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## Article

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*Suggested Citation:* M'ng, Jacinta Chan Phooi; Rahman, Mahfuzur; Sannacy, Selvam (2017) : The determinants of capital structure: Evidence from public listed companies in Malaysia, Singapore and Thailand, Cogent Economics & Finance, ISSN 2332-2039, Taylor & Francis, Abingdon, Vol. 5, Iss. 1, pp. 1-34,  
<https://doi.org/10.1080/23322039.2017.1418609>

This Version is available at:

<https://hdl.handle.net/10419/194747>

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Received: 11 June 2017  
Accepted: 19 November 2017  
First Published: 19 December 2017

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Reviewing editor:  
Louis Murray, University College Dublin, Ireland

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## FINANCIAL ECONOMICS | RESEARCH ARTICLE

# The determinants of capital structure: Evidence from public listed companies in Malaysia, Singapore and Thailand

Jacinta Chan Phooi M'ng<sup>1</sup>, Mahfuzur Rahman<sup>1\*</sup> and Selvam Sannacy<sup>1</sup>

**Abstract:** We investigate the determinants of capital structure of public listed companies on Bursa Malaysia, Singapore Stock Exchange and Thailand Stock Exchange from 2004 to 2013. We also investigate how firm-specific factors such as profitability, firm size, tangibility of assets and depreciation to total assets along with the macroeconomic factor such as inflation influence the capital structure decisions of public listed companies. Our findings support capital structure theories such as trade-off and pecking order theories and are consistent with prior empirical studies. We find all the factors examined in this study provide strong explanatory power for the capital structure decisions of the sampled public listed companies across all three countries. We find profitability has a significant negative influence on capital structure for Malaysia and Singapore but insignificant for Thailand. While, firm size has a significant positive influence on capital structure for all countries. Our findings also suggest that tangibility of assets has a significant positive influence on capital structure for Malaysia and Singapore while insignificant for Thailand. The depreciation to total assets indicates a negative influence on capital structure across all the three countries. Our study should be of interest to top managers who wish to have optimal capital structure to improve the firm performance.

### ABOUT THE AUTHORS

Jacinta Chan Phooi M'ng specializes in investment decisions and risk management, and is actively researching algorithmic investment decisions and their timings.

Mahfuzur Rahman studies the relevance of psychological biases in individual investment behaviour. He models behavioral factors in investigating financial decision making, financial risk tolerance, and portfolio diversification.

Selvam Sannacy is interested in investigating on different tax treatments of leverage in capital structure and the determination of capital structure for corporations.

### PUBLIC INTEREST STATEMENT

We found profitability has a negative influence on the level of leverage for Malaysia and Singapore while it has an insignificant impact on Thailand. Firm size has a significant positive relationship with leverage for all the three countries while tangibility of assets has significant positive influence in Malaysia and Singapore but not for Thailand. Depreciation to total assets has a negative relationship with leverage for all three countries while inflation has a significant positive impact in Malaysia and Thailand but not for Singapore. These results are interesting because shareholders, external investors and corporate managers can have a better understanding of how capital structures are determined in each of these countries and plan their financing strategies accordingly to facilitate prudent decisions while banks may find the results useful in evaluating the firms' performance in light of these variables before giving loans.

**Subjects:** Quantitative Finance; Statistics for Business, Finance & Economics; International Finance; Business, Management and Accounting

**Keywords:** capital structure; profitability; firm size; net tangible asset; depreciation to asset; inflation

**JEL classifications:** G31; G32

## 1. Introduction

The capital structure puzzle pointing to different and even conflicting views (Myers, 1984), has been vastly debated over the last five decades since its introduction by Modigliani and Miller (1958) (MM). Modigliani and Miller (1958) pioneered the study in capital structure by predicting that in a perfect capital market, firm value is independent of its capital structure rendering debt and equity perfectly substitutable. Subsequent researches have eased the restrictive propositions of irrelevance theory underlying the capital structure and introduced numerous capital market frictions such as taxes, bankruptcy costs, transaction costs, agency conflicts and asymmetric information in their models. These lead to the development of alternative capital structure theories explaining the relevance of the capital structure in maximizing the firm value such as the trade-off theory (Kraus & Litzenberger, 1973), agency theory (Jensen & Meckling, 1976), signalling (Ross, 1977), target adjustment behaviour (Myers, 1984; Myers & Majluf, 1984), pecking order theory (Myers, 1984), free cash flow theory (Jensen, 1986) and market timing theory (Baker & Wurgler, 2002; Demirguc-Kunt & Maksimovic, 2002). These theories often point to different or even opposing results (Bayrakdaroglu, Ege, & Yazici, 2013; Frank & Goyal, 2003; Haron, 2014; Mahajan & Tartaroglu, 2008). Moreover, most of the capital structure theories are not mutually exclusive (Cotei & Farhat, 2009; Huang & Ritter, 2009; Leary & Robert, 2010) as these theories cannot independently explain certain crucial facts about capital structure. Kayhan and Titman (2007) proposed the reconciliation between the trade-off theory and pecking order theory by introducing the modified pecking order behaviour whereby the short-term capital structure is influenced by pecking order theory whereas long-term capital structure governed by trade-off theory. Early empirical studies on capital structure decisions focused on finding the leverage level and examining the determinants of leverage which were predominantly directed to firms in the US (Brennan & Schwartz, 1984; Titman & Wessels, 1988). Researches on the capital structure decisions were later extended to other developed countries such as Europe and Japan (Rajan & Zingales, 1995). Rajan and Zingales (2003), Beck, Demirgüç-Kunt, and Maksimovic (2005) and Porta et al. (2006) focused on cross-country comparative studies by examining global patterns in capital structure with different institutional settings and macroeconomic variables. Korajczyk and Levy (2003), Hackbarth et al. (2006), and Huang and Ritter (2009) focused on the impact of macroeconomic variables on capital structure. Taggart Jr (1985), Booth et al. (2001) and Hatzinikolaou, Katsimbris, and Noulas (2002) explored distortion caused by inflation on capital structure. Booth et al. (2001) who pioneered the study of emerging markets indicated that the determinants of capital structure vary across developing countries. However, Deesomsak et al. (2004) argued that despite the importance of economics and cross-countries diversities, limited studies were conducted in ASEAN countries.

The empirical results are not consistent in resolving capital structure issues on financing choices. Akhtar and Oliver (2009) and Ali (2011) found that the firm size is significantly and positively related to financial leverage. On the contrary, Rajan and Zingales (1995) implied that firm size could have an inverse relationship with financial leverage. Ali (2011) highlighted that profitability asserts positive influences on financial leverage as profitable firms are less likely to go bankrupt and can avail more debt at lower interest rates, thereby decreasing bankruptcy costs when profitability increases. In contrast, Drobetz and Wanzenried (2006) and Antoniou et al. (2008) indicated that profitability is inversely correlated with leverage due to a firm's preference to raise capital from internal to external financing choices. As empirical studies have thus far provided inconclusive results, there is a need to continuously evaluate the validity of the competing capital structure theories by re-examining the determinants of capital structure to bridge the gap between theoretical explanations and financial

practices involving capital structure (Brounen et al., 2004, 2006). Given the background of the dynamic changes in the development of optimal capital structure (Lemmon & Zender, 2010), the associated problems arising from inconsistent studies (Haron, 2014) and the need for a relevant interpretation of research studies (Leary & Robert, 2010), this study re-examines the validity of the determinants of an optimal capital structure such as firm-specific factors and macroeconomic variables for countries in the ASEAN region.

This objective of this paper is to examine the relevant determinants of the capital structure in Malaysia, Singapore and Thailand thereby adding to the body of knowledge on the importance of some firm-specific factors such as profitability, net tangible assets, firm size and depreciation to total assets, and macroeconomic variable such as inflation to determine the level of capital structure for firms in these countries. Apart from sharing common attributes such as historical, cultural and geographical location, the three countries are selected because Thailand is a developing country, which is comparable to the Malaysian economy, whereas Singapore is a model for a developed country within the ASEAN region. The results of this research are of interest and significance to policy-makers, corporate managers, bankers and investors transacting with ASEAN economies and financial markets. Testing the explanatory power of the selected firm-specific and macroeconomic variables in this study will provide a better understanding of the cross-countries capital structure decisions and the financing strategies adopted. The findings provide important and meaningful contribution to the following stakeholders: (1) shareholders and external investors will have a better understanding about the determinants of capital structure and its role in maximizing firm value before making investment decisions on the firm's equity. A better understanding of the information asymmetry problem between firm and external investors is necessary to reduce the adverse selection costs, (2) corporate managers can use these factors as part of their financing strategies to facilitate prudent investment decisions and (3) lenders may find the results useful in evaluating the firms' performance in the light of these variables before giving loans, with emphasis on the level of default risk involved.

This study seeks to firstly extend existing studies to cover the selected ASEAN countries which have provided inconclusive results (Haron, 2014). The re-examination of the variables in these countries would present the latest empirical evidence on the determinants of capital structure. This study also tests the explanatory power of selected firm-specific factors for the significance of their impact on capital structure. The impact of inflation on capital structures of these countries is also examined. Prior works using inflation have focused on developed countries and no such effort has been recorded on the investigation of significant impact of inflation on capital structure in ASEAN countries. Booth et al. (2001) and Faulkender, Flannery, Hankins, and Smith (2012) feature the influence of inflation on capital structure at aggregate level using pooled data analysis on cross-country comparison whereas Taggart Jr (1985), Frank and Goyal (2009) and Camara (2012) mainly concentrated on the relationship between inflation and capital structure in US. The paper is structured as follows. In Section 2, literature review on Modigliani and Miller (1958) and subsequent capital structure theories are discussed. Section 3 presents the proposed capital structure model. Data analysis and regression are performed and the results are reported in Sections 4 and 5. Section 6 summarizes the main findings and concludes.

## **2. Literature review on capital structure theory**

Modigliani and Miller (1958) have pioneered research on the capital structure and its relation to firm value. Based on the strict conditions of competitive, frictionless and perfect market capital, the firm's market value is independent of its capital structure choices whereas the firm's cost of capital is entirely dependent on business risks. The capital structure and financing decisions are deemed irrelevant in enhancing the shareholder value, thus an optimal capital structure does not exist. Modigliani and Miller (1963) further revised the irrelevance theory by incorporating the tax benefit in their corporate capital structure and firm value. Firm that issue debt financing pay interest which is tax deductible and provides a tax shield in the form of lower tax exposure, whereas equity financing is not entitled to such tax deductibility. Thus, in the theoretical argument, full debt relative to equity financing is a preferred choice for an optimal capital structure that maximizes the firm value.

However, as firms increase their leverage, they tend to default on interest payments thus incurring bankruptcy costs or financial distress costs. Baxter (1967) and Kraus and Litzenberger (1973) set forth the capital structure trade-off theory predicting that firms choose their target capital structure by balancing the tax saving debt benefits against the bankruptcy cost of borrowing. According to Barnea, Haugen, and Senbet (1981), firms with tax exposure should increase their capital structure until the marginal value of the tax shield is offset by the present value of possible financial distress costs. The trade-off stresses the existence of a target capital structure that maximizes the firm value meaning that any divergence from that target capital structure should be adjusted.

