Capital Structure Determinants for Local Commercial Banks: Thailand Evidence

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Abstract

This study explores significant determinants of bank capital structure, and how they help to explain these structures. A fixed-effects regression model was applied to analyze Thai local banks during the period from 2004-2014. Two measurements of bank leverage were used, namely book value leverage ratio and risk-weighted book value leverage ratio. Firm-level determinants were bank profitability, risk, growth, and liquid assets with GDP growth rate, inflation rate, unemployment rate, and public debt as country-level determinants.

Empirical results indicated that both firm-level and country-level determinants had statistically significant relationships with the book value leverage ratio, except for the unemployment rate. However, when we examined the influence of these determinants on the risk-weighted book value leverage ratio, only growth, liquid assets, unemployment rate, and public debt showed a statistically significant relationship. These empirical findings may assist bank managers in implementing relevant policies to ensure soundness and stability in the Thai banking sector.

Keywords: *Capital structure, leverage, banks, Thailand, fixed-effects regression model*

Introduction

Background of the Study

The 2008 Global Financial Crisis (GFC) drew attention to the stability of banks and, in particular, to how banks finance their balance sheets. In fact, the capital structure of banks should be reformed to better address dynamic changes in the financial industry, and to prevent another bank meltdown during any future world economic crisis (Mishkin, 1999). The banking industry is an important sector in supporting the economic growth of all nations. Banks act as financial intermediaries, facilitating flows of capital between businesses and depositors. Since they provide capital resources, adequate capital requirements for banks maximize investment opportunities in capital markets and support national financial stability (Ding, Wu, & Chang, 2013). In contrast, the failure of banks to maintain adequate capital may cause depositors and creditors to withdraw their funds, resulting in a domino effect which could lead to another financial crisis (Greenbaum, Thakor, & Boot, 2016).

Earlier research by Gropp and Heider (2010) found similarities in the determinants of capital structures of financial and non-financial firms. Many recent empirical studies have suggested that, alongside firm-level determinants, national market factors might also influence the capital structure of a firm (Baltaci & Ayaydin, 2014; Booth, Aivazian, Demirguc-Kunt, & Maksimovic, 2001; Butt, Khan, & Nafees, 2013; De Jong, Kabir, & Nguyen, 2008; Gropp & Heider, 2010; Rajan & Zingales, 1995). The findings from previous researches concerned the significance of market factors on bank capital structures, and leverage ratios also differ from country to country. Berlin (2011) stated that banks are typically highly leveraged firms compared with most non-financial firms, and that market factors have been an important determinant of bank capital decisions since the early 1990s. Thus, mixed conclusions were drawn from previous research investigations, making further study necessary.

The Research Problem

Most previous studies have examined firms in the United States or European Union with few notable exceptions. Several recent studies on the determinants of bank capital structures from other countries, including Jordan, Pakistan, and Turkey, have shown that market factors of a single country may significantly affect banks' capital structure decisions (Al-Shubiri, 2011; Baltaci & Ayaydin, 2014; Butt et al., 2013). There have been few studies of the banking sectors in the emerging countries of the Association of Southeast Asian Nations (ASEAN), despite the fact that local banks in these nations play

a dominant role in providing financial resources. Therefore, this research aims to explore the determinants of capital structure of local commercial banks in Thailand from 2004 to 2014 inclusive.

This study is important for two reasons. First, Thailand is ranked among the top five best emerging markets in 2014 (Bloomberg, 2014). Despite its importance in the world economy, there have been limited studies of Thai firms, especially in its financial sector. Within the Thai financial sector, local banks play a dominant role, holding more than 80 percent of total industrial assets in Thailand. Second, in regards to theories of capital structure, most previous studies observed non-financial firms in Thailand. For instance, Udomsirikul, Jumreornvong, and Jiraporn (2011) investigated the impact of the liquidity of Thai firms' equity on their capital structures. Tongkong (2012) investigated important factors influencing capital structure decisions in Thai real estate companies listed on Stock Exchange of Thailand (SET). Thippayana (2014) studied the determinants of firm capital structure based on 144 listed firms in the SET.

