Determinants of Bank Capital Structure: Evidence from Thailand

Can the standard determinants of capital structure explain bank capital structure in Thailand?

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Content

1
- Introduction
- Motivation of Research
- Research Question

2
- Research Methodology
- Result
- Conclusion

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1. Introduction

What is Capital Structure?

Equity Capital + Debt Capital

1. Introduction

How is it important for firms?

What about in Bank?

2. Motivation of Research Paper

" The market value of any firms is independent of its capital structure and is given by capitalizing its expected return at the rate ρ appropriate to its risk class" Modigliani and Miller proposition I

"Becasue of the high costs of holding capital[…], Bank managers often wants to hold less bank capital than is required by the regulatory authorities. In this case, the amount of bank capital is determined by the bank capital requirement" (Mishkin, 2000)

"There should be little cross-sectional variation in leverage ratio of those banks falling under the Basel I regulatory regime, since it prescribes uniform capital ratio". Reint Gropp and Florain Heider(2009

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3. Research Questions

Can standard determinants of capital structure explian bank capital structure ?

4. Data and Methodology

- 10 Commercial Banks Publicly on the Stock Exchange of Thailand (SET) during 2004-2011 obtained from Bankscope of Bureau van Dijk and ORBIS database.

4.1 Methodology

- The Ordinary Least Square Regression (OLS)

- The Least Square Dummy Varaibles (LSDV)

4.2 Model I

The Standard model of Determinants of Capital Structure

$$L_{it} = \beta_0 + \beta_1 MTB_{it-1} + \beta_2 Prof_{it-1} + \beta_3 Ln(Size_{it-1}) + \beta_4 Coll_{it-1} + \beta_5 Div_{it} + c_t + u_{ti}$$

where   Lit   -   Leverage
            MTB -   Market-to-Book Ratio
            Prof   -   Profitability
            Size   -   Natural logarithm of size
            Coll   -   Collateral
            Div   -   Dividend payers for bank i in year t
            Ct -   Time fixed effect.

Gropp and Heider (2009), Lemmon et al. (2008) and Frank and Goyal (2007)

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4.3 Hypothesis I

- $H_{0:}$ The independent variables have no explanatory power to the dependent variable

- $H_{1:}$ The independent variables have significant explanatory power to the dependent variable

4.2 Model II

The Standard model of Determinants of Capital Structure

$$L_{it} = \beta_0 + \beta_1 MTB_{it-1} + \beta_2 Prof_{it-1} + \beta_3 Ln(Size_{it-1}) + \beta_4 Coll_{it-1} + \beta_5 Div_{it} + \beta_6 Ln(Risk_{it-1}) +$$

$$c_t + u_{ti}$$

where   Lit   - Leverage
        MTB - Market-to-Book Ratio
         Prof - Profitability
         Size - Natural logarithm of size
         Coll - Collateral
         Div   - Dividend payers for bank *i* in year *t*
         Risk it-1 - Natural Logarithm of Risk
         Ct   - Time fixed effect.

Gropp and Heider (2009), Lemmon et al. (2008) and Frank and Goyal (2007)

Descriptive