Myers (1984) sternly criticized that the trade-off theory rules out conservative capital structure by tax-paying firms. Graham (2000) argued that the tax benefits seem to be substantial and the dead-weight bankruptcy cost appear small, whereas Frank and Goyal (2003) often questioned the empirical relevance of the trade-off theory. Brennan and Schwartz (1984) and Kane et al. (1984) introduced the dynamic models that study the tax saving against bankruptcy trade-off using constant time models with uncertainty, taxes and bankruptcy costs but exclude transaction costs. Fischer et al. (1989) deterred the unrealistic speedy rebalancing problem by presenting transaction costs into the dynamic capital structure analysis. In the presence of transaction costs, firms allow their capital structure to deviate from the target capital structure much of the time and undertake a discrete rebalancing when the observed capital structure move farther away. The dynamic trade-off theory deals with the capital structure adjustment behaviour whereby revision occurs when the cost of deviations from the target capital structure exceed the cost of adjustment towards that target.

According to Fama and French (2002), the dynamic characteristic is the most convincing evidence that lends credence to the trade-off theory in explaining a firm's departure from its optimal capital structure. The adjustment towards the target capital structure validates the trade-off theory against the alternative capital structure theories such as the pecking order theory and market timing theory that do not presume the existence of a target capital structure. Myers (1984) extended Donaldson (1961) pecking order theory by describing how firms make capital structure decisions with the choice of internal and external financing. The most common motivation for pecking order theory is adverse selection (Myers, 1984). The asymmetric information problem between firm managers and external investors create a preference ranking over financing sources to minimize adverse selection costs. Equity may be mispriced by the market if external investors are less informed about the riskiness and true value for the firm than the manager. Managers will seek to evade underinvestment problems by financing new projects using a security that is not undervalued by the market such as retained earnings which include no asymmetric information, followed by less risk debt and risky debt, and equity as a last resort. Lemmon, Roberts, and Zender (2008) offered a strict interpretation of the pecking order theory which led to the concept of debt capacity suggesting that after the initial public offering, a firm should only consider the equity issue once debt financing has become infeasible. This serves to limit the amount of capital structure within the pecking order and to sanction the use of equity. Leary and Robert (2010) argued that such a strict interpretation is practically irrelevant and has led researchers to concentrate on the modified pecking order theory. Their study indicated that less than 20% of firms adhere to the pecking order's prediction concerning debt and equity issuance decisions under a strict interpretation but improve significantly to over 80% when firms' debt capacities can adjust with variables often associated to alternative capital structure theories such as the trade-off theory.

Frank and Goyal (2003) indicated that the pecking order theory is more relevant for large firms because small firms experience high asymmetric information problems which differ from Byoun and Rhim (2005) who asserted that the pecking order theory is relevant for small and non-dividend paying firms because of the difficulty encountered by small firms to access external financing. Fama and French (2005) highlighted that researchers have extensively tested the trade-off theory and pecking order theory over the years and suggest that both capital structure theories treated "as stable mates, each having elements of the truth that help explain some aspects of financing decisions". Cotei and Farhat (2009) stressed that these theories discretely cannot describe certain essential facts about capital structure. The study shows that trade-off theory features are important



determinant of the fraction of debt to be repurchased or issued under the pecking order assumptions whereas the pecking order features are primary determinants of the speed of adjustment under the trade-off theory assumptions hence implying that both theories are not mutually exclusive. Inspired by the conclusive evidence on equity market timing, Baker and Wurgler (2002) claimed that capital structure evolves as the cumulative outcome of past attempts to time the equity market i.e. relates capital structure choices to historical market to book ratio. Equity market conditions have a significant effect on the pecking order capital structure behaviour as firms tend to issue equity when share price rises thus the cost of capital are minimized by timing the market. Camara (2012) found support for the market timing hypothesis by indicating that highly levered firms have greater encouragement than less levered firms to adjust target leverage when equity market conditions are advantageous. Nevertheless, Leary and Roberts (2005), Hovakimian (2006), Altı (2006), and Mahajan and Tartaroglu (2008) found that the equity timing effect on leverage is momentary and defused within five years of equity issuance, signifying speedy adjustment towards the target leverage. Huang and Ritter (2009) highlighted that as firms rapidly adjust towards the target capital structure, which varies over time as market conditions and firm-specific factors change, market conditions and past financing behaviour do not have a considerable enduring effect on the firm's current capital structure, implying that the market timing hypothesis is insignificant.

Initial empirical studies on capital structure theories suffer from drawbacks which are partly described by a lack of proper econometrics. The trade-off theory implies that target leverage is obtained by balancing the marginal debt tax benefits against the marginal bankruptcy costs (Ross, Westerfield, Jeffrey, & Jordan, 2007). Hackbarth et al. (2006) stressed that the current state and expected macroeconomic conditions significantly influence both the costs and benefits of debt. The debt tax benefits depend on profitability whereas bankruptcy costs depend on default risk and losses, both of which are related to economic conditions. Korajczyk and Levy (2003) highlighted that firms' capital structure decision response to changes in macroeconomic conditions differ with the degree of access to the financial market. The finding observes that less constrained firms raise debt counter-cyclically and equity pro-cyclically thereby unveiling counter-cyclical disparity in leverage ratios. Thus, the less constrained firms are critical of macroeconomic conditions and schedule their financing decisions to correspond with advantageous macroeconomic conditions. The constrained firms raise debt pro-cyclical and their financing mix is insensitive to the business cycle. Similar studies were conducted by Hovakimian (2006), Altı (2006), Jek and Tan (2010), and Almeida and Campello (2010) in exploring the timing and method of issuing securities. These studies suggest that issuing cost and macroeconomic conditions considerably effect securities issuance decisions, which in turn influence the financing mix choice. Covas and Den Haan (2007) and Huang and Ritter (2009) further added that higher macroeconomic risk raises discount rates, reduces potential future cash flows and decreases the market value of equity indicating that firms' capital structure decisions are pro-cyclical. Knowledge on capital structure is mostly derived from developed countries such as the US and Europe that have many institutional similarities compared to developing countries (Booth et al., 2001; Deesomsak et al., 2004; Niu, 2008; Tarek, 2007). According to Eldomiaty (2008) and Haron (2014), even though the recent studies on developing countries are earning popularity, the body of knowledge is very limited because the equity and capital market in these developing countries are relatively less efficient and imperfect as compared with the developed countries.

Delcours (2007) found that firms in Central and Eastern European countries have preference for short-term debt as opposed to long-term debt. The agency, pecking order and trade-off theories partially explain the capital structure decisions in these transitional economies. Differences in institutional settings lead to the presence of the modified pecking order theory. Sbeiti (2010) investigated the effect of stock market development on the capital structure decisions of firms operating in three Gulf Cooperation Council (GCC) countries using a sample of 142 firms from Kuwait, Saudi Arabia and Oman during the 1998 to 2005 period. Even though the GCC countries are non-tax paying entities, the capital structure choices are comparable between the developed and developing countries. The leverages in the GCC countries are relatively lower than the developed countries and the stock market indicators are inversely related to the capital structure in both Saudi Arabia and Kuwait

indicating that the stock markets in these countries have progressed considerably and seem to influence the firms' financing decisions. Nagano (2003) highlighted that the firm capital structure in East Asian countries of Thailand, Philippines, Malaysia, Korea and Indonesia post 1997 Asian financial crisis differ from developed countries from the perspective of the agency cost and asymmetric information and pecking order theory. Firms in the region demonstrate a pecking order in financing choices whereby internal funds and short-term bank loan are preferred due to lower asymmetry information and the close relationship with creditors. Equity financing seems to be unrelated to the capital structure in these firms. A similar study conducted by Deesomsak et al. (2004) stressed that capital structure decisions are not solely related to firm characteristics but also influenced by different institutional, financial and the legal environment in which they operate. Moreover, the 1997 financial crisis adjusted the role of firm-specific and country level factors on capital structure choices in these Asia Pacific countries. Haron (2014) focused on the potential contributing factors to the subject of inconclusiveness in the determinants of capital structure studies using the sample firms from Malaysia, Singapore and Thailand for the 2000 to 2009 period. The use of static and dynamic trade-off model with the same leverage definition and different leverage definitions applying the same models arrive at different results. The discrepancies are more evident in different leverage definitions applying the same models.

The discussion on the above literature centred on finding the target leverage, identifying the determinants of capital structure and providing theoretical explanation of the capital structure decisions that are subject to empirical test by many scholars. While the scholars are still exploring a unifying theoretical explanation in resolving the capital structure issues, empirical studies conclude that the firm-specific variables such as profitability, firm size, tangibility of assets and expected inflation which is the sole macroeconomic variable, are the core factors that influence capital structure in the US (Frank & Goyal, 2009). Similarly, Kayo and Kimura (2011) stress that firm-specific factors rather than the industrial or macroeconomic variable are important determinants of capital structure decisions across 40 countries. Nevertheless, recent studies on international capital structure in the emerging countries observe that these core factors provide contradictory results such as Boyle and Eckhold (1997), Delcours (2007), Hewa Wellalage and Locke (2012) and Fauzi, Basyith, and Idris (2013). Hatzinikolaou, Katsimbris, and Noulas (2002) stress that inflation raises uncertainty and business risk as it increases the volatility in earning, price, cost structure, cashflow and tax shield uncertainty. The researches on the economic effects of inflation on capital structure are still lacking despite the immense distortions it causes on firms operating income and probability of insolvency. Booth et al. (2001) and Bayrakdaroglu et al. (2013) indicate a negative relationship between inflation and capital structure as oppose to the studies by Taggart Jr (1985), Homaifa et al. (1994), Barry, Mann, Mihov, and Rodriguez (2008) and Frank and Goyal (2009) which highlight a positive association. The literature review also observed that while the empirical studies are generally increasing in developing countries, limited studies are conducted in the ASEAN region (Deesomsak et al., 2004; Driffield et al., 2010; Fan & Wong, 2002). The present study therefore, adds some knowledge to the body of literature by empirically testing the determinants of capital structure in Malaysia, Singapore and Thailand. The variables to determine the leverage level such as profitability, firm size, tangibility of asset, depreciation to total assets and inflation have been identified from a review of these previous studies.

### 3. The model

#### 3.1. The dependent variables

We have developed our research framework based on the variables identified from the literature review. The present study employed leverage as the dependent variable and five independent variables comprising of four firm-specific factors i.e. profitability, firm size, tangibility of assets and depreciation to total assets and one macroeconomic variable namely inflation. The dependent variable that lagged one year is also included in the research framework for the selection of the regression model.

### 3.1.1. Leverage

The leverage is measured as the book ratio of total debt to total capital whereby the total capital is defined as the sum of total debt and book equity. Drobetz and Wanzenried (2006) highlight that the leverage measure focuses on the capital employed which best denote the impact of historical capital structure decisions and relates directly to the agency problem associated with debt as proposed by Jensen and Meckling (1976) and Myers (1977). Thies and Klock (1992) stressed book ratio as a better reflection of the firm target leverage whereas Fama and French (2002) endorsed that book leverage is widely used in capital structure literatures. The dependent variable, i.e. the leverage ratio is measured as follows:

$$\text{Total Debt to Capital Ratio, Leverage} = \frac{\text{Total debt}}{\text{Total debt} + \text{Book value of equity}}$$

### 3.2. Profitability

Return on assets (ROA) as a proxy for profitability is the ratio of earnings before interest and tax (EBIT) over total assets (Bayrakdaroglu et al., 2013; Deesomsak et al., 2004; Haron, 2014). The trade-off theory predicts that capital market frictions such as agency costs, taxes and bankruptcy costs substantially influence profitable firms' preference for debt financing thus profitability has positive effect on firm leverage. Ali (2011) highlighted that profitable firms are less likely to go bankrupt and can avail more debt at lower interest rates thereby reducing bankruptcy costs when profitability increases. Tax shields derived from interest payment deductibility prompt firms to raise debt financing.