This study attempts to fill in the research gap by providing key market factors at the firm-specific level that influence the capital structure of local banks by way of extension to cover all Thai commercial banks in Thailand. Allen, Napaporn, and Robert (2013) conducted a research study regarding the determinants of capital structure for Thai banks. However, they focused on internal bank variables, and found that non-performing loans and risk-weighted assets had a significant relationship to banks' leverage ratios. This research study, on the other hand, investigated both bank determinants and macroeconomic factors influencing the capital structures of local banks in Thailand. The findings from this study should provide theoretical and practical guidance in this under-studied region, and provide a starting-point for further studies.

The next section reviews related literature, including works on the theory of capital structures, background literature on the banking sector in Thailand, and previous studies of capital structure determinants. This is followed by the research methodology and data, details and a discussion of the research findings, and a conclusion.

Literature Review

Capital Structure Theories

A firm must raise capital needed to expand its business activities. Capital structure is the mixture of debt and equity that results from firm's financial decisions to raise capital. Four theories relate to capital structure are briefly summarized as follows:

Modigliani-Miller (MM) Theorem

Modigliani and Miller (1958) started the modern theory of capital structure, which assumes a perfect market, where insiders and outsiders have symmetric information; no transaction costs, bankruptcy costs or taxation distortions; equity and debt choices became irrelevant, and internal and external capital can be substituted. Later the revised MM model (Modigliani & Miller, 1963) suggested that the optimal structure occurred because of the tax-shield benefit of using debt financing over equity. Fama and French (1998) studied the tax model of the MM theorem and concluded that companies that are more profitable tend to use more debt rather than equity. The MM theorem has given rise to many more modern theories of capital structure.

Pecking Order Theory

The pecking order theory, which was developed by Myers and Majluf (1984) and Myers (1984), is also referred to as information asymmetry theory. The pecking order theory states that a firm follows a hierarchy of financing choices ranging from internal to external sources. The theory relies on the assumption that adverse selection costs result from issuing risky securities incurred because of either asymmetric information, managerial optimism, or both. To minimize adverse selection costs, firms prefer internal over external sources of funds. If the firms need external funds, their first preference is to issue debt, and then as a less-favored option, to issue hybrid securities such as subordinated debt, and then – as a last resource – to issue equity.

Static Trade-off Theory

The static trade-off theory was initially proposed by Modigliani and Miller (1958) based on tax-shelter benefits, bankruptcy costs, and agency costs, where there is no offsetting cost of debt; thus, firms can solely use debt financing in their capital structures. Later, Kraus and Litzenberger (1973) proposed an optimal capital structure involving a trade-off between the costs and benefits of debt financing. In the trade-off model, debt financing has one important advantage over equity; the interests provide tax-shelter benefit while equity income is subject to corporate tax. However, debt increases financial risks so that debt financing is not cheaper than equity financing. In static trade-off theory, managers must balance the costs and benefits of borrowings, and maintain an appropriate debt level to maximize the firm value.

Agency Costs Based Theory

Agency costs refer to costs associated with resolving conflicts among managers, bondholders, and shareholders. The agency costs based theory states that a firm's capital structure is determined by agency costs, which includes the costs of debt and equity issuings. Jensen and Meckling (1976) claimed that more debt issue could lead to conflict between shareholders (through managers) and bondholders, since managers may invest in high-risk projects that yield high returns to shareholders, but increase the cost of failure to bondholders, because of shareholders' limited liability. More equity issues, on the other hand, could lead to conflict between shareholders and management due to high levels of free cash flow. Managers may select short-term projects rather than profitable long-term projects due to results that may come early and enhance their reputation quickly. Managers may prefer less risky investments and lower debt levels to reduce the chance of bankruptcy, and this may diverge from shareholders' interest in maximizing the firm's value (Jensen & Meckling, 1976).

