population of firms for generalization purposes. The sample covers firms from various industries of listing including agriculture, consumer products, industrial, infrastructure and utilities, mining, properties, trade and services and miscellaneous industry. Table 2 describes the detail of the sample firms according to industries. Only firms with a minimum of three consecutive observations towards the end of the study period are included in the data set (Deesomsak *et al.*, 2009; Haron, 2016), meaning the firms should at least be listed on the IDX from the year 2012. Unbalanced panel data is used due to the different listing dates of firms within the study period of 2000–2014.

Table 1 Variables, measurement, hypothesis and expected signs

Variables	Measurement	Hypothesis	Expected sign
Dependent variable			
Leverage			
	Total debt/total asset		
	Short term debt/total asset		
Explanatory variables			
Firm variable			
Non-debt tax shield		H1	negative
	Annual depreciation expenses/total asset		
Firm size		H2	positive
	Log total asset		
Business risk		H3	negative
	Yearly change in firm EBIT		
Tangibility		H4	positive
	Net fixed asset/total asset		
Liquidity		H5	negative
	Current asset/current liabilities		
Profitability		H6	negative
	EBIT/total asset		
Intangible asset		H7	positive
	Intangible asset/total asset		
Growth		H8	negative
	Market value equity/book value equity		
Age		H9	negative
	Years since listing		
Share price performance		H10	negative
Ownership concentration	Yearly change in year-end share price	H11	positive
Industry variable	Ownership with shareholdings greater than 5%		
Munificence		H12	negative
Dynamism	(1) regressing time against sales of an industry over the	H13	negative
Herfindahl–Hirschman Index (HHI)	5 years period under analysis and (2) taking the ratio of	H14	positive/
	the regression slope coefficient to the mean value of		negative
	sales over the same period		
	Standard error of the munificence regression divided by		
	the mean value of sales over the same period		
	Sum of the squares of market		
	shares (sales) of firms within a given industry for the year		

Table 2 Number of firms and percentage in each industry

Industry	No. of firms	(%)
Agriculture	21	5.22
Consumer products	36	8.96
Industrial	62	15.42
Infrastructure and utilities	47	11.69
Mining	36	8.96
Properties	51	12.69
Trade and services	110	27.36
Miscellaneous	39	9.70
Total sample	402	100

Notes: Industry classification is following the general industry listing of the Indonesia Stock Exchange
Source: www.idx.co.id/

4.2 Methodology

Leverage is defined as the ratio of total debt to total asset $\left(\frac{TD}{TA}\right)$ (Bunkanwanicha *et al.*, 2008; Khaw, 2019). Leverage is also being defined as the ratio of short term debt to total asset $\left(\frac{STD}{TA}\right)$ for robustness check.

This study uses a dynamic panel regression to estimate the relationship between firm leverage and firm- and industry-level determinants, estimated based on GMM (one-step and two-step system-GMM) and applied Windmeijer's finite sample correction using Stata xtabond2. GMM is a panel data estimator that is widely used to control for endogeneity (Soetanto and Liem, 2019; Brahmana *et al.*, 2019), as well as to cater for the dynamic nature of the capital structure study (Asarkaya and Özcan, 2007; Getzmann *et al.*, 2010; Haron, 2016; Muchtar *et al.*, 2018). Moreover, in situations where panel data set consists of small *T* and large *N* (as in this study), GMM estimator is most suitable when independent variables are not strictly exogenous; there is a presence of fixed individual effects, heteroscedasticity and serial correlation (Soetanto and Liem, 2019; Brahmana *et al.*, 2019; Al-ahdal *et al.*, 2020). The leverage function is specified as:

$$
\begin{aligned}
Lev_{it} = \alpha &+ Lev_{it(-1)} + \beta_1 NDTS_{it} + \beta_2 SIZE_{it} + \beta_3 RISK_{it} + \beta_4 TANG_{it} + \beta_5 LIQ_{it} \\
&+ \beta_6 PROF_{it} + \beta_7 INTANG_{it} + \beta_8 GROW_{it} + \beta_9 AGE_{it} + \beta_{10} SPP_{it} \\
&+ \beta_{11} OWN_{it} + \beta_{12} MUN_t + \beta_{13} DYN_t + \beta_{14} HHI_t + \varepsilon_{it}
\end{aligned}
\tag{1}
$$

where the dependent variable, Lev_{it}, represents the leverage level of firm *i* at time *t*, which is defined as $\frac{TD}{TA}$ and $\frac{STD}{TA}$. Firm level determinants comprise of NDTS (non-debt tax shield), *SIZE* (firm size), *RISK* (business risk), *TANG* (asset tangibility), *LIQ* (liquidity), *PROF* (profitability), *INTANG* (intangibility), *GROW* (growth), *AGE* (firm age), *SPP* (share price performance), *OWN* (ownership concentration) and industry level determinants – *MUN* (industry munificence), *DYN* (industry dynamism), *HHI* (industry concentration), and ε_{it} is the error term.