### 3.3. Firm size

The firm size is measured as the natural logarithm of net sales (De Jong et al., 2008; Drobetz et al., 2006). The trade-off theory predicts a positive relationship between firm size and leverage considering that large firms have lower monitoring costs, less agency costs of debt, less volatile cash flows, easier access to credit market and need more debt to fully benefit from the tax shield (Sbeiti, 2010).

### 3.4. Tangibility of assets

Tangibility of assets is defined as the ratio of net property, plant and equipment to total assets (Camara, 2012; De Jong et al., 2008; Haron, 2014). A high ratio of tangibility of assets offers a high level of security since creditors can liquidate the collateral assets in the event of bankruptcy. The trade-off theory predicts a positive relationship between the tangibility of assets and leverage (Hewa Wellalage & Locke, 2012).

### 3.5. Depreciation to total assets

Depreciation to total assets is also described as the non-debt tax shield (Bayrakdaroglu et al., 2013; Deesomsak et al., 2004; Haron, 2014). Akhtar and Oliver (2009) stressed that firms with higher non-debt tax shields such as depreciation expenses, investment tax credits and net operating loss carry-forward will have less desire to exploit the debt tax shield because the tax advantage of leverage is less valuable. Thus, the trade-off theory predicts that depreciation to total assets has a negative relationship with leverage.

### 3.6. Inflation

Inflation rate is measured as the percentage of annual inflation rate for each country (Booth et al., 2001). Drobetz et al. (2006) stressed that the positioning of economic condition in the business cycle phase plays a significant role in determining the default risk and the capital structure decisions. Graham and Harvey (2001) highlighted that inflation risk is an important factor to calculate the discount rate when evaluating investment projects. There are contradictory predictions within trade-off theory on the effect of inflation on capital structure. Booth et al. (2001) and Hatzinikolaou et al. (2002) highlighted that the benefit derived from larger monetary value of firms' asset is offset by the higher borrowing cost and monetary risk triggered by inflation. Accordingly, inflation has an inverse effect on capital structure. On the other hand, Taggart Jr (1985) argued that the real cost of borrowing which refers to the interest rate adjusted for expected inflation is most important to economic



decisions. An increase in the expected inflation reduces the real cost of borrowing thereby increases the real value of the tax shield and firms have greater incentive to increase leverage. Hence from the literature review, inflation is predicted to have a positive influence on capital structure (Table 1).

Based on the variables discussed in theoretical framework, the following hypotheses are tested to address the objectives of this research which are to investigate the firm-specific factors, like profitability, firm size, tangibility of assets, depreciation to total assets and macroeconomic variable, inflation, are significant determinants of the level of leverage in Malaysia, Singapore and Thailand. The hypotheses based on the literature review are: (1) profitability has a negative influence, (2) firm size has a positive influence, (3) tangibility of assets has a positive influence, (4) depreciation to total assets has a negative influence and (5) inflation has a positive influence on leverage in Malaysia, Singapore and Thailand. Based on the theoretical framework, the following panel data model specification tests the hypotheses which imply that the leverage differs across firms and over time:

$$LEV_{it} = \beta_0 + \beta_1 PROF_{it} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 DTA_{it} + \beta_5 INF_{it} + \beta_6 LEV_{it-1} + \varepsilon_{it}$$

whereby,  $LEV_{it}$  = total debt ratio for the  $i$ th firm at time  $t$ ;  $\alpha$  = constant,  $\beta_1$  to  $\beta_6$  = coefficient of explanatory variables;  $PROF_{it}$  = profitability of  $i$ th firm at time  $t$ ;  $SIZE_{it}$  = firm size of  $i$ th firm at time  $t$ ;  $TANG_{it}$  = tangibility of  $i$ th firm at time  $t$ ;  $DTA_{it}$  = depreciation to total assets of  $i$ th firm at time  $t$ ;  $INF_{it}$  = inflation of  $i$ th firm at time  $t$ ;  $LEV_{it-1}$  = lagged one year leverage of  $i$ th firm at time  $t - 1$ ; and  $\varepsilon_{it}$  is the error term.

The present study uses panel data regression model which incorporates data on both cross-sectional and time series dimension (Wooldridge, 2002). According to Sun and Parikh (2001), Antoniou et al. (2002) and Gujarati (2003), the cross-observation gathered during a prescribed period are combined thus increasing the number of observation, lowering the multicollinearity problem among the explanatory variables and increasing the degree of freedom to provide more accurate results. The ordinary least square (OLS) model with fixed effect regression is used to analyze the sample firms separately instead of the pooled ordinary least square model to prevent biasness in the regression output which is consistent with cross-countries studies carried out by Driffield and Pal (2010) and Haron (2014). The sample firms from the selected countries are heterogeneous as they belong to different stage of business cycle, operate in different industries with different institutional settings and compete on different products and services. According to Booth et al. (2001), the changing firm intercepts that vary over firm and time can capture the effect of the omitted explanatory variables. The dependent variable lagged one year is used in the fixed effect regression model to select the model with the lowest value of Akaike Information Criterion or Schwarz. The Akaike Information Criterion and Schwarz measure the trade-off between the complexity and goodness of fit of the regression model and the lowest value indicates less information loss when generating the data.

**Table 1. Summary of selected empirical studies on the determinants of capital structure**

Variables to test	Positive influence on capital structure	Negative influence on capital structure
Profitability	Flannery and Rangan (2006), De Jong, Kabir and Nguyen (2008) and Ali (2011)	Antoniou et al. (2008), Serrasqueiro and Rogão (2009), Frank and Goyal (2009) and Sbeiti (2010)
Firm size	Eriotis et al. (2007), Sbeiti (2010), Akhtar and Oliver (2009), Frank and Goyal (2009), Ali (2011) and Hewa Wellalage and Locke (2012)	Titman and Wessels (1988)
Tangibility of assets	Antoniou et al. (2008), De Jong et al. (2008), Frank and Goyal (2009), Sheikh and Wang (2011), Ali (2011), Camara (2012) and Hewa Wellalage and Locke (2012).	Sbeiti (2010)
Depreciation to total assets	Moore (1986), Delcours (2007) and Antoniou et al. (2008)	Deesomsak et al. (2004), and Akhtar and Oliver (2009)
Inflation	Taggart Jr (1985), Homaifa et al. (1994), Barry et al. (2008) and Frank and Goyal (2009)	Booth et al. (2001), Hatzinikolaou et al. (2002) and Bayrakdaroglu et al. (2013)

#### 4. The data

The total number of companies listed on the Bursa Malaysia, Singapore Stock Exchange and the Stock Exchange of Thailand are 911, 7,761 and 5,841, respectively, as of 31 December 2013. The study incorporates all non-financial firms listed on the Bursa Malaysia, Singapore Stock Exchange and the Stock Exchange of Thailand. Financial firms such as banks, insurance and finance companies are excluded because of the different accounting categories and they are governed by special regulations (Rajan & Zingales, 1995). This study uses balanced panel data, thus firms with missing values and observations with negative book value of equity are eliminated. This is in accordance with the practice of (Camara, 2012; Faulkender, Flannery, Hankins, & Smith, 2010). The final samples consist of 475 Malaysian firms, 262 Singaporean firms and 280 Thailand firms which represents 52.14, 33.76 and 48.29% of the total number of listed companies in the respective stock exchanges. This study uses 10-year period data from 2004 to 2013 whereby the firm level data are sourced from the Thomson Reuter DataStream and the country level data from the World Bank database. The financial and economic data for all the three countries are converted and presented in USD. The resulting panel data of 1,017 firms provides 10,017 observations. Table 2 presents the summary of the descriptive statistics of leverage for Malaysia, Singapore and Thailand over the period 2004–2013.

Thailand has the highest mean leverage ratio of 0.5626 that deviates within the range of 26.78% followed by Singapore with a moderate mean leverage ratio of 0.4532 that varied over the range of 26.76%. Malaysia has the lowest mean value of leverage of 0.4013 with standard deviation in the range of 24.09%. The skewness of leverage for Malaysia and Singapore are in the range of –0.5 and 0.5 inferring that the distributions of leverage are approximately symmetric. The distribution of leverage for Thailand is moderately skewed to the left (negatively skewed) indicating that larger portion of the leverage are at the higher range. The kurtosis values indicate that distributions of leverage for all the three countries have a lower and broader central peak and the tails are shorter and thinner compared to a normal distribution. All the coefficients of correlation are below 0.6 (see Appendix B) and there are no high correlations between the independent variables (Gujarati & Porter, 2009). As no multicollinearity error problem exists, hence all the selected independent variables can be used simultaneously in the panel set and no further test is required using variance inflation factor (VIF). Two-way Granger causality test are performed on the variables and the resultant t-test values indicate that all the independent variables have Granger causality on the dependent variable, leverage, except for inflation in Singapore and profitability and tangibility of assets in Thailand. The F-test statistic values also show that the dependent variable lagged one year improves the prediction of the dependent variable in the regression model for all the three countries (Gujarati & Porter, 2009). Table 2 presents the summarized results of the restricted Granger causality test for Malaysia, Singapore and Thailand. The results of the two-way Granger causality test between the independent variables and dependent variable are produced in Appendix D for Malaysia, Singapore and Thailand.

**Table 2. Descriptive statistics of leverage for Malaysia, Singapore and Thailand**

	Malaysia	Singapore	Thailand
Mean	0.4013	0.4532	0.5626
Median	0.3953	0.4617	0.6202
Maximum	0.9969	1	0.9937
Minimum	0	0	0
Std. Dev.	0.2409	0.2676	0.2678
Skewness	0.1748	0.0190	–0.527
Kurtosis	2.1419	1.9520	2.2097

## 5. The empirical results

Tables 3–5 present the summaries of the fixed effects regression results for the determinants of capital structure for Malaysia, Singapore and Thailand. The highly adjusted  $R^2$  values show that the selected independent variables in the models can significantly explain more than 80% of the variability of leverage ratios for all the three countries. The  $F$ -statistics suggests that the statistical models fit the data significantly whereas all the sample data have Durbin–Watson statistics values which are close to 2 indicating the absence of autocorrelation problems.