The Banking Sector in Thailand

As a member of the Bank of International Settlements (BIS), the Bank of Thailand (BOT) has adopted the Basel Accords implemented since 1993, known as Basel I, II, and III. It is required that all Thai commercial banks and foreign banks operating in the Kingdom comply with the capital requirements of Basel I, II, and, most recently, III. Under Basel III, all Thai commercial banks must maintain a minimum common equity ratio of 4.50 percent, a Tier 1 ratio of 6.0 percent, and a minimum risk-based capital ratio of 8.50 percent (Bank of Thailand, 2012). The risk-based capital ratio remains unchanged from Basel II.

The BOT, Thailand's central bank, is responsible for supporting the economic and financial system through monetary policy implementation. One of the responsibilities of the BOT is to supervise financial institutions, including Thai commercial banks, retail banks, foreign bank subsidiaries and branches, finance companies, credit foncier companies, asset management companies, credit card companies, and personal loan companies (Bank of Thailand, 2016a). Commercial banks, or universal banks, serve as intermediaries allocating funds from depositors and providing loans to the household and business sectors. Commercial banking businesses registered in Thailand may fall into one of several categories: commercial banks (universal banks), retail banks, foreign commercial bank subsidiaries and foreign commercial bank branches (Bank of Thailand, 2016a). In 2016, there were a total of 30 commercial bank businesses: 14 Thai commercial banks (universal banks), one retail bank, four foreign subsidiaries, and 11 foreign commercial bank branches (Bank of Thailand, 2016b). This study focused only on the 14 Thai commercial banks that are licensed to undertake commercial or universal banking business. These 14 local banks represent 46.67 percent of all commercial banks in Thailand, but hold 80 percent of the total assets of all banks operating in Thailand, and thus represent a significant sample of these banks.

Previous Research on Capital Determinants

In this section, we investigate the empirical literature that has studied the standard determinants of capital structure for both financial and non-financial firms. We begin with leverage ratio, and then proceed to firm-level determinants and country/macroeconomic determinants.

There are several different measurements of leverage in capital structures (Rajan & Zingales, 1995; Titman & Wessels, 1988). For non-financial firms, the most common leverage ratio is total debt to total assets. Myers and Majluf (1984) found that the duration of debt used in leverage ratios (short-term debt to total assets, and long-term debt to total assets) are proxies for better methods to measure leverage. However, with respect to bank capital structures, the standard view of capital requirements is that banks must also hold capital buffers above the regulatory minimum in order to avoid the costs of issuing new equity at short notice. According to this view, the costs of issuing equity are caused by the existence of asymmetric information (Myers & Majluf, 1984). For this reason, bank capital structures may differ from the Modigliani-Miller theory.

Furthermore, empirical studies from developing countries have adopted only a book-value-based leverage ratio, using the book value of equity (Al-Shubiri, 2011; Amidu, 2007; Baltaci & Ayaydin, 2014; Butt et al., 2013; Ukaegbu & Oino, 2014). A market-value-based leverage ratio using the market value of equity has been employed as an additional dependent variable in some empirical studies in developed countries (Gropp & Heider, 2010; Pandey, 2001; Sangeetha & Sivathaasan, 2013; Teixeira, Silva, Fernandes, & Alves, 2014). Since Thailand is categorized as a developing country, we employ a leverage ratio based on the book value of equity. In addition, we follow the studies of Baltaci and Ayaydin (2014), Brewer, Kaufman, and Wall (2008), and Teixeira et al. (2014) by using two leverage measurements: LEV1 and LEV2. In this study, LEV1 is defined as the book value leverage ratio, while LEV2 is defined as the risk-weighted book value leverage ratio (see Table I). The difference between the two ratios is that LEV1 uses the book value of assets, whereas LEV2 uses the risk-weighted book value of assets based on Basel standards. In the case of Thai banks, the Bank of Thailand has adopted the Basel Accords, which requires commercial banks to hold the regulatory minimum risk-based, or "capital adequacy" ratio at 8.50 percent.

According to the buffer view of capital requirements and after a lesson learned during the Asian financial crisis in 1997, Thai commercial banks tend to hold capital buffers above the regulatory minimum in order to play safe if they are affected by an unexpected economic downturn or crisis. Without a good buffer, it would be difficult for banks to raise capital during economic turbulence. Therefore, maintaining the risk-based capital is important for all commercial banks.