Based on equation (1), this study performs eight regression models (one-step and two-step system-GMM) with leverage definitions of $\frac{TD}{TA}$ and $\frac{STD}{TA}$ i.e. Models (1-A), (1-B), (1-C) and (1-D). Model (1-A) includes all the 14 independent variables as in equation (1); Model (1-B) includes all the 14 independent variables with controlling for the financial crisis of 2007/2008; Model (1-C) includes all the 14 independent variables with controlling for the financial crisis of 2007/2008 and sub-sectors; and Model (1-D): includes 11 of the independent variables with controlling for the financial crisis of 2007/2008 and sub-sectors (the last three related industry variables were removed[1]). Following Saghi-Zedek and Tarazi (2015), the period of analysis (2000–2014) is divided into three: (before the crisis: 2000–2006), (during the crisis: 2007–2008); and (after the crisis: 2009–2014). Only during and after the crisis periods (two dummies) were included in the related models, whereas the period before the crisis is considered as the reference period (Cordazzo *et al.*, 2017). Similarly, seven sector dummies for the eight sub-sectors (agricultural, consumer products, industrial, infrastructure and utilities, mining, properties, trade and services and miscellaneous) are used to control for sector-specific effects (Altaf and Shah, 2018). The variables (leverage$_{(-1)}$, NDTS, firm size, risk, tangibility, liquidity, profitability and growth) are treated as endogenous following the literature (Asarkaya and Özcan, 2007; Getzmann *et al.*, 2010).

The standard diagnostic tests are performed to ensure the efficiency of the GMM estimators, (Nomran and Haron, 2019; Soetanto and Liem, 2019; Al-ahdal *et al.*, 2020). The tests are the Wald test (null: all coefficients on the determinants are jointly equal zero); the second order serial correlation test AR(2) (null: no second order serial correlation in the residuals) and the Hansen-test, a test for the validity of the instrumental variables representing $Lev_{it(-1)}$ (null: instrumental variables are valid). Estimates derived from the

Table 3 Variance inflation factor (VIF)

Variable	TD/TA	STD/TA
NDTS	1.76	1.76
Size	1.11	1.11
Risk	1.01	1.01
Tangibility	1.27	1.27
Liquidity	1.03	1.03
Profitability	1.58	1.58
Intangibility	1.07	1.07
Growth	1.09	1.09
Age	1.09	1.09
Share price performance	1.03	1.03
Ownership	1.08	1.08
Munificence	1.11	1.11
Dynamism	1.05	1.05
HHI	1.06	1.06
Mean VIF	1.17	1.17

GMM are only consistent if there is no second order serial correlation in the residuals and instrumental variables are valid (Soetanto and Liem, 2019; Brahmana *et al.*, 2019; Al-ahdal *et al.*, 2020). Variance inflation factor (VIF) is performed to check whether there is multicollinearity problem between variables in the model. The VIF should be less than 10, as shown in Table 3, to confirm that there is no multicollinearity problem in the data set (Soetanto and Liem, 2019).

5. Analysis and findings

5.1 Descriptive statistics

Table 4 summarizes the descriptive statistics of all variables in this study. Indonesian firms use mean leverage of 0.3691 and 0.2673 of $\frac{TD}{TA}$ and $\frac{STD}{TA}$, respectively, in their capital structure. Ownership concentration shows, on average 47.64% ownership exceeding 5% shareholding with the maximum and minimum of 100% and zero, respectively. This

Table 4 Descriptive statistics (whole sample)

Variable	Mean	Maximum	Minimum	Median	Standard deviation
TD/TA	0.3691	0.9020	0.0998	0.3355	0.1872
STD/TA	0.2673	0.8420	0.0998	0.2133	0.1642
NDTS	0.0310	0.6045	0.0000	0.0244	0.0384
Firm size	11.5277	16.8969	4.1109	11.5955	1.7817
Risk	−0.0594	28.5000	−29.7739	−0.0275	3.0502
Tangibility	0.3922	0.9852	0.0000	0.3677	0.2504
Liquidity	2.1793	29.8679	0.1027	1.4378	2.6678
Profitability	0.0654	2.8310	−2.9565	0.0672	0.1791
Intangible	0.0164	0.9650	0.0000	0.0000	0.0621
Growth	8.3666	97.8479	0.6000	2.9101	14.2480
Age	15.4104	38.0000	3.0000	15.0000	7.6098
SPP	0.0058	2.7810	−4.8121	0.0010	0.2038
Ownership	0.4764	1.0000	0.0000	0.5700	0.3383
Munificence	0.1563	0.4041	0.0050	0.1534	0.0751
Dynamism	0.0544	0.1592	0.0081	0.0493	0.0310
HHI	0.1420	0.4841	0.0398	0.0961	0.1082