### 5.1. Regression results for Malaysia

The  $t$ -statistic indicates that all the independent variables seem statistically significant at 1% significance level. All the alternative hypotheses of H1 to H5 are not rejected implying that the selected independent variables have significant effect on firm leverage in Malaysia. The regression equation for the determinants of capital structure for Malaysia is as follows:

$$\text{LEV}_{i,t} = -0.6876 - 0.0422\text{PROF}_{i,t} + 0.0683\text{SIZE}_{i,t} + 0.1231\text{TANG}_{i,t} - 0.4365\text{DTA}_{i,t} + 0.9783\text{INF}_{i,t} + 0.5930\text{LEV}_{i,t-1} + \varepsilon_{i,t}$$

Profitability has a negative effect on firm leverage, whereby a 1% increase in profit will reduce firms' tendency to use leverage by 4.22%. Firm size and tangibility of assets has positive influence on firm leverage as expected. 1% increase in investment in fixed assets over total assets would result in the leverage to increase by 12.31%. Depreciation to total assets with coefficient value of  $-0.4365$  incites substantial negative influence over leverage. Inflation has a very high coefficient of 0.9783 suggesting a strong positive influence over leverage. The leverage lagged one year has a coefficient

**Table 3. The fixed effect regression result for the determinants of capital structure for Malaysia**

	Coefficient	Standard error	t-statistic	Probability
Constant	−0.6876	0.0466	−14.7666	0.0000
Profitability	−0.0422	0.0064	−6.6146	0.0000
Firm size	0.0683	0.0040	17.2506	0.0000
Tangibility of assets	0.1231	0.0142	8.6592	0.0001
Depreciation to total assets	−0.4365	0.1097	−3.9773	0.0000
Inflation	0.9783	0.1044	9.3729	0.0000
Leverage $t - 1$	0.5930	0.0122	48.6151	0.0000
$R^2$	0.8782	$F$ -statistic	57.0184	0.0000
Adjusted $R^2$	0.8628	Durbin–Watson statistic	1.8480	

**Table 4. The fixed effect regression result for the determinants of capital structure for Singapore**

	Coefficient	Standard error	t-statistic	Probability
Constant	−0.1900	0.04370	−4.3496	0.0000
Profitability	−0.0352	0.0075	−4.6911	0.0000
Firm size	0.0312	0.0036	8.5827	0.0000
Tangibility of assets	0.1105	0.0252	4.3803	0.0000
Depreciation to total assets	−0.5402	0.1216	−4.4419	0.0000
Inflation	0.0776	0.1261	0.6150	0.5386
Leverage $t - 1$	0.5445	0.0176	30.9886	0.0000
$R^2$	0.8310	$F$ -statistic	38.4913	0.0000
Adjusted $R^2$	0.8094	Durbin–Watson statistic	2.0552	

value of 0.5930 hence 1% increases in immediate preceding year leverage is expected to increase the current year leverage by 59.29%.

### 5.2. Regression results for Singapore

The *t*-statistic indicates that with exception to inflation, all the other independent variables are significant at 1% significance level. As such, the main alternative hypotheses of H1, H2, H3 and H4 are not rejected inferring the significant effect of the independent variables over firm capital structure whereas H5 is rejected. The regression equation for the determinants of capital structure for Singapore is as follows:

$$\text{LEV}_{i,t} = -0.1900 - 0.0352\text{PROF}_{i,t} + 0.0312\text{SIZE}_{i,t} + 0.1105\text{TANG}_{i,t} - 0.5402\text{DTA}_{i,t} + 0.0776\text{INF}_{i,t} + 0.5445\text{LEV}_{i,t-1} + \varepsilon_{i,t}$$

Profitability with a coefficient of  $-0.0352$  induces a negative influence over firm leverage. A coefficient of  $0.0312$  suggests that firm size has mild positive influence over leverage. Tangibility of assets has a coefficient of  $0.1105$  thus, the positive effect suggests that a 1% increase in fixed assets over total assets increases the leverage by 11.05%. The depreciation to total assets reports high coefficient of  $-0.5402$  inferring a negative effect over leverage. The inflation with coefficient of  $0.0776$  suggests mild positive influence on firm leverage but the results seems to be statistically insignificant for Singaporean firms. The leverage lagged one year has coefficient of  $0.5445$  implying that past financing decision significantly influences over firms' current leverage.

### 5.3. Regression results for Thailand

The *t*-statistic shows that except for profitability and tangibility of assets, the remaining independent variables are significant at 1% significance level. Firm size, depreciation to total assets and inflation have significant influences over firm leverage. The regression equation for the determinants of capital structure for Thailand is as follows:

$$\text{LEV}_{i,t} = -0.1018 - 0.0053\text{PROF}_{i,t} + 0.0285\text{SIZE}_{i,t} + 0.0481\text{TANG}_{i,t} - 0.2518\text{DTA}_{i,t} + 0.5961\text{INF}_{i,t} + 0.5584\text{LEV}_{i,t-1} + \varepsilon_{i,t}$$

The profitability has weak negative influence over firm leverage and is statistically insignificant. The firm size with coefficient value of  $0.0285$  incites positive influence on leverage. Tangibility of assets has a coefficient of  $0.0481$  but the positive effect over leverage is statistically insignificant. A coefficient value of depreciation to total assets is  $-0.2518$  implying relatively moderate negative influence over firm leverage. Leverage lagged one year with coefficient of  $0.5584$  suggests that historical capital structure behaviour has significant positive influence over current financing decisions. Overall, the fixed effect regression results from Tables 3, 4, and 5 illustrate that all the explanatory determinants have significant influence on the level of leverage in Malaysia, Singapore and Thailand. Generally, the directions of the coefficient of variables are consistent across all the countries and with the main stream literature (Homaifa et al., 1994; Jensen, 1986; Myers, 1984; Rajan & Zingales, 1995; Titman & Wessels, 1988).

#### 5.3.1. Profitability

Profitability appears to have a negative influence on capital structure for all the three countries. The results are statistically significant for Malaysia and Singapore but insignificant for Thailand, hence the findings support the hypotheses of H1 for Malaysia and Singapore but rejected for Thailand. This is consistent with most of the prior studies such as Jensen (1986), Rajan and Zingales (1995), Booth et al. (2001), De Jong et al. (2008), Viviani (2008), Serrasqueiro and Rogão (2009), and Cheng and Shiu (2007) as well as consistent with the pecking order theory and is inconsistent with the trade-off theory. Such negative and insignificant results for Thai firms were previously reported by Deesomsak et al. (2004). The negative and significant results support the prediction of the pecking order theory that firms are inclined towards using internal source of financing when profits are high. The asymmetric information problem between firm managers and external investors create the preference ranking over financing sources in order to minimize adverse selection costs.

**Table 5. The fixed effect regression result for the determinant of capital structure for Thailand**

	Coefficient	Standard error	t-statistic	Probability
Constant	-0.1018	0.0570	-1.7848	0.0744
Profitability	0.0053	0.0051	-1.0505	0.2936
Firm size	0.0285	0.0048	5.9532	0.0000
Tangibility of assets	0.0481	0.0241	1.9945	0.0462
Depreciation to total assets	-0.2518	0.1077	-2.3384	0.0195
Inflation	0.5961	0.1218	4.8938	0.0000
Leverage $t - 1$	0.5584	0.0172	32.5290	0.0000
$R^2$	0.8602	$F$ -statistic	48.2308	0.0000
Adjusted $R^2$	0.8424	Durbin-Watson statistic	1.8602	

### 5.3.2. Firm size

Firm size has a statistically significant and positive influence on capital structure for all the countries. However, the degree of the effect differs with firm size having the strongest effect on Malaysian firms followed by Singapore and Thailand. This findings support the studies of Titman and Wessels (1988), Byoun (2008), Hewa Wellalage and Locke (2012) and Fauzi, Basyith, and Idris (2013) that firms' ability to access and choose between the equity and debt financing are very much dependent on firm size. Large firms are more diversified thus less exposed to bankruptcy risk, have lower bankruptcy costs and higher debt capacity. Furthermore, firm size is considered as a proxy for information asymmetry between managers and investors in the capital market whereby large firms are regarded as more transparent, inclined to have higher leverage which enable them to issue larger amounts of debt with less issuing costs. Thus, hypothesis H2 is mutually supported for all the three countries based on the significance of the relationship.

### 5.3.3. Tangibility of assets

As expected, the tangibility of assets asserts a positive influence on capital structure and the relationship is statistically significant in Malaysia and Singapore. Other studies such as Myers (1984), Harris and Raviv (1991), Kayhan and Titman (2007), Antoniou et al. (2008), Almeida and Campello (2007), Sheikh and Wang (2011), and Ali (2011) support the consensus that capital structure increases with the proportion of tangible assets. The availability of collateral assets provides high level of security on debt repayment as creditors can proceed to liquidate the assets in the event of bankruptcy. Hence, secured leverage is less risky to creditors due to lower distress costs and debt-related agency problem. However, tangibility of assets is statistically insignificant with mild positive effect on firm capital structure in Thailand which is consistent with the finding of Wiwattanakantang (1999). The hypothesis of H3 is supported by the findings of this study in Malaysia and Singapore but rejected in Thailand.

### 5.3.4. Depreciation to total assets

The depreciation to total assets has a statistically significant and negative relationship with leverage for all the three countries thereby mutually supporting hypothesis H4. This finding corroborates with prior studies such as Rajan and Zingales, Wiwattanakantang (1999), Deesomsak et al. (2004), and Akhtar and Oliver (2009). The depreciation to total assets establishes a strong influence on leverage for Singapore followed by Malaysia and Thailand. Firms with higher depreciation to total assets indicates that non-debt tax shields such as depreciation and amortization expenses, investment tax incentives and unabsorbed losses will have less desire to utilize the debt tax shield because the tax advantage of leverage are less valuable.



### 5.3.5. Inflation

Inflation yields a statistically significant positive influence on leverage for Malaysia and Thailand but demonstrates an insignificant relationship for Singapore. The financial leverage is higher when the economic prospects are good and the finding is consistent with Homaifa et al. (1994) and Barry et al. (2008) but contradict with Bayrakdaroglu et al. (2013). Increases in the expected inflation reduce the real value of the cost of leverage thereby increasing the real value of the tax shield. Furthermore, the finding can be viewed from the perspective of debt market timing whereby firms tend to increase leverage when the expected inflation is relatively higher than the current interest rate (Barry et al., 2008). Hence, the findings of this study support hypothesis H5 for Malaysia and Thailand but is rejected for Singapore.

### 5.3.6. Leverage lagged one year

All the three countries show a significantly high and positive coefficient of leverage lagged one year which is similar to the findings of Antoniou et al. (2008) and Sbeiti (2010). According to Welch (2004), the high influence of leverage lagged one year over the current leverage level indicates that firms in these three countries planned their financial leverage level hence they do have target leverage.

## 6. Concluding remarks

The sample data for Malaysia, Singapore and Thailand are subject to correlation tests which indicate that there are no high correlations between the independent variables and therefore no multicollinearity problem exists. The Granger causality tests demonstrate that all the independent variables show causality prediction to forecast the dependent variable except for the inflation for Singapore and profitability and tangibility of assets for Thailand. The ordinary least square (OLS) with fixed effect panel data regression is used in this study given that the sample firms from the selected countries are heterogeneous. The fixed effect regression model with leverage lagged one year which has the lowest Akaike Information Criterion and Schwarz value is selected to preserve the loss of information while analyzing the data. The regression results with highly adjusted  $R^2$  values show that the selected independent variables can significantly explain the variability of leverage ratios for all the three countries. The  $F$ -statistics suggests that the statistical models fit the data and there are no autocorrelation problems in all the sample data as indicated by the Durbin-Watson statistics values (Table 6).