This study includes both debt and non-debt liabilities (of which the major portion is deposits) in accordance with the corporate finance literature, which does not distinguish between debt and non-debt liabilities (Gropp & Heider, 2010). Therefore, leverage ratios in this study are calculated with reference to both debt and non-debt liabilities, which is a better measurement for bank leverage. Among the firm-level determinants of capital structure, this study discusses profitability, firm risk (business/operational risk), firm growth, and liquid assets.

Profitability of firms is one of the significant firm-level determinants of capital structure for both non-financial and financial firms. Following the trade-off theory, Frank and Goyal (2009), Kayo and Kimura (2011), Sangeetha and Sivathaasan (2013), and Ukaegbu and Oino (2014) found a positive relationship between firm profitability and leverage. That is, under the trade-off theory, firms with higher profit are more likely to use debt than other sources of funding in order to benefit from tax shelters and reduce the expected cost of financial distress. On the contrary, many research findings have identified a negative relationship between firm profitability and leverage, a finding that is in accordance with the pecking order theory (Baltaci & Ayaydin, 2014; Booth et al., 2001; Gropp & Heider, 2010; Pandey, 2001; Rajan & Zingales, 1995; Teixeira et al., 2014; Titman & Wessels, 1988). Firms in these studies preferred to use their own, internal sources of financing before using external sources. Because these firms with high profitability use internal funding first, they are less leveraged.

Based on the trade-off theory, all else being equal, firms with higher business or operational risk tend to incur less debt (Myers, 1984). Previous studies by Aktas, Acikalin, Bakin, and Celik (2015),

Amidu (2007), Al-Shubiri (2011), Brewer et al. (2008), Pandey (2001), and Ukaegbu and Oino (2014) agreed that higher business or firm risk has a significant negative relationship with bank leverage. In essence, financial firms tend to use less debt when they encounter a higher-than-expected cost of financial distress or earnings volatility. A study in the Thai context of non-financial firms found no significant relationship between business risk and leverage ratios (Thippayana, 2014). There have been no related studies of financial firms in Thailand. Therefore, they are studied in this research.

The empirical findings for corporate finance follow the trade-off theory because growth increases the cost of financial distress, reduces free cash flows problems, and might raise debt-related agency problems, causing firms to keep debt at low levels (Frank & Goyal, 2009). The trade-off theory holds that there is an inverse relationship between firm growth and leverage, and some previous studies have confirmed this, including Deesomsak, Paudyal, and Pesscetto (2004), Frank and Goyal (2009), and Gropp and Heider (2010). However, most previous studies seem to follow the pecking order theory: firms with high growth, beside an internal equity, prefer external financing, resulting in relatively higher debt levels. Most studies have found a positive correlation between firm growth and leverage (Al-Shubiri, 2011; Amidu, 2007; Hall, Hutchinson, & Michaelas, 2004; Pandey, 2001; Tongkong, 2012; Ukaegbu & Oino, 2014).

Firms' liquid assets are one of the most significant determinants of capital structure. According to the trade-off theory, a company with high liquid assets tends to experience lower financial distress, and therefore to be more leveraged. Empirical research following the trade-off theory includes Al-Shubiri (2011), Gropp and Heider (2010), Teixeira et al. (2014), and Ukaegbu and Oino (2014). On the contrary, some studies followed the pecking order theory, concluding that firms with high liquid assets tend to encounter higher information costs and higher financial distress, and therefore prefer a lower ratio of debt to equity (Aktas et al., 2015; Amidu, 2007; Baltaci & Ayaydin, 2014; Butt et al., 2013).

Country/macroeconomic determinants might also affect a firm's ability to raise capital, especially during financial crises. Previous research has suggested that, along with firm-level determinants, country/macroeconomic determinants might also influence the capital structure of a firm. However, the results have been mixed and inconclusive. Thus, further studies remain necessary. In this study, we chose the GDP growth rate, the inflation rate, the unemployment rate, and public debt as variables capturing overall macroeconomic conditions of the country.