Notes: Number of all firms = 402; number of observations = 4737 for each variable. SPP = share price performance, HHI = Herfindahl–Hirschman Index

statistic shows that the ownership structure of public listed firms in Indonesia is highly concentrated, supporting Utama *et al.* (2017) and Musallam (2020).

5.2 Determinants of leverage

Tables 5 (one step-system-GMM) and 6 (two step-system-GMM) present the results on determinants of leverage. First, the current capital structure of Indonesian firms is influenced by the previous year capital structure position (autoregressive), confirming the dynamic nature of capital structure in Indonesian firms. Second, nine determinants are found to significantly influence leverage throughout the period understudy, i.e. firm level determinants: tangibility, liquidity, profitability, intangible, growth, age and ownership and industry-level determinants: dynamism and industry concentration.

This study finds an inverse relationship between tangibility and leverage (both $\frac{TD}{TA}$ and $\frac{STD}{TA}$), consistent for all models, in contrast to the positive relationship as expected in *H4*. Firms in Indonesia with high tangible assets appear to rely more on internal funds generated from these assets as explained by the POT, hence a negative relationship with leverage (Degryse *et al.*, 2010; Qamar *et al.*, 2016; Haron, 2016).

Liquidity is depicted to relate negatively with leverage ($\frac{TD}{TA}$ and $\frac{STD}{TA}$), consistent for all models, supporting *H5*. Highly liquid firms in Indonesia seem to generate high retained earnings thus reduce their debt engagement. The influence of POT is detected here consistent with Deesomsak *et al.* (2009), Moosa and Li (2012) and Haron and Adeyemi (2016).

Profitability shows a negative relationship with leverage ($\frac{TD}{TA}$ and $\frac{STD}{TA}$), consistent for all models, *H6* is thus supported. Implying the existence of POT, highly profitable firms in Indonesia opt for retained earnings to finance their investments. Supporting Bunkanwanicha *et al.* (2008), Moosa and Li (2012), Haron (2016) and Haron and Adeyemi (2016), the negative relationship reported reflects the after effect of the financial reformation taken place in Indonesia which have encouraged firms to turn to their retained earnings rather than merely relying on bank loans to finance their investments.

Intangible asset also shows a negative relationship with leverage ($\frac{TD}{TA}$ and $\frac{STD}{TA}$), consistent for all models (One-Step) except for $\frac{TD}{TA}$ (Two-Step, exclude Model 1-D). This is in contrast to *H7* where a positive relationship is expected. The negative relationship documented in this study is not consistent with past literature especially on the developed market. It is worth noting that intangible assets are not recognized as collateral to secure debt from lenders by the Bank Indonesia (the central bank). The central bank regards intangible assets as lacking in economic value and cannot be traded (Mulyani *et al.*, 2014) thus does not impose a policy of intangible asset as a fiduciary security object. This condition may well justify the negative relationship between intangibility and leverage depicted in this study. Furthermore, the value of these assets is not easy to measure and being so would be difficult to value and anticipate the risk to the bank. Nevertheless, though this result does not support the stylized fact of the effect of intangible asset on capital structure, it is worth noting that intangibility should be recognized as collateral, as intangible asset such as goodwill is capable to increase borrower's access to debt as confirmed by Loumioti (2011). Other countries sharing similar economic landscape could consider this finding in devising their policy.

Growth shows a positive relationship with leverage ($\frac{TD}{TA}$ and $\frac{STD}{TA}$), consistent for all models, in contrast to *H8* where a negative relationship is expected. Explained by the agency theory, rapid growing firms take on more short-term debt to tackle any underinvestment problems that might occur (Myers, 2003) thus explains the positive relationship depicted in this study. Growth firms in Indonesia might also engage with debt rather than equity as they could reap the advantage of tax shield from debt financing. This might also reflect the thin capitalization concept discussed earlier. Engaging with higher debt level to take advantage of the interest tax shield (TOT) may be the tax planning strategy by firms in Indonesia, as the government still postpones the implementation of thin capitalization rules during the period understudy