Profitability has a negative influence on financial leverage for Malaysia and Singapore but is insignificant for Thailand. The negative relationship is also observed by previous empirical studies such as Frank and Goyal (2003), Abor (2005), De Jong and Veld (2001), Flannery and Rangan (2006) and De

**Table 6. The summary of the regression results for the determinants of capital structure for Malaysia, Singapore and Thailand**

	Malaysia	Singapore	Thailand
Constant	-0.6876*** (-14.7666)	-0.1900*** (-4.3496)	-0.1018* (-1.7848)
Profitability	-0.0422*** (-6.6146)	-0.0352*** (-4.6911)	-0.0053* (-1.0505)
Firm size	0.0683*** (17.2506)	0.0312*** (8.5827)	0.0285*** (5.9532)
Tangibility of assets	0.1231*** (8.6592)	0.1105*** (4.3803)	0.0481* (1.9945)
Depreciation to total assets	-0.4365*** (-3.9773)	-0.5403*** (-4.4419)	-0.2518** (-2.3384)
Inflation	0.9783*** (9.3729)	0.0776 (0.6150)	0.5961*** (4.8938)
Leverage lagged one year	0.5930*** (48.6150)	0.5445*** (30.9886)	0.5584*** (32.5290)
$R^2$	0.8782	0.8310	0.8136
Adjusted $R^2$	0.8628	0.8094	0.8132
$F$ -statistic	57.0184***	38.4913***	1,828.7 ***
Durbin-Watson statistic	1.847992	2.055227	1.94505

Notes: Coefficient that are significantly different from zero at 1, 5 and 10% level are marked with \*\*\*, \*\* and \*, respectively.  $t$ -statistic value is in the brackets.

Jong, Kabir, and Nguyen (2008) but contradict with Drobetz and Wanzenried (2006), and Antoniou et al. (2008) which indicate a positive relationship. Firm size has a significant and positive influence on financial leverage for all the countries. However, the degree of the effect differs with firm size has strongest effect on Malaysian firms followed by Singapore and Thailand. Such positive association between firm size and capital structure is also highlighted by MacKay and Phillips (2005) and Flannery and Rangan (2006). The tangibility of assets asserts a positive influence on financial leverage and the relationship is statistically significant in Malaysia and Singapore but insignificant in Thailand. The capital market particularly the banking industries in Malaysia and Singapore are strictly regulated and well protected. Firms investing in intangible assets in countries with good creditor protections have better accessibility to leverage as evidenced by Pandey (2002), Graham (2003), Drobetz and Wanzenried (2006), De Jong et al. (2008), and Sheikh and Wang (2011).

The depreciation to total assets has a statistically significant and negative relationship with financial leverage in all the three countries which is consistent with Deesomsak et al. (2004). The depreciation to total assets establishes strong influence on leverage for Singapore followed by Malaysia and Thailand which corresponds with the level of firms' profitability in the respective countries implying that the tax based capital structure model is at work. Firms with higher profitability gain from the depreciation to total assets have less incentive to use financial leverage. DeAngelo and Masulis (1980) and Rajan and Zingales support the positive relationship between depreciation to total assets and financial leverage, whereas Moore (1986), Akhtar and Oliver (2009), and Antoniou et al. (2008) showed a negative association. Inflation yielded a statistically significant and positive influence on financial leverage in Malaysia and Thailand and has an insignificant relationship for Singapore. Similar results are also noted by Taggart Jr (1985) that during the inflationary period, the real value of the cost of leverage decreases thereby enhances the real value of the tax advantage. Nominal interest rate has been positively correlated with inflation in accordance with Fishers' theory that nominal interest rate is the sum of real interest rate and inflation. Likewise, Barry et al. (2008) state that firms incline to increase their leverage when current interest rate is lower than the expected inflation hence indicate the changing nature of the impact of inflation on different economic states. This has been highlighted for further research in the next section. The positive influence of inflation on financial leverage opposes the finding by Hatzinikolaou et al. (2002) which imply that inflation increases uncertainty and business risk such as fluctuation in earning, price, cost structure, cashflow and tax shield uncertainty thereby reduces preference for financial leverage. All the three countries show a significantly high positive coefficient of leverage lagged one year which is consistent with Frank and Goyal (2003), Antoniou et al. (2008) and Sbeiti (2010). The high influence of leverage lagged one year on the current leverage indicates that firms in these three countries do have target leverage (Kayhan & Titman, 2007). In conclusion, the above findings drawn from the results show that the determinants above have significant impact on financial leverage.

The limitation of this study is that it does not take into consideration the different accounting policies and practices adopted by the three countries prior to 2012 that might influence the interpretation and comparison of the financial data. Subsequently, these countries started to adopt the harmonized international financial reporting standard in 2012 which might impair the comparison of the time variant financial data. It has not incorporated the impact of the 2008/2009 global financial crises that might have abruptly altered the corporate capital structure behaviour in these selected countries. As direction for future research, researchers can pursue a more in-depth study on capital structure by adopting institutional factors such as capital market development, the development of financial intermediaries and creditors and shareholders' right. Future research can examine the impact of different macroeconomic variables on the decision mix of capital structure at different points in time, in particular, further research can examine the significance of the impact of inflation on different economic states.

## Funding

The authors received no direct funding for this research.

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## Citation information

Cite this article as: The determinants of capital structure: Evidence from public listed companies in Malaysia, Singapore and Thailand, Jacinta Chan Phooi M'ng, Mahfuzur Rahman & Selvam Sannacy, *Cogent Economics & Finance* (2017), 5: 1418609.

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- Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. Cambridge: The MIT Press. Appendix A. Table A1, A2 and A3 present the summaries of the descriptive statistics of the independent variables for Malaysia, Singapore and Thailand, respectively, over the period 2004–2013.

## Appendix A.

Table A1, A2 and A3 present the summaries of the descriptive statistics of the independent variables for Malaysia, Singapore and Thailand, respectively, over the period 2004–2013.

Table A1. The descriptive statistics of independent variables for Malaysia

	<b>Profitability</b>	<b>Firm size</b>	<b>Tangibility of assets</b>	<b>Depreciation to total assets</b>	<b>Inflation</b>
Mean	0.0494	11.5772	0.3848	0.0296	0.0248
Median	0.0507	11.4369	0.3740	0.0237	0.0207
Maximum	11.0788	17.2589	0.9805	0.4036	0.0544
Minimum	−6.1894	0	0	−0.0004	0.0058
Std. Dev.	0.2302	1.4953	0.2099	0.0281	0.0130

Table A2. The descriptive statistics of independent variables for Singapore

	<b>Profitability</b>	<b>Firm size</b>	<b>Tangibility of assets</b>	<b>Depreciation to total assets</b>	<b>Inflation</b>
Mean	0.0590	11.8608	0.2926	0.0300	0.0273
Median	0.0668	11.6769	0.2489	0.0226	0.0224
Maximum	9.1978	18.3996	0.9859	0.7541	0.0652
Minimum	−12.647	0	0	−0.0159	0.0042
Std. Dev.	0.3499	1.6918	0.2229	0.0326	0.0196

Table A3. The descriptive statistics of independent variables for Thailand

	<b>Profitability</b>	<b>Firm size</b>	<b>Tangibility of assets</b>	<b>Depreciation to total assets</b>	<b>Inflation</b>
Mean	0.078244	11.3735	0.377282	0.040261	0.031082
Median	0.075629	11.29894	0.3588	0.033819	0.031436
Maximum	22.59614	18.32824	0.982161	0.525978	0.054685
Minimum	−1.055995	0	0	0	−0.00846
Std. Dev.	0.440063	1.678536	0.24307	0.036645	0.01669

Thailand has the highest mean value for profitability of 7.8% but standard deviation of 44% implies that distribution of profitability is spread over a large range of value. The mean value of profitability for Singapore is 5.9% with standard deviation of 34.99% whereas Malaysia has the lowest mean value of 4.93% and standard deviation of 23.02%. All the three countries record high standard deviations for firm size which are in the range of 149.52% to 167.85% signifying that the sample data represent a broad spectrum of firm size. Tangibility of assets for the three countries has a comparable mean value and standard deviation. Low standard deviations infer that the distributions of depreciation to total assets and inflation are clustered closely to the mean value for all the three countries.

## A2. Descriptive statistics of variables

### Malaysia

Malaysia	LEV	PROFIT	LSIZE	TANG_ASSETS	DTA	INFLATION
Mean	0.401346	0.049366	11.5772	0.38477	0.02955	0.02481
Median	0.395397	0.050658	11.43693	0.374019	0.023714	0.020662
Maximum	0.996883	11.07877	17.2589	0.980491	0.4036	0.054408
Minimum	0	-6.18937	0	0	-0.00042	0.005833
Std. dev.	0.240974	0.230186	1.495268	0.20993	0.028125	0.013013
Skewness	0.174804	19.31241	0.444573	0.335464	3.120757	0.860211
Kurtosis	2.141926	1260.075	5.033169	2.576936	22.81585	3.257688
Jarque-Bera	169.9147	3.13E + 08	974.6129	124.5147	85,425.68	598.9466
Probability	0	0	0	0	0	0
Sum	1,906.395	234.4878	54,991.7	1,827.657	140.3613	117.8499
Sum Sq. Dev.	275.7679	251.6282	10,617.94	209.2905	3.756634	0.804234
Observations	4,750	4,750	4,750	4,750	4,750	4,750

### Singapore

Singapore	LEV	PROFIT	LSIZE	TANG_ASSETS	DTA	INFLATION
Mean	0.453199	0.059001	11.86038	0.292606	0.029985	0.027295
Median	0.461693	0.066848	11.67692	0.248957	0.02262	0.022412
Maximum	1	9.197814	18.3996	0.985908	0.754152	0.065186
Minimum	0	-12.64706	0	0	-0.01589	0.004251
Std. Dev.	0.267599	0.349918	1.691813	0.222935	0.032608	0.019593
Skewness	0.019015	-12.48004	-0.31483	0.84909	6.753622	0.637921
Kurtosis	1.952006	854.8077	9.865661	3.101497	114.568	2.144458
Jarque-Bera	120.0548	79,276,756	5189.103	315.9408	1,378,759	257.6031
Probability	0	0	0	0	0	0
Sum	1,187.381	154.5831	31,074.2	766.6276	78.56121	71.51275
Sum Sq. Dev.	187.5445	320.6773	7,496.182	130.1638	2.78472	1.005376
Observations	2,620	2,620	2,620	2,620	2,620	2,620

### Thailand

Thailand	LEV	PROFIT	LSIZE	TANG_ASSETS	DTA	INFLATION
Mean	0.562627	0.078244	11.3735	0.377282	0.040261	0.031082
Median	0.620178	0.075629	11.29894	0.3588	0.033819	0.031436
Maximum	0.993668	22.59614	18.32824	0.982161	0.525978	0.054685
Minimum	0	-1.055995	0	0	0	-0.00846
Std. dev.	0.267759	0.440063	1.678536	0.24307	0.036645	0.01669
Skewness	-0.52746	47.84239	0.157298	0.307473	4.058772	-0.9315
Kurtosis	2.209677	2450.285	5.162591	2.111419	35.80801	3.69699
Jarque-Bera	202.7037	7.00E + 08	557.173	136.2359	133,263.7	461.6006
Probability	0	0	0	0	0	0
Sum	1575.356	219.0834	31,845.79	1056.391	112.7312	87.02989
Sum Sq. Dev.	200.6746	542.0421	7886.131	165.374	3.758741	0.77969
Observations	2,800	2,800	2,800	2,800	2,800	2,800

## Appendix B.

Table B1. The summary of the correlation matrix between independent variables for Malaysia, Singapore and Thailand

	Country	Profitability	Firm size	Tangibility of assets	Depreciation to total assets	Inflation
Profitability	M'sia	1.0000				
	S'pore	1.0000				
	Thai	1.0000				
Firm size	M'sia	0.0811***	1.0000			
	S'pore	-0.0044***	1.0000			
	Thai	0.0402**	1.0000			
Tangibility of assets	M'sia	-0.0453***	0.0605***	1.0000		
	S'pore	-0.0395**	-0.0124*	1.0000		
	Thai	-0.0164	0.0569***	1.0000		
Depreciation to total assets	M'sia	-0.0556***	-0.1971***	0.2744***	1.0000	
	S'pore	-0.1747***	-0.0714***	-0.3000**	1.0000	
	Thai	0.1811***	0.0227	0.2812***	1.0000	
Inflation	M'sia	-0.0044	-0.0113	-0.0042	-0.0037	1.0000
	S'pore	-0.0072	0.1150***	-0.0080***	-0.0214	1.0000
	Thai	-0.0405**	-0.0149	0.0129	-0.0017	1.0000

Note: Coefficients of correlation that are significantly different from zero at 1, 5 and 10% level are marked with \*\*\*, \*\* and \*, respectively.