The GDP growth rate indicates growth opportunities present in the overall economy (Joeveer, 2013), especially for the banking sector. In countries with higher economic growth, firms usually require greater debt to make new investments (De Jong et al., 2008). Following the pecking order theory, firms with higher growth opportunities need more capital. Therefore, there will be a greater demand for capital when firms seize on higher growth opportunities, making external funding through debt financing preferred (Teixeira et al., 2014), Rajan and Zingales (1995), Booth et al. (2001), De Jong et al. (2008), Frank and Goyal (2009), and Baltaci and Ayaydin (2014) all found a positive correlation between GDP growth and leveraged financing. However, according to the trade-off theory, firms with high growth opportunities are more likely to face agency problems (Modigliani & Miller, 1958; Myers, 1984), and may also suffer from financial distress, making them tend to use more equity financing. Previous empirical findings, such as Titman and Wessels (1988), Rajan and Zingales (1995), Kayo and Kimura (2011), and Joeveer (2013), confirmed, in accordance with the trade-off theory, that there is a negative relationship between GDP growth rate and leverage.

Inflation is a macroeconomic indicator that reflects the stability of a country. Given a decrease in the real value of debt and an increase in the real tax advantage of debt to firms under an inflationary environment, a firm has an incentive to issue more debt, resulting in higher leverage. This positive effect of inflation on leverage has been found by, for instance, Frank and Goyal (2009) and Lemma and Negash (2013). This is consistent with the trade-off theory. It has also been argued that inflation increases the cost of obtaining external sources of funding and bankruptcy costs, causing firms to reduce debt. Therefore, inflation has a negative correlation with leverage as found by Booth et al. (2001), Frank and Goyal (2009), Joeveer (2013) and Tongkong (2012).

The unemployment rate and public debt are additional macroeconomic factors identified in the literature (e.g. Camara, 2012; Dincergok & Yalciner, 2011; Mokhova & Zinecker, 2014) that deserve further consideration. These factors reflect the state of the economy and have an impact on firms' capital structures. However, findings regarding the influence of these factors on capital structures are mixed. For instance, Mokhova and Zinecker (2014) studied the influence of macroeconomic factors, including central government debt to GDP and unemployment rate on corporate capital structure, in different European countries. They found that firms' financial decisions are different depending on the macroeconomic conditions and countries' specifics, representing the significance of a country's level of development.

Table 1 provides a summary of variables, abbreviations, and proxies.

Table 1. Summary of Variables, Abbreviations, and Proxies

Variables and Abbreviations	Proxies
Book capital ratio	Book value of equity to book value of assets
Capital adequacy ratio	Book value of equity to risk-weighted book value of assets
Book value leverage (LEV1)	1 - (book value capital ratio)
Risk-weighted book value leverage (LEV2)	1 - (capital adequacy ratio)
Profitability (PRO)	Net profit to total assets
Firm risk (RISK)	Risk-weighted assets to total assets
Firm growth (GROW)	Growth in total assets
Liquid assets (LIQASSET)	Liquid assets to total assets
GDP growth rate (GDP)	Thailand's GDP growth rate
Inflation rate (INF)	Thailand's inflation rate
Unemployment rate (UR)	Thailand's unemployment rate
Public debt (PDEBT)	Thailand's public debt to GDP
U_i	Unobserved fixed-effects
E_{it}	Error term of regression equation

Methodology

Our study follows the existing literature as to the selection of firm-specific factors determining leverage (Al-Shubiri, 2011; Baltaci & Ayaydin, 2014; Deesomsak et al., 2004; Frank & Goyal, 2009; Gropp & Heider, 2010; Pandey, 2001; Sangeetha & Sivathaasan, 2013; Teixeira et al., 2014; Tongkong, 2012; Ukaegbu & Oino, 2014). In addition, we also incorporate country-specific, macroeconomic variables in the regression. It is important to control for these factors since banks may be highly exposed to them (Baltaci & Ayaydin, 2014; Booth et al., 2001; Frank & Goyal, 2009; Joeveer, 2013).