Table 5	Determinants of leverage: one-step robust system-GMM estimation results							

GMM Model Variable	One-step robust system-GMM 1-A		One-step robust system-GMM 1-B		One-step robust system-GMM 1-C		One-step robust system-GMM 1-D	
	TD/TA	STD/TA	TD/TA	STD/TA	TD/TA	STD/TA	TD/TA	STD/TA
Constant	0.478**	0.094	0.394*	0.083	0.367*	−0.001	0.392*	0.103
	(0.047)	(0.482)	(0.060)	(0.512)	(0.083)	(0.995)	(0.082)	(0.507)
TD/TA (−1)	0.495**	−	0.507**	−	0.512**	−	0.526**	−
	(0.035)		(0.033)		(0.034)		(0.026)	
STD/TA(−1)	−	0.574**	−	0.565**	−	0.587**	−	0.641**
		(0.022)		(0.027)		(0.025)		(0.021)
NDTS	−0.564	0.739	−0.405	0.667	−0.600	0.666	−0.568	0.643
	(0.574)	(0.250)	(0.696)	(0.308)	(0.578)	(0.291)	(0.601)	(0.326)
Size	−0.007	0.007	−0.005	0.008	−0.001	0.011	−0.003	0.006
	(0.606)	(0.475)	(0.730)	(0.369)	(0.957)	(0.233)	(0.849)	(0.510)
Risk	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001
	(0.606)	(0.327)	(0.455)	(0.385)	(0.716)	(0.388)	(0.701)	(0.204)
Tangibility	−0.317**	−0.291*	−0.284**	−0.294*	−0.345**	−0.315**	−0.298**	−0.291**
	(0.037)	(0.053)	(0.034)	(0.051)	(0.031)	(0.048)	(0.046)	(0.045)
Liquidity	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**
	(0.033)	(0.042)	(0.027)	(0.039)	(0.029)	(0.039)	(0.034)	(0.045)
Profitability	−0.438***	−0.437***	−0.427***	−0.441***	−0.448***	−0.447***	−0.430***	−0.441***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Intangibility	−0.271**	−0.209***	−0.226**	−0.210***	−0.347**	−0.248***	−0.308**	−0.229***
	(0.031)	(0.009)	(0.045)	(0.008)	(0.022)	(0.008)	(0.027)	(0.006)
Growth	0.001**	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*
	(0.024)	(0.050)	(0.070)	(0.061)	(0.075)	(0.097)	(0.071)	(0.053)
Age	−0.005**	−0.001	−0.003	−0.001	−0.005*	−0.000	−0.002	0.000
	(0.045)	(0.636)	(0.244)	(0.736)	(0.088)	(0.948)	(0.359)	(0.916)
SPP	−0.016	0.016	−0.011	0.016	−0.005	0.017	−0.012	0.019
	(0.150)	(0.456)	(0.340)	(0.458)	(0.665)	(0.436)	(0.250)	(0.372)
Ownership	0.016	0.026**	0.037**	0.031**	0.033*	0.033**	0.032*	0.025*
	(0.333)	(0.048)	(0.031)	(0.034)	(0.062)	(0.034)	(0.075)	(0.074)
Munificence	−0.108	−0.053	−0.120	−0.055	−0.145	−0.064	No	No
	(0.440)	(0.458)	(0.337)	(0.452)	(0.297)	(0.487)		
Dynamism	−0.658**	−0.324*	−0.666**	−0.314*	−0.809**	−0.282	No	No
	(0.030)	(0.069)	(0.041)	(0.090)	(0.021)	(0.148)		
HHI	0.326*	0.230*	0.337*	0.231*	0.398*	0.321*	No	No
	(0.070)	(0.077)	(0.074)	(0.078)	(0.099)	(0.090)		
Crisis dummies	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies	No	No	No	No	Yes	Yes	Yes	Yes
Wald test	219.040***	115.430***	316.020***	127.890***	267.110***	158.710***	311.020***	163.440***
(p-value) χ^2 statistic	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen test	132.790	37.150	135.490	37.460	129.760	37.380	126.210	27.150
(p-value)	(0.123)	(0.173)	(0.129)	(0.164)	(0.149)	(0.166)	(0.205)	(0.564)
AR(1) test statistics	−1.800*	−2.160**	−1.810*	−2.120**	−1.850*	−2.170**	−1.870*	−2.180**
(p-value)	(0.071)	(0.030)	(0.070)	(0.034)	(0.064)	(0.030)	(0.061)	(0.029)
AR(2) test statistics	−0.960	−1.320	−1.040	−1.380	−0.890	−1.330	−1.010	−1.440
(p-value)	(0.336)	(0.187)	(0.300)	(0.169)	(0.373)	(0.185)	(0.314)	(0.150)
No. of instruments	131	46	136	48	139	55	136	51
No. of groups	371	371	371	371	371	371	371	371
N. of observations	2454	2453	2453	2453	2454	2453	2455	2454