### B1. Correlation Test

#### Malaysia

Covariance analysis: Ordinary		0.15				
Sample: 2004 2013						
Included observations: 4,750						
Correlation						
t-statistic						
Probability						
	LEV	PROFIT	LSIZE	TANG_ASSETS	DTA	INFLATION
LEV	1					
	-					
	-					
PROFIT	0.010706	1				
	0.737747	-				
	0.4607	-				
LSIZE	0.535877	0.081086	1			
	43.73463	5.605751	-			
	0	0	-			
TANG_ASSETS	0.096823	-0.045347	0.06047	1		
	6.703138	-3.127898	4.174359	-		
	0	0.0018	0	-		

DTA	0.011992	-0.055587	-0.197128	0.274368	1	
	0.826362	-3.836186	-13.85514	19.66	-	
	0.4086	0.0001	0	0	-	
INFLATION	0.037552	-0.004378	-0.011255	-0.004221	-0.003716	1
	2.589383	-0.301681	-0.775594	-0.290864	-0.256061	-
	0.0096	0.7629	0.438	0.7712	0.7979	-

### Singapore

Covariance Analysis: Ordinary						
Sample: 2004 2013						
Included observations: 2,620						
Correlation						
t-statistic						
Probability						
	LEV	PROFIT	LSIZE	TANG_AS-SETS	DTA	INFLATION
LEV	1					
	-					
	-					
PROFIT	0.014927	1				
	0.763827	-				
	0.445	-				
LSIZE	0.379896	0.122981	1			
	21.01327	6.340615	-			
	0	0	-			
TANG_ASSETS	0.0854	-0.039545	-0.012352	1		
	4.385655	-2.024979	-0.632056	-		
	0	0.043	0.5274	-		
DTA	-0.133574	-0.17468	-0.071376	0.29959	1	
	-6.896297	-9.077318	-3.661383	16.0669	-	
	0	0	0.0003	0	-	
INFLATION	-0.053737	-0.007231	0.115032	-0.080095	-0.021389	1
	-2.75353	-0.369992	5.925122	-4.111379	-1.094633	-
	0.0059	0.7114	0	0	0.2738	-

### Thailand

Covariance Analysis: Ordinary						
Sample: 2004 2013						
Included observations: 2,800						
Correlation						
t-statistic						
Probability						
	LEV	PROFIT	LSIZE	TANG_AS-SETS	DTA	INFLATION



LEV	1					
	–					
	–					
PROFIT	–0.009287	1				
	–0.491255	–				
	0.6233	–				
LSIZE	0.440234	0.04024	1			
	25.93505	2.130257	–			
	0	0.0332	–			
TANG_ASSETS	0.141832	–0.016393	0.056884	1		
	7.578976	–0.867264	3.013809	–		
	0	0.3859	0.0026	–		
DTA	–0.015051	0.181123	0.022756	0.281214	1	
	–0.796206	9.741804	1.20399	15.50067	–	
	0.426	0	0.2287	0	–	
INFLATION	0.02463	–0.040554	–0.0149	0.012906	–0.001663	1
	1.303225	–2.14691	–0.788241	0.682747	–0.087952	–
	0.1926	0.0319	0.4306	0.4948	0.9299	–

### Appendix C.

Table C2 presents the summarized results of the restricted Granger causality test for Malaysia, Singapore and Thailand. The *t*-test values indicate that with exception for inflation in Singapore and profitability and tangibility of assets in Thailand, all the other independent variables and the leverage lagged one year have Granger causality on the leverage. The *F*-test statistic values also show that the dependent variable lagged one year improves the prediction of the dependent variable in the regression model for all the three countries (Gujarati and Porter, 2009). The results of the two-way Granger causality test between the independent variables and dependent variable are produced in Appendices C1, C2 and C3 for Malaysia, Singapore and Thailand, respectively.

Table C1. The summary of the results of Granger causality test for Malaysia, Singapore and Thailand

Profitability	Malaysia			Singapore			Thailand		
	Value	df	Probability	Value	df	Probability	Value	df	Probability
t-statistic	-6.61457	3794	0	-4.69108	2090	0	-1.05047	2234	0.2936
F-statistic	43.75258	(1, 3794)	0	22.00627	(1, 2090)	0	1.103496	(1, 2234)	0.2936
$\chi^2$	43.75258	1	0	22.00627	1	0	1.103496	1	0.2935
Normalized Restriction (= 0)									
Coefficient	0.042217		Std. Err.			Std. Err.			Std. Err.
Firm size	Value	df	Probability	Value	df	Probability	Value	df	Probability
t-statistic	17.25059	3794	0	8.582714	2090	0	5.953155	2234	0
F-statistic	297.5828	(1, 3794)	0	73.66299	(1, 2090)	0	35.44006	(1, 2234)	0
$\chi^2$	297.5828	1	0	73.66299	1	0	35.44006	1	0
Normalized Restriction (= 0)									
Coefficient	0.068341		Std. Err.			Std. Err.			Std. Err.
Tangibility of assets	Value	df	Probability	Value	df	Probability	Value	df	Probability
t-statistic	8.659216	3794	0	4.380327	2090	0	1.994464	2234	0.0462
F-statistic	74.98202	(1, 3794)	0	19.18726	(1, 2090)	0	3.977889	(1, 2234)	0.0462
$\chi^2$	74.98202	1	0	19.18726	1	0	3.977889	1	0.0461
Normalized Restriction (= 0)									
Coefficient	0.123087		Std. Err.			Std. Err.			Std. Err.
Depreciation to total assets	Value	df	Probability	Value	df	Probability	Value	df	Probability
t-statistic	-3.97734	3794	0.0001	-4.44189	2090	0	-2.33844	2234	0.0195
F-statistic	15.81922	(1, 3794)	0.0001	19.73042	(1, 2090)	0	5.468285	(1, 2234)	0.0195
$\chi^2$	15.81922	1	0.0001	19.73042	1	0	5.468285	1	0.0194
Normalized Restriction (= 0)									
Coefficient	-0.43651		Std. Err.			Std. Err.			Std. Err.
Inflation	Value	df	Probability	Value	df	Probability	Value	df	Probability
t-statistic	-6.61457	3794	0	0.614997	2090	0.5386	4.893834	2234	0
F-statistic	9.3729	(1, 3794)	0	0.378222	(1, 2090)	0.5386	23.94961	(1, 2234)	0
$\chi^2$	87.85125	(1, 3794)	0	0.378222	1	0.5386	23.94961	1	0
Normalized Restriction (= 0)									
Coefficient	0.978325		Std. Err.			Std. Err.			Std. Err.
Leverage lagged one year	Value	df	Probability	Value	df	Probability	Value	df	Probability
t-statistic	48.61505	3794	0	30.98862	2090	0	32.52896	2234	0
F-statistic	2363.423	(1, 3794)	0	960.2947	(1, 2090)	0	1058.133	(1, 2234)	0
$\chi^2$	2363.423	1	0	960.2947	1	0	1058.133	1	0
Normalized Restriction (= 0)									
Coefficient	0.592955		Std. Err.			Std. Err.			Std. Err.
			0.012197	0.544545		0.017572	0.558428		0.017167

### C3-1(a). Malaysia: Restricted Granger Causality test

Estimation equation
=====
LEV = C(1)*PROFIT + C(2)*LSIZE + C(3)*TANG_ASSETS + C(4)*DTA + C(5)*INFLATION + C(6) + C(7)*LEV(-1) + [CX = F]

Wald test:				Wald test:			
Equation: Untitled				Equation: Untitled			
Test statistic	Value	df	Probability	Test statistic	Value	df	Probability
t-statistic	-6.614573	3,794	0	t-statistic	17.25059	3,794	0
F-statistic	43.75258	(1, 3794)	0	F-statistic	297.5828	(1, 3794)	0
$\chi^2$	43.75258	1	0	$\chi^2$	297.5828	1	0
Null hypothesis: C(1) = 0				Null hypothesis: C(2) = 0			
Null hypothesis summary:				Null hypothesis Summary:			
Normalized restriction (=0)		Value	Std. err.	Normalized restriction (=0)		Value	Std. err.
C(1)		-0.042217	0.006382	C(2)		0.068341	0.003962
Restrictions are linear in coefficients				Restrictions are linear in coefficients			

Wald test:				Wald test:			
Equation: Untitled				Equation: Untitled			
Test statistic	Value	df	Probability	Test statistic	Value	df	Probability
t-statistic	8.659216	3,794	0	t-statistic	-3.97734	3,794	0.0001
F-statistic	74.98202	(1, 3,794)	0	F-statistic	15.81922	(1, 3,794)	0.0001
$\chi^2$	74.98202	1	0	$\chi^2$	15.81922	1	0.0001
Null Hypothesis: C(3)=0				Null Hypothesis: C(4)=0			
Null Hypothesis Summary:				Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.	Normalized Restriction (= 0)		Value	Std. Err.
C(3)		0.123087	0.014215	C(4)		-0.43651	0.109748
Restrictions are linear in coefficients.				Restrictions are linear in coefficients.			