This research study observed the Thai banking industry, which is comprised of 14 Thai commercial banks (universal banks), one retail bank, four foreign subsidiaries, and 11 foreign bank branches. Our sample consisted of 14 local banks that constitute all of the Thai commercial banks operating during the period from 2004 to 2014 inclusive. These 14 observed banks represent 46.67 percent of all 30 banks, or about 80 percent of total assets of all banks operating in Thailand. All 14 banks are publicly traded; quarterly financial data were collected from the Bank of Thailand, the Thomson Reuters database, and the banks' websites. Our final dataset consists of 508 quarterly observations. Because some banks began operating sometime during the 2004-2014 period, we do not have complete data for these banks during the sample period. As for macroeconomic country data, we collected data for the GDP growth rate from the Office of the National Economic and Social Development Board's (NESDB) website, the inflation rate from the Bureau of Trade and Economic Indices' website, the unemployment rate from National Statistical Official of Thailand, and public debt to GDP from the Public Debt Management Office's website.

The descriptive statistics for all the variables are presented in Table 2. As noted above, the sample consists of all 14 Thai commercial banks during the period from 2004 to 2014 inclusive, and includes 508 observations. The mean of LEV1 is 0.901, while the mean of LEV2 is 0.849. The mean for profitability (PRO), as measured by return on assets, is 1.1 percent. The minimum and maximum profitability shows a high variation in percentage terms. Firm risk (RISK) is measured by comparing risk-weighted assets to total assets; its mean is 73.7 percent. Firm growth (GROW) shows a mean value of 1.9 percent. This variable exhibits a very high level of variation, as reflected in the high standard deviation compared to mean value, and the wide range between the minimum and maximum numbers. Liquid assets (LIQASSET) show a mean of 27.8 percent, and GDP growth rate (GDP) has a mean of 3.8 percent. GDP shows a wide gap between the minimum of -4.3 percent and the maximum of 15.3 percent. The inflation rate (INF) shows a mean value of 1.2 percent. INF also shows a large gap between a minimum value of -1 percent and a maximum value of 4 percent. The unemployment rate (UR), on the other hand, has a small gap between a minimum value of 1 percent and a maximum value of 3 percent with a mean of 1.2 percent. For public debt to GDP (PDEBT), its mean and standard deviation are 41.7 percent and 0.030 respectively.

Table 2. Descriptive Statistics

Variables	Mean	Standard Deviation	Minimum	Maximum
LEV1	0.901	0.034	0.76	1.00
LEV2	0.849	0.024	0.76	0.94
PRO	0.011	0.013	-0.06	0.04
RISK	0.737	0.081	0.52	1.00
GROW	0.019	0.089	-0.67	0.66
LIQASSET	0.278	0.095	0.08	0.70
GDP	0.038	0.037	-0.04	0.15
INF	0.005	0.009	-0.01	0.04
UR	0.012	0.005	0.01	0.03
PDEBT	0.417	0.030	0.37	0.49

This research follows the studies of Cook and Tang (2010), Gropp and Heider (2010), Lemmon, Roberts and Zender (2008) and Teixeira et al. (2014) in which a multiple regression model with fixed effects and lagged explanatory variables is used to predict the relationship between firm-level determinants, country-level determinants, and a bank's leverage ratio. This is because there might be unobserved fixed effects specific to an individual bank that do not vary over time, and that could be significant in explaining variations in bank capital structures. Moreover, using one-period lagged determinants in the regression is to assume that the banks have information regarding to determinants available at the time of decision. This research investigates such fixed effects, and, therefore, the multiple regression models are constructed as follows.