Notes: Standard coefficients are presented (*p*-values in parentheses). ***, ** and * are significant at 1%, 5% and 10% respectively; Model (1-A) includes all the 14 independent variables as in equation (1); Model (1-B) includes all the 14 independent variables with controlling for the financial crisis of 2007/2008; Model (1-C) includes all the 14 independent variables with controlling for the financial crisis and sub-sectors; and Model (1-D) includes 11 of the independent variables with controlling for the financial crisis and sub-sectors (the last three related industry variables were removed). Following Saghi-Zedek and Tarazi (2015), the period of analysis (2000–2014) is divided into three: (before the crisis: 2000–2006), (during the crisis: 2007–2008); and (after the crisis: 2009–2014). Only during and after the crisis periods (two dummies) are included in the related models, whereas the period before the crisis is considered as the reference period (Cordazzo *et al.*, 2017). Similarly, seven sector dummies for eight sub-sectors are used to control for sector-specific effects (Altaf and Shah, 2018). The variables (leverage$_{(−1)}$, NDTS, firm size, risk, tangibility, liquidity, profitability and growth) are treated as endogenous following the literature (Asarkaya and Özcan, 2007; Getzmann *et al.*, 2010). The financial crisis and sector dummies are included in the related models but not reported here. Stata software v14 was used for analysing hypotheses test based on system-GMM

GMM Model Variable	Two-step robust system-GMM 1-A		Two-step robust system-GMM 1-B		Two-step robust system-GMM 1-C		Two-step robust system-GMM 1-D	
	TD/TA	STD/TA	TD/TA	STD/TA	TD/TA	STD/TA	TD/TA	STD/TA
Constant	0.541*	0.023	0.355	0.055	0.531	0.014	0.418	0.035
	(0.071)	(0.784)	(0.105)	(0.431)	(0.105)	(0.853)	(0.116)	(0.675)
TD/TA (−1)	0.490**	–	0.505**	–	0.495**	–	0.522**	–
	(0.039)		(0.037)		(0.037)		(0.030)	
STD/TA(−1)	–	0.586**	–	0.534**	–	0.555**	–	0.707***
		(0.013)		(0.019)		(0.017)		(0.001)
NDTS	−0.698	0.657	−0.484	0.360	−0.802	0.355	−0.670	0.266
	(0.474)	(0.265)	(0.616)	(0.591)	(0.440)	(0.585)	(0.474)	(0.686)
Size	−0.012	0.012*	−0.001	0.013*	−0.012	0.015**	−0.004	0.013**
	(0.509)	(0.097)	(0.911)	(0.064)	(0.620)	(0.025)	(0.775)	(0.033)
Risk	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001*
	(0.945)	(0.359)	(0.725)	(0.217)	(0.942)	(0.181)	(0.989)	(0.089)
Tangibility	−0.295*	−0.251**	−0.291**	−0.281**	−0.315*	−0.313**	−0.302**	−0.242**
	(0.063)	(0.019)	(0.032)	(0.011)	(0.061)	(0.011)	(0.040)	(0.022)
Liquidity	−0.001**	−0.001*	−0.001**	−0.001**	−0.001**	−0.001*	−0.001**	−0.001*
	(0.046)	(0.098)	(0.029)	(0.044)	(0.034)	(0.063)	(0.043)	(0.075)
Profitability	−0.463***	−0.469***	−0.436***	−0.475***	−0.477***	−0.487***	−0.463***	−0.464***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Intangibility	−0.146	−0.227**	−0.135	−0.253***	−0.222	−0.288***	−0.235*	−0.241***
	(0.275)	(0.016)	(0.237)	(0.006)	(0.136)	(0.005)	(0.081)	(0.009)
Growth	0.001**	0.001**	0.001**	0.001**	0.001*	0.001**	0.001*	0.001**
	(0.023)	(0.030)	(0.046)	(0.032)	(0.070)	(0.038)	(0.078)	(0.018)
Age	−0.005*	−0.002	−0.002	−0.002	−0.005*	−0.002	−0.002	−0.002
	(0.080)	(0.275)	(0.382)	(0.151)	(0.091)	(0.137)	(0.361)	(0.211)
SPP	−0.009	0.008	−0.005	0.015	−0.001	0.018	−0.002	0.018
	(0.337)	(0.708)	(0.546)	(0.441)	(0.941)	(0.364)	(0.827)	(0.365)
Ownership	0.005	0.021**	0.026*	0.022*	0.015	0.024*	0.018	0.018*
	(0.779)	(0.036)	(0.087)	(0.057)	(0.486)	(0.058)	(0.204)	(0.096)
Munificence	−0.107	−0.034	−0.098	−0.042	−0.119	−0.046	No	No
	(0.385)	(0.474)	(0.337)	(0.374)	(0.344)	(0.434)		
Dynamism	−0.521**	−0.011	−0.413*	−0.064	−0.647**	−0.052	No	No
	(0.023)	(0.938)	(0.070)	(0.696)	(0.027)	(0.771)		
HHI	0.266*	0.148**	0.233*	0.185**	0.307	0.253**	No	No
	(0.061)	(0.020)	(0.065)	(0.013)	(0.136)	(0.020)		
Crisis dummies	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies	No	No	No	No	Yes	Yes	Yes	Yes
Wald test	164.330***	143.380***	238.870***	133.300***	215.110***	154.640***	249.390***	194.470***
(p-value) χ^2 statistic	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen test	131.800	26.720	135.760	28.310	130.460	28.070	125.130	23.940
(p-value)	(0.122)	(0.534)	(0.126)	(0.605)	(0.125)	(0.617)	(0.205)	(0.775)
AR(1) test statistics	−1.740*	−2.490**	−1.710*	−2.390**	−1.790*	−2.430**	−1.810*	−2.720***
(p-value)	(0.082)	(0.013)	(0.087)	(0.017)	(0.073)	(0.015)	(0.071)	(0.007)
AR(2) test statistics	−0.970	−1.070	−1.010	−1.430	−0.910	−1.410	−1.020	−1.240
(p-value)	(0.333)	(0.286)	(0.313)	(0.154)	(0.365)	(0.158)	(0.306)	(0.217)
No. of instruments	130	44	136	49	138	56	135	52
No. of groups	371	371	371	371	371	371	371	371
N. of observations	2454	2453	2454	2453	2454	2453	2455	2453