Wald test:				Wald test:			
Equation: Untitled				Equation: Untitled			
Test statistic	Value	df	Probability	Test statistic	Value	df	Probability
t-statistic	9.3729	3,794	0	t-statistic	48.61505	3,794	0
F-statistic	87.85125	(1, 3,794)	0	F-statistic	2363.423	(1, 3,794)	0
$\chi^2$	87.85125	1	0	$\chi^2$	2363.423	1	0
Null hypothesis: C(5) = 0				Null hypothesis: C(7) = 0			
Null hypothesis summary:				Null hypothesis summary:			
Normalized restriction (= 0)		Value	Std. Err.	Normalized restriction (=0)		Value	Std. err.
C(5)		0.978325	0.104378	C(7)		0.592955	0.012197
Restrictions are linear in coefficients				Restrictions are linear in coefficients			

### C3-1(b) Malaysia: Two-Way Granger Causality test

Pairwise Granger Causality Tests

Sample: 2004 2013

Null Hypothesis:	Obs	Lags: 1		Obs	Lags: 2	
		F-Statistic	Prob.		F-Statistic	Prob.
PROFIT does not Granger Cause LEV LEV does not Granger Cause PROFIT	4275	18.0436 9.16568	2.00E-05 0.0025	3800	21.5858 6.00081	5.00E-10 0.0025
LSIZE does not Granger Cause LEV LEV does not Granger Cause LSIZE	4275	66.3347 1.20556	5.00E-16 0.2723	3800	45.0098 1.72575	5.00E-20 0.1782
TANG_ASSETS does not Granger Cause LEV LEV does not Granger Cause TANG_ASSETS	4275	0.33723 1.09997	0.5615 0.2943	3800	4.72761 0.30249	0.0089 0.739
NDTS does not Granger Cause LEV LEV does not Granger Cause NDTS	4275	6.97713 6.957	0.0083 0.0084	3800	3.48618 8.16604	0.0307 0.0003
INFLATION does not Granger Cause LEV LEV does not Granger Cause INFLATION	4275	31.3329 0.62331	2.00E-08 0.4299	3800	15.4524 2.05365	2.00E-07 0.1284
LSIZE does not Granger Cause PROFIT PROFIT does not Granger Cause LSIZE	4275	14.4145 12.415	0.0001 0.0004	3800	8.63923 10.0694	0.0002 4.00E-05
TANG_ASSETS does not Granger Cause PROFIT PROFIT does not Granger Cause TANG_ASSETS	4275	1.32171 1.28406	0.2504 0.2572	3800	0.89242 2.86768	0.4097 0.057
NDTS does not Granger Cause PROFIT PROFIT does not Granger Cause NDTS	4275	0.23874 2.68975	0.6251 0.1011	3800	1.84681 1.80548	0.1579 0.1645
INFLATION does not Granger Cause PROFIT PROFIT does not Granger Cause INFLATION	4275	0.22569 6.83544	0.6348 0.009	3800	0.14439 3.91445	0.8656 0.02
TANG_ASSETS does not Granger Cause LSIZE LSIZE does not Granger Cause TANG_ASSETS	4275	0.10215 0.39788	0.7493 0.5282	3800	4.53494 3.33014	0.0108 0.0359
NDTS does not Granger Cause LSIZE LSIZE does not Granger Cause NDTS	4275	10.6133 3.66189	0.0011 0.0557	3800	2.80311 6.08366	0.0607 0.0023
INFLATION does not Granger Cause LSIZE LSIZE does not Granger Cause INFLATION	4275	15.0624 8.5252	0.0001 0.0035	3800	17.2933 33.5158	3.00E-08 4.00E-15
NDTS does not Granger Cause TANG_ASSETS TANG_ASSETS does not Granger Cause NDTS	4275	2.39847 30.6201	0.1215 3.00E-08	3800	2.34081 16.18	0.0964 1.00E-07
INFLATION does not Granger Cause TANG_ASSETS TANG_ASSETS does not Granger Cause INFLATION	4275	11.2787 3.33762	0.0008 0.0678	3800	4.43383 66.2142	0.0119 5.00E-29
INFLATION does not Granger Cause NDTS NDTS does not Granger Cause INFLATION	4275	6.8131 0.00325	0.0091 0.9545	3800	4.4703 1.67932	0.0115 0.1866

### C3-2(a) Singapore: Restricted Granger Causality test

Estimation equation:

=====

LEV = C(1)\*PROFIT + C(2)\*LSIZE + C(3)\*TANG\_ASSETS + C(4)\*DTA + C(5)\*INFLATION + C(6) + C(7)\*LEV(-1) + [CX = F]

Wald test:				Wald test:			
Equation: Untitled				Equation: Untitled			
Test statistic	Value	df	Probability	Test statistic	Value	df	Probability
t-statistic	-4.691084	2090	0	t-statistic	8.582714	2,090	0
F-statistic	22.00627	(1, 2,090)	0	F-statistic	73.66299	(1, 2,090)	0
$\chi^2$	22.00627	1	0	$\chi^2$	73.66299	1	0
Null hypothesis: C(1) = 0				Null hypothesis: C(2) = 0			
Null hypothesis summary:				Null hypothesis summary:			
Normalized restriction (= 0)		Value	Std. Err.	Normalized restriction (= 0)		Value	Std. Err.
C(1)		-0.035223	0.007508	C(2)		0.031244	0.00364
Restrictions are linear in coefficients				Restrictions are linear in coefficients			

Wald test:				Wald test:			
Equation: Untitled				Equation: Untitled			
Test Statistic	Value	df	Probability	Test Statistic	Value	df	Probability
t-statistic	4.380327	2,090	0	t-statistic	-4.44189	2,090	0
F-statistic	19.18726	(1, 2,090)	0	F-statistic	19.73042	(1, 2,090)	0
$\chi^2$	19.18726	1	0	$\chi^2$	19.73042	1	0
Null Hypothesis: C(3)=0				Null Hypothesis: C(4)=0			
Null Hypothesis Summary:				Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.	Normalized Restriction (= 0)		Value	Std. Err.
C(3)		0.110474	0.025221	C(4)		-0.54026	0.121628
Restrictions are linear in coefficients.				Restrictions are linear in coefficients.			

Wald test:				Wald test:			
Equation: Untitled				Equation: Untitled			
Test Statistic	Value	df	Probability	Test statistic	Value	df	Probability
t-statistic	0.614997	2,090	0.5386	t-statistic	30.98862	2,090	0
F-statistic	0.378222	(1, 2,090)	0.5386	F-statistic	960.2947	(1, 2,090)	0
$\chi^2$	0.378222	1	0.5386	$\chi^2$	960.2947	1	0
Null hypothesis: C(5) = 0				Null hypothesis: C(7)=0			
Null hypothesis summary:				Null hypothesis summary:			
Normalized restriction (= 0)		Value	Std. Err.	Normalized restriction (= 0)		Value	Std. Err.
C(5)		0.077572	0.126135	C(7)		0.544545	0.017572
Restrictions are linear in coefficients				Restrictions are linear in coefficients			



### C3-2(b)Singapore: Two-Way Granger Causality test

Pairwise Granger Causality Tests  
Sample: 2004 2013

Null Hypothesis:	Lags: 1			Lags: 2		
	Obs	F-Statistic	Prob.	Obs	F-Statistic	Prob.
PROFIT does not Granger Cause LEV	2358	0.10188	0.7496	2096	0.04788	0.9532
LEV does not Granger Cause PROFIT		5.59764	0.0181		3.16073	0.0426
LSIZE does not Granger Cause LEV	2358	37.204	1.00E-09	2096	25.0682	2.00E-11
LEV does not Granger Cause LSIZE		18.7377	2.00E-05		9.5951	7.00E-05
TANG_ASSETS does not Granger Cause LEV	2358	0.30336	0.5818	2096	2.25909	0.1047
LEV does not Granger Cause TANG_ASSETS		0.89096	0.3453		5.33485	0.0049
NDTS does not Granger Cause LEV	2358	15.1821	0.0001	2096	9.50156	8.00E-05
LEV does not Granger Cause NDTS		0.01455	0.904		0.72896	0.4825
INFLATION does not Granger Cause LEV	2358	4.425	0.0355	2096	6.73045	0.0012
LEV does not Granger Cause INFLATION		30.1292	4.00E-08		10.8797	2.00E-05
LSIZE does not Granger Cause PROFIT	2358	25.8849	4.00E-07	2096	21.3782	6.00E-10
PROFIT does not Granger Cause LSIZE		55.5636	1.00E-13		42.9599	5.00E-19
TANG_ASSETS does not Granger Cause PROFIT	2358	11.3506	0.0008	2096	80.4381	2.00E-34
PROFIT does not Granger Cause TANG_ASSETS		16.7668	4.00E-05		9.49317	8.00E-05
NDTS does not Granger Cause PROFIT	2358	19.0449	1.00E-05	2096	27.9567	1.00E-12
PROFIT does not Granger Cause NDTS		33.5505	8.00E-09		20.8584	1.00E-09
INFLATION does not Granger Cause PROFIT	2358	3.66913	0.0556	2096	1.75778	0.1727
PROFIT does not Granger Cause INFLATION		6.24097	0.0126		4.30719	0.0136
TANG_ASSETS does not Granger Cause LSIZE	2358	0.10277	0.7486	2096	6.7943	0.0011
LSIZE does not Granger Cause TANG_ASSETS		0.38858	0.5331		2.0685	0.1266
NDTS does not Granger Cause LSIZE	2358	7.12438	0.0077	2096	9.18163	0.0001
LSIZE does not Granger Cause NDTS		0.13076	0.7177		0.82661	0.4377
INFLATION does not Granger Cause LSIZE	2358	27.6241	2.00E-07	2096	23.127	1.00E-10
LSIZE does not Granger Cause INFLATION		28.2787	1.00E-07		8.45841	0.0002
NDTS does not Granger Cause TANG_ASSETS	2358	0.06262	0.8024	2096	2.74736	0.0643
TANG_ASSETS does not Granger Cause NDTS		20.2772	7.00E-06		33.476	5.00E-15
INFLATION does not Granger Cause TANG_ASSETS	2358	9.71824	0.0018	2096	6.93883	0.001
TANG_ASSETS does not Granger Cause INFLATION		21.1571	4.00E-06		7.79676	0.0004
INFLATION does not Granger Cause NDTS	2358	1.67304	0.196	2096	0.89639	0.4082
NDTS does not Granger Cause INFLATION		3.04148	0.0813		3.56273	0.0285

### C3-3(a) Thailand: Restricted Granger Causality test

Pairwise Granger Causality Tests

Sample: 2004 2013

Null Hypothesis:	Obs	Lags: 1		Obs	Lags: 2	
		F-Statistic	Prob.		F-Statistic	Prob.
PROFIT does not Granger Cause LEV	2520	0.82165	0.3648	2240	0.50143	0.6057
LEV does not Granger Cause PROFIT		0.01428	0.9049		0.18356	0.8323
LSIZE does not Granger Cause LEV	2520	22.9671	2.00E-06	2240	14.5297	5.00E-07
LEV does not Granger Cause LSIZE		19.2774	1.00E-05		19.9176	3.00E-09
TANG_ASSETS does not Granger Cause LEV	2520	0.91707	0.3383	2240	2.65417	0.0706
LEV does not Granger Cause TANG_ASSETS		1.07645	0.2996		0.68776	0.5028
NDTS does not Granger Cause LEV	2520	2.33139	0.1269	2240	2.48607	0.0835
LEV does not Granger Cause NDTS		6.03961	0.0141		10.4069	3.00E-05
INFLATION does not Granger Cause LEV	2520	4.15143	0.0417	2240	6.1482	0.0022
LEV does not Granger Cause INFLATION		0.22116	0.6382		0.5779	0.5612
LSIZE does not Granger Cause PROFIT	2520	1.75616	0.1852	2240	0.74468	0.475
PROFIT does not Granger Cause LSIZE		0.20571	0.6502		1.64295	0.1936
TANG_ASSETS does not Granger Cause PROFIT	2520	1.37723	0.2407	2240	2.96064	0.052
PROFIT does not Granger Cause TANG_ASSETS		1.85983	0.1728		0.35666	0.7001
NDTS does not Granger Cause PROFIT	2520	6.30207	0.0121	2240	3.46337	0.0315
PROFIT does not Granger Cause NDTS		148.23	4.00E-33		57.5174	4.00E-25
INFLATION does not Granger Cause PROFIT	2520	0.79924	0.3714	2240	0.34309	0.7096
PROFIT does not Granger Cause INFLATION		0.15396	0.6948		0.35049	0.7044
TANG_ASSETS does not Granger Cause LSIZE	2520	0.05729	0.8109	2240	15.7547	2.00E-07
LSIZE does not Granger Cause TANG_ASSETS		1.31392	0.2518		1.47875	0.2281
NDTS does not Granger Cause LSIZE	2520	7.79052	0.0053	2240	5.56344	0.0039
LSIZE does not Granger Cause NDTS		0.56148	0.4537		1.08115	0.3394
INFLATION does not Granger Cause LSIZE	2520	39.2809	4.00E-10	2240	12.8345	3.00E-06
LSIZE does not Granger Cause INFLATION		13.2656	0.0003		18.3455	1.00E-08
NDTS does not Granger Cause TANG_ASSETS	2520	0.0656	0.7979	2240	0.07536	0.9274
TANG_ASSETS does not Granger Cause NDTS		33.6843	7.00E-09		11.4538	1.00E-05
INFLATION does not Granger Cause TANG_ASSETS	2520	4.05735	0.0441	2240	5.21365	0.0055
TANG_ASSETS does not Granger Cause INFLATION		0.8081	0.3688		0.72255	0.4856
INFLATION does not Granger Cause NDTS	2520	1.62008	0.2032	2240	3.77526	0.0231
NDTS does not Granger Cause INFLATION		2.13764	0.1438		0.68862	0.5024