$$LEV1_{it} = \beta_0 + \beta_1 PRO_{it-1} + \beta_2 RISK_{it-1} + \beta_3 GROW_{it-1} + \beta_4 LIQASSET_{it-1} + \beta_5 GDP_{t-1} + \beta_6 INF_{t-1} + \beta_7 UR_{t-1} + \beta_8 PDEBT_{t-1} + U_i + E_{it} \quad [1]$$

$$LEV2_{it} = \beta_0 + \beta_1 PRO_{it-1} + \beta_2 RISK_{it-1} + \beta_3 GROW_{it-1} + \beta_4 LIQASSET_{it-1} + \beta_5 GDP_{t-1} + \beta_6 INF_{t-1} + \beta_7 UR_{t-1} + \beta_8 PDEBT_{t-1} + U_i + E_{it} \quad [2]$$

Correlation and a variance inflation factor (VIF) were calculated prior to running the regression models to detect multicollinearity. Any collinear variables with a value of VIF higher than 10 was dropped from the models.

Empirical Results and Discussion

Table 3 reports the empirical results from the estimations of the "book value of the leverage ratio" (LEV1) and the "risk-weighted book value of the leverage ratio" (LEV2) as a dependent variable as shown in Equations [1] and [2].

Our results for Thai commercial banks indicate that bank profitability has a significant negative correlation only with the book value of the leverage ratio (LEV1). The results of this study reaffirm those of previous studies (Baltaci & Ayaydin, 2014; Booth et al., 2001; Gropp & Heider, 2010; Rajan & Zingales, 1995; Teixeira et al., 2014). These findings are consistent with the pecking order theory; in essence, firms with high profits are more likely to rely on internal sources of financing before they use debt financing. Using retained earnings would make banks' financial standing more secure.

The coefficients of firm risk and book value of the leverage ratio (LEV1) are negative and statistically significant. However, the coefficients of firm risk and risk-weighted book value of the leverage ratio (LEV2) shows no significant relationship. This finding is in line with several empirical studies supporting the trade-off theory (Al-Shubiri, 2011; Amidu, 2007; Brewer et al., 2008; Ukaegbu & Oino, 2014), showing that banks tend to use less leverage as they encounter higher-than-expected costs of financial distress and/or higher-than-expected insolvency risk.

The findings in Table 3 show that both leverage ratios (LEV1 and LEV2) are significantly and positively related to firm growth. This finding is in line with other empirical studies, such as Amidu (2007), Al-Shubiri (2011), Hall et al. (2004), Tongkong (2012), and Ukaegbu and Oino (2014), and these results are consistent with the pecking order theory. Thai commercial banks with higher growth rates require more capital to finance such growth. According to the pecking order theory, banks can raise this capital from customer loans, and can also borrow more by expanding deposits and/or issuing debt instruments rather than issuing new equity.

Similarly, liquid assets are significantly and negatively related to both leverage ratios applied in this study. This finding is consistent with the pecking order theory, in which banks with high liquid assets have a sufficient or excess amount of liquidity and, therefore, do not have significant need for much debt. To the contrary, banks with low amounts of liquidity face higher information costs and more financial distress, and, therefore, prefer to use more debt than equity. These results are in line with the international evidence of the relationship between leverage and liquid assets (e.g., Aktas et al. (2015), Amidu (2007), Baltaci and Ayaydin (2014), and Butt et al. (2013).

In regards to country-level determinants, Table 3 reports that the book value of the leverage ratio (LEV1) is significantly related to the GDP growth rate, inflation rate, and public debt. The GDP growth rate has a negative influence, whereas the inflation rate and public debt have a positive relationship to the book value of the leverage ratio (LEV1). The relationships between the GDP growth rate and inflation rate to the leverage ratio are consistent with the trade-off theory. That is, Thai banks choose to use more equity financing to alleviate agency problems and financial distress that the banks face during good economic periods and under a disinflationary environment. For public debt, the positive relationship with the leverage ratio is consistent with what Dincergok and Yalciner (2011) and Mokhova and Zinecker (2014) found in other developing countries such as the Czech Republic and Slovakia. The risk-weighted book value of the leverage ratio (LEV2), on the other hand, has a significant positive relationship only with the unemployment rate and public debt. This positive relationship between the unemployment rate and the leverage ratio reaffirms what we find with GDP growth rate and the book value of the leverage ratio (LEV1). That is, the leverage ratio is counter-cyclical, meaning it is higher during bad macroeconomic periods. Hence, the leverage ratio increases together with an increasing unemployment rate.