Notes: Standard coefficients are presented (p-values in parentheses). ***, ** and * are significant at 1%, 5% and 10% respectively; Model (1-A) includes all the 14 independent variables as in equation (1); Model (1-B) includes all the 14 independent variables with controlling for the financial crisis of 2007/2008; Model (1-C) includes all the 14 independent variables with controlling for the financial crisis and sub-sectors; and Model (1-D) includes 11 of the independent variables with controlling for the financial crisis and sub-sectors (the last three related industry variables were removed). Following Saghi-Zedek and Tarazi (2015), the period of analysis (2000–2014) is divided into three: (before the crisis: 2000–2006), (during the crisis: 2007–2008); and (after the crisis: 2009–2014). Only during and after the crisis periods (two dummies) are included in the related models, whereas the period before the crisis is considered as the reference period (Cordazzo et al., 2017). Similarly, seven sector dummies for eight sub-sectors are used to control for sector-specific effects (Altaf and Shah, 2018). The variables (leverage$_{(-1)}$, NDTS, firm size, risk, tangibility, liquidity, profitability and growth) are treated as endogenous following the literature (Asarkaya and Özcan, 2007; Getzmann et al., 2010). The financial crisis and sector dummies are included in the related models but not reported here. Stata software v14 was used for analysing hypotheses test based on system-GMM

thus does not limit the amount of the interest tax shield. This positive relationship is also reported by Booth *et al.* (2001) in their study on emerging countries and Haron and Adeyemi (2016) and Ramli *et al.* (2019) on Indonesia, respectively.

Age of firm relates negatively with leverage ($\frac{TD}{TA}$), supporting *H9*, as shown in Model 1-A and 1-C (one-step and two-step). This finding supports the argument that aged firms are able to accumulate huge funds throughout the years and thus need less debt in their capital structure. Looking at the sample firms used in this study about 53% of the firms have been listed for more than 15 years with the average of 15.41 years. As explained by Chen and Strange (2005) and Khaw (2019) aged firms normally keep impressive track record with substantial retained earnings thus debt is not an option. The negative relationship between age and leverage reflects the influence of POT in the capital structure of firms in Indonesia.

Higher level of concentrated ownership positively relate with leverage ($\frac{TD}{TA}$ and $\frac{STD}{TA}$), as evidenced in most of the models, supporting *H11*, in line with Driffield *et al.* (2007) and Khaw (2019). The positive relationship depicted explains the use of debt as disciplinary mechanism by large controlling shareholders in a highly concentrated ownership over the managers (agency theory). Such finding may also be because of large controlling shareholders wanting to avoid ownership dilution via equity issuance thus opts for debt consumption instead. This situation as depicted in this study could be a good inference to countries having similar ownership structure in modeling their corporate financing. Moreover, again the thin capitalization concept can perhaps be one of the justifications of the positive relationship found in this study. Controlling shareholders are taking advantage of the interest tax shield that comes with debt (TOT), as the implementation of thin capitalization rules are still being put on hold during the period understudy thus firms are taking the fullest advantage by engaging maximum debt level.