Estimation equation:

=====

$$\text{LEV} = C(1) \cdot \text{PROFIT} + C(2) \cdot \text{LSIZE} + C(3) \cdot \text{TANG\_ASSETS} + C(4) \cdot \text{DTA} + C(5) \cdot \text{INFLATION} + C(6) + C(7) \cdot \text{LEV}(-1) + [\text{CX} = \text{F}]$$

Wald test:				Wald test:			
Equation: Untitled				Equation: Untitled			
Test statistic	Value	df	Probability	Test statistic	Value	df	Probability
t-statistic	-1.050474	2,234	0.2936	t-statistic	5.953155	2,234	0
F-statistic	1.103496	(1, 2,234)	0.2936	F-statistic	35.44006	(1, 2,234)	0
$\chi^2$	1.103496	1	0.2935	$\chi^2$	35.44006	1	0
Null hypothesis: C(1)=0				Null hypothesis: C(2)=0			
Null hypothesis summary:				Null hypothesis summary:			
Normalized restriction (= 0)		Value	Std. Err.	Normalized restriction (= 0)		Value	Std. Err.
C(1)		-0.005344	0.005087	C(2)		0.028486	0.004785
Restrictions are linear in coefficients				Restrictions are linear in coefficients			

Wald test:				Wald test:			
Equation: Untitled				Equation: Untitled			
Test statistic	Value	df	Probability	Test statistic	Value	df	Probability
t-statistic	1.994464	2,234	0.0462	t-statistic	-2.33844	2,234	0.0195
F-statistic	3.977889	(1, 2,234)	0.0462	F-statistic	5.468285	(1, 2,234)	0.0195
$\chi^2$	3.977889	1	0.0461	$\chi^2$	5.468285	1	0.0194
Null hypothesis: C(3)=0				Null Hypothesis: C(4)=0			
Null hypothesis summary:				Null hypothesis summary:			
Normalized restriction (= 0)		Value	Std. Err.	Normalized restriction (= 0)		Value	Std. Err.
C(3)		0.048125	0.024129	C(4)		-0.25181	0.107682
Restrictions are linear in coefficients				Restrictions are linear in coefficients			

Wald test:				Wald test:			
Equation: Untitled				Equation: Untitled			
Test Statistic	Value	df	Probability	Test Statistic	Value	df	Probability
t-statistic	4.893834	2,234	0	t-statistic	32.52896	2,234	0
F-statistic	23.94961	(1, 2,234)	0	F-statistic	1058.133	(1, 2,234)	0
$\chi^2$	23.94961	1	0	$\chi^2$	1058.133	1	0
Null hypothesis: C(5)=0				Null hypothesis: C(7)=0			
Null hypothesis summary:				Null hypothesis summary:			
Normalized restriction (= 0)		Value	Std. Err.	Normalized restriction (= 0)		Value	Std. Err.
C(5)		0.596075	0.121801	C(7)		0.558428	0.017167
Restrictions are linear in coefficients				Restrictions are linear in coefficients			

### C3-3(b) Thailand: Two-Way Granger Causality test

Pairwise Granger Causality Tests

Sample: 2004 2013

Null Hypothesis:	Lags: 1			Lags: 2		
	Obs	F-Statistic	Prob.	Obs	F-Statistic	Prob.
PROFIT does not Granger Cause LEV	2358	0.10188	0.7496	2096	0.04788	0.9532
LEV does not Granger Cause PROFIT		5.59764	0.0181		3.16073	0.0426
LSIZE does not Granger Cause LEV	2358	37.204	1.00E-09	2096	25.0682	2.00E-11
LEV does not Granger Cause LSIZE		18.7377	2.00E-05		9.5951	7.00E-05
TANG_ASSETS does not Granger Cause LEV	2358	0.30336	0.5818	2096	2.25909	0.1047
LEV does not Granger Cause TANG_ASSETS		0.89096	0.3453		5.33485	0.0049
NDTS does not Granger Cause LEV	2358	15.1821	0.0001	2096	9.50156	8.00E-05
LEV does not Granger Cause NDTS		0.01455	0.904		0.72896	0.4825
INFLATION does not Granger Cause LEV	2358	4.425	0.0355	2096	6.73045	0.0012
LEV does not Granger Cause INFLATION		30.1292	4.00E-08		10.8797	2.00E-05
LSIZE does not Granger Cause PROFIT	2358	25.8849	4.00E-07	2096	21.3782	6.00E-10
PROFIT does not Granger Cause LSIZE		55.5636	1.00E-13		42.9599	5.00E-19
TANG_ASSETS does not Granger Cause PROFIT	2358	11.3506	0.0008	2096	80.4381	2.00E-34
PROFIT does not Granger Cause TANG_ASSETS		16.7668	4.00E-05		9.49317	8.00E-05
NDTS does not Granger Cause PROFIT	2358	19.0449	1.00E-05	2096	27.9567	1.00E-12
PROFIT does not Granger Cause NDTS		33.5505	8.00E-09		20.8584	1.00E-09
INFLATION does not Granger Cause PROFIT	2358	3.66913	0.0556	2096	1.75778	0.1727
PROFIT does not Granger Cause INFLATION		6.24097	0.0126		4.30719	0.0136
TANG_ASSETS does not Granger Cause LSIZE	2358	0.10277	0.7486	2096	6.7943	0.0011
LSIZE does not Granger Cause TANG_ASSETS		0.38858	0.5331		2.0685	0.1266
NDTS does not Granger Cause LSIZE	2358	7.12438	0.0077	2096	9.18163	0.0001
LSIZE does not Granger Cause NDTS		0.13076	0.7177		0.82661	0.4377
INFLATION does not Granger Cause LSIZE	2358	27.6241	2.00E-07	2096	23.127	1.00E-10
LSIZE does not Granger Cause INFLATION		28.2787	1.00E-07		8.45841	0.0002
NDTS does not Granger Cause TANG_ASSETS	2358	0.06262	0.8024	2096	2.74736	0.0643
TANG_ASSETS does not Granger Cause NDTS		20.2772	7.00E-06		33.476	5.00E-15
INFLATION does not Granger Cause TANG_ASSETS	2358	9.71824	0.0018	2096	6.93883	0.001
TANG_ASSETS does not Granger Cause INFLATION		21.1571	4.00E-06		7.79676	0.0004
INFLATION does not Granger Cause NDTS	2358	1.67304	0.196	2096	0.89639	0.4082
NDTS does not Granger Cause INFLATION		3.04148	0.0813		3.56273	0.0285

## Appendix D.

### Fixed effect regression results

#### Malaysia

<b>Dependent variable: LEV</b>				
<b>Method: Panel least squares</b>				
<b>Sample (adjusted): 2005 2013</b>				
<b>Periods included: 9</b>				
Cross-sections included: 475				
Total panel (balanced) observations: 4,275				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. error</b>	<b>t-statistic</b>	<b>Prob.</b>
PROFIT	−0.042217	6.38E-03	−6.614573	0
LSIZE	0.068341	0.003962	17.25059	0
TANG_ASSETS	0.123087	0.014215	8.659216	0
DTA	−0.436505	0.109748	−3.977339	0.0001
INFL	0.978325	0.104378	9.3729	0
C	−0.687631	0.046567	−14.76656	0
LEV(−1)	0.592955	0.012197	48.61505	0
Effects Specification				
Cross-section fixed (dummy variables)				
$R^2$	0.878252	Mean dependent var		0.402234
Adjusted $R^2$	0.862849	S.D. dependent var		0.242221
S.E. of regression	0.089704	Akaike info criterion		−1.87895
Sum squared resid	30.52931	Schwarz criterion		−1.16329
Log likelihood	4497.247	Hannan–Quinn criter.		−1.62612
F-statistic	57.01841	Durbin–Watson stat		1.847992
Prob(F-statistic)	0			

#### Singapore

<b>Dependent Variable: LEV</b>				
<b>Method: Panel least squares</b>				
<b>Sample (adjusted): 2005 2013</b>				
<b>Periods included: 9</b>				
Cross-sections included: 262				
Total panel (balanced) observations: 2358				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. error</b>	<b>t-statistic</b>	<b>Prob.</b>
PROFIT	−0.035223	7.51E-03	−4.691084	0
LSIZE	0.031244	0.00364	8.582714	0
TANG_ASSETS	0.110474	0.025221	4.380327	0
DTA	−0.540258	0.121628	−4.441894	0
INFLATION	0.077572	0.126135	0.614997	0.5386
C	−0.190043	0.043692	−4.349604	0
LEV(−1)	0.544545	0.017572	30.98862	0

<b>Dependent Variable: LEV</b>			
<b>Method: Panel least squares</b>			
<b>Sample (adjusted): 2005 2013</b>			
<b>Periods included: 9</b>			
Effects specification			
Cross-section fixed (dummy variables)			
$R^2$	0.831004	Mean dependent var	0.445349
Adjusted $R^2$	0.809415	S.D. dependent var	0.267425
S.E. of regression	0.116747	Akaike info criterion	-1.35095
Sum squared resid	28.48649	Schwarz criterion	-0.69566
Log likelihood	1860.771	Hannan-Quinn criter.	-1.11234
F-statistic	38.49129	Durbin-Watson stat	2.055227
Prob(F-statistic)	0		

#### Thailand

<b>Dependent Variable: LEV</b>				
<b>Method: Panel least squares</b>				
<b>Sample (adjusted): 2005 2013</b>				
<b>Periods included: 9</b>				
Cross-sections included: 280				
Total panel (balanced) observations: 2,520				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. error</b>	<b>t-statistic</b>	<b>Prob.</b>
PROFIT	-5.34E-03	5.09E-03	-1.050474	0.2936
LSIZE	0.028486	0.004785	5.953155	0
TANG_ASSETS	0.048125	0.024129	1.994464	0.0462
DTA	-0.251807	0.107682	-2.338436	0.0195
INFLATION	0.596075	0.121801	4.893834	0
C	-0.101785	0.057027	-1.784848	0.0744
LEV(-1)	0.558428	0.017167	32.52896	0
Effects Specification				
Cross-section fixed (dummy variables)				
$R^2$	0.860198	Mean dependent var		0.56412
Adjusted $R^2$	0.842363	S.D. dependent var		0.268922
S.E. of regression	0.106771	Akaike info criterion		-1.52973
Sum squared resid	25.46792	Schwarz criterion		-0.86785
Log likelihood	2213.464	Hannan-Quinn criter.		-1.28953
F-statistic	48.2308	Durbin-Watson stat		1.860162
Prob(F-statistic)	0			





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