Table 3. Examining Determinants of Bank Leverage (LEV1 and LEV2)

Dependent Variable:	LEV1		LEV2	
	Coefficient	**t**	**Coefficient**	**t**
Constant	1.046**	64.834	0.865**	41.328
Firm-level Factors				
Profitability (PRO)	-0.147**	-3.902	-0.064	-0.924
Firm risk (RISK)	-0.440**	-12.157	0.007	0.922
Firm growth (GROW)	0.126**	4.945	0.236**	4.968
Liquid asset (LIQASSET)	-0.416**	-9.811	-0.616**	-7.953
Country/Macroeconomic Factors				
GDP growth rate (GDP)	-0.071**	-2.863	-0.046	-1.026
Inflation rate (INF)	0.058+	1.652	0.051	0.792
Unemployment rate (UR)	-0.017	-0.559	0.189**	3.513
Public debt (PDEBT)	0.112**	3.856	0.096+	1.796
Adjusted R^2	0.795		0.316	
Number of banks	14	14	14	14
Number of observations	508	508	508	508

Notes: LEV1 = (1-book capital ratio)
LEV2 = (1-capital adequacy ratio)
** Statistical significance at the 1% level.
* Statistical significance at the 5% level.
+ Statistical significance at the 10% level.

In summary, the fixed-effects regression results of this study, as they relate to leverage, appear both theoretically and empirically plausible in the context of Thai banks. The results concerning profitability, growth, and liquid assets are consistent with the predictions of the pecking order theory, while the results for bank size and risk are consistent with the trade-off theory. Moreover, macroeconomic conditions of the Thai economy do have an influence on banks' capital structure.

Conclusions

The banking sector is important to any economy because it facilitates flows of capital between investors and savers (Mishkin, 1999). Given the importance of the banking industry in supporting and accelerating economic growth, it is necessary to investigate the determinants of capital structure therein. Since there has been only very limited empirical research in the banking sector of developing countries, especially in ASEAN countries, this study aims to contribute to our knowledge of bank capital structures by examining the determinants of those structures in the context of the ASEAN country of Thailand. The findings of this study provide insights and useful information for both bank managers and relevant regulatory authorities in Thailand.

Considering each leverage ratio separately, all four firm-level determinants show a statistically significant correlation with the book value leverage ratio (LEV1), but only two determinants—growth, and liquid assets — are statistically significant with respect to the risk-weighted book value leverage ratio (LEV2). Unobserved time-invariant fixed effects also appear to play an important role in determining banks' leverage. By considering firm-level determinants, we conclude that our findings are consistent with the explanation offered by the pecking order theory used in corporate finance; in essence, banks, like many other firms, prefer to use internal funding. However, if banks need more capital, they use debt financing in priority to issuing new equity.

Moreover, we also find that country-level determinants do have an influence on banks' capital structure. Specifically, the book value of the leverage ratio (LEV1) has a significant relationship with the GDP growth rate, inflation rate and public debt, whereas the risk-weighted book value of the leverage ratio (LEV2) has a significant relationship with unemployment rate and public debt. Banks'

financial decisions made based on the state of the economy are consistent with the trade-off theory, and they show that the leverage ratio varies counter-cyclically with macroeconomic conditions.

As with all empirical studies, this study is not without limitations. First, the fact that this research relied on the Thai banking sector may limit the generalizability of the results. Future studies should examine data from other countries since the market factors influencing bank leverage might be different from one country to another. Second, foreign banks operating in Thailand are not only required to comply with the BOT's regulations, but they are also subject to their home country's management and regulations, making the factors affecting their capital structures different. Third and finally, additional research could investigate more details of the composition of capital structure, since the major portion of bank liabilities exist as deposits rather than as debt or borrowings. Analyzing the leverage effects in the context of the different categories of bank liabilities – for example, deposits versus non-deposit or debt financing – might provide more in-depth information on the determinants of capital structure for local banks.

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