In term of industry level determinants, dynamism relates negatively with leverage ($\frac{TD}{TA}$ and $\frac{STD}{TA}$), as evidenced in most of the models, hence supporting *H13*. The concept of dynamism being interpreted as risk (Ferri and Jones, 1979) is reflected in this finding. It is apparent that firms in Indonesia operating in a highly dynamic environment avoid debt consumption as to avoid risk. In addition, based on the TOT prediction, firms operating in an unpredictable industry environment would consume low debt, in support of Kayo and Kimura (2011). Industry concentration (HHI) is found to positively influenced leverage ($\frac{TD}{TA}$ and $\frac{STD}{TA}$), as evidenced in most of the models, hence supports *H14*. This finding supports the argument by MacKay and Phillips (2005) explaining that the higher the HHI, where significant entry barriers exist, the higher the debt consumption of the firm. Firms pursue higher returns when investing in high risk projects with high level of debt, supporting the TOT. A report on Indonesia by IIMA (2018) that highly concentrated industry in Indonesia such as mining remains high in leverage since 2010 up to 2018 seems to lend support to this finding. IIMA also reports that leverage to industry's gross domestic product (GDP) reached as high as 40% in 2014 before reaching 30% in 2018.

However, certain determinants (NDTS, size, risk, share price performance and industry munificence) do not seem to have significant influence of the capital structure of firms in Indonesia during the period understudy even though they are reported as significant factors in past studies. The finding of this study is summarized in Table 7, and the two-quadrant relationship diagram representing high level of determinant and debt is shown in Figure 1.

6. Conclusion

This study investigates the effects of firm- as well as industry-level determinants on capital structure of firms in Indonesia using a dynamic panel model, and the results are robust to the different definitions of leverage, heterogeneity, autocorrelation, multicollinearity and endogeneity concern.
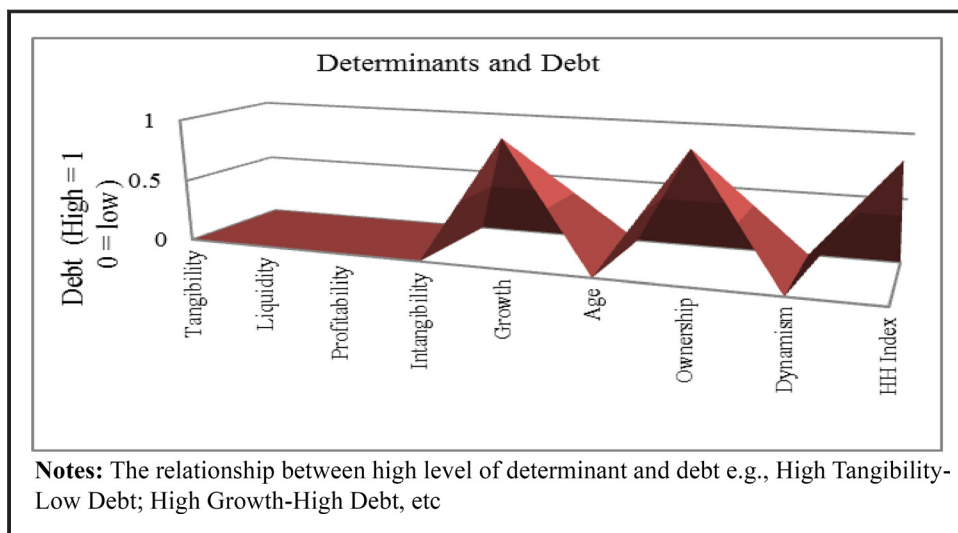
Table 7 Summary of finding

Explanatory variable	Hypotheses (expected sign)	Hypotheses (supported/not supported)	Finding	Theories supporting finding	Consistencies with STD/TA
NDTS	H1: negative	Not supported	–	–	–
Firm size	H2: positive	Not supported	–	–	–
Risk	H3: negative	Not supported	–	–	–
Tangibility	H4: positive	Not supported	negative	POT	Yes
Liquidity	H5: negative	Supported	negative	POT	Yes
Profitability	H6: negative	Supported	negative	POT	Yes
Intangibility	H7: positive	Not supported	negative	TOT/Agency	Yes
Growth	H8: negative	Not supported	positive	TOT/Agency	Yes
Age	H9: negative	Supported	negative	POT	No
SPP	H10: negative	Not supported	–	–	–
Ownership	H11: positive	Supported	positive	Agency/TOT	Yes
Munificence	H12: negative	Not supported	–	–	–
Dynamism	H13: negative	Supported	negative	TOT	Yes
HH Index	H14: significant	Supported	positive	TOT	Yes

Notes: SPP = share price performance, HHI = Herfindahl–Hirschman Index; POT = pecking order theory; TOT = trade-off theory

It is apparent that certain firm-level determinants such as firm tangibility, liquidity, profitability, intangibility, growth, age and concentrated ownership significantly influence the capital structure of the firms understudy.

Industry-level determinants also have noticeable influence on the capital structure of these firms. Firm operating in highly concentrated industries and in a less dynamic environment is observed to use higher debt. Rapid growing firms in Indonesia engage with high debt ratio because of low asymmetric information issues. It may also be because these growing firms get better access to bank loans following the competitive banking industry after the financial reformation. These firms take fullest advantage of the interest tax shield offered by engaging with higher debt (thin capitalization) and are willing to take higher risk for higher return. All these show the work of TOT in the financing decisions of the firms understudy.

Nevertheless, aged and highly liquid firms with high profit and high tangible and intangible assets operating in a high dynamic environment seem to practice the hierarchical financing (POT) and reduce their debt reliance. This is explained by the risk

Figure 1 Two-quadrant relationship (determinants and debt)

Notes: The relationship between high level of determinant and debt e.g., High Tangibility-Low Debt; High Growth-High Debt, etc

that comes with debt financing thus high level of debt is not an option. With regards to firms operating in a highly concentrated industry, firms consume higher leverage. The concentrated ownership phenomenon also poses significant influence over the capital structure of the firms understudy. The positive relationship depicted in this study may be justified by the concern over ownership dilution by the controlling shareholders thus avoid equity issuance entirely.

This study offers policy implication. Tangible and intangible assets do have substantial influence over capital structure of firms in Indonesia. With respect to that, the central bank of Indonesia should perhaps consider accepting intangible assets as collateral to support firm's growth, especially firms that are subject to high asymmetric information, high volatility of earnings but with low collateral value. Examples of such firms may include research and development intensive firms such as the young public high-tech firms. By recognizing intangible assets as collateral may perhaps encourage these firms to take on more debt in their financing strategy. This might then encourage policymakers to promote conducive local bond market to attract these firms to engage with debt financing, making bond market to be more vibrant and active.

The insights from this study contribute significantly to the literature. Both developed and emerging markets can also benefit and learn from this study of Indonesia particularly on the significant influence of intangible assets to leverage and the potential of these assets as collateral to secure debts for certain types of firms as discussed above. The inclusion of industry characteristics is novel, as it offers new insights on how industry characteristics and the environment of the industry the firm is operating in can influence capital structure of firms especially in emerging market. Policymaker may want to improve on debt policy following the negative relationship depicted in this study relating to industry dynamic and debt ratio and the higher debt consume by highly concentrated industry. One possible way is to increase the size and liquidity of the local bond market. OECD (2018) reports that Indonesian bond market is relatively small and dominated by government issuance resulted firms to have less alternative to borrow except from banks. OECD also reports that the developments of corporate sector that accounts for about 70% of bank lending should be continuously monitored as a risk factor to the banking sector of Indonesia.

Looking at the ownership structure, other emerging markets with high ownership concentration can infer valuable insights and information relating to debt and ownership concentration as depicted in this study. Debt can act as an effective controlling mechanism to curb managers from taking advantage of the cash flows and investments to satisfy at their own self-interest. Debt can also act as a protection instrument to avoid ownership dilution to ensure continuous controlling power of the firm and be an effective tax planning strategy as explained by the thin capitalization where firms can reap maximum interest tax shield from debt consumption.

This study however has limitation. Even though this study uses longitudinal data with quite bigger sample firms, the results still need to be cautiously interpreted. The industry regression is not performed individually, rather are pooled together to serve the purpose of this study that is to examine the effecting factors without giving specific focus on a particular industry. It is recommended that for future research, examination can be done on individual industry as firms in different industry may react differently responding to certain characteristic of each individual industry. To explore further and for a more comprehensive insights on the issue of concentrated ownership and its influence on capital structure, it is recommended that future research incorporate ownership identity and political connection on debt financing of Indonesian firms. Therefore, a more conclusive and detail scenario can be captured for future improvement of firms in Indonesia in particular and firms in the rest of emerging markets as a whole.

Note

1. The three industry variables were removed to ensure that the findings are robust by removing any similar related explanatory variables with controlling variables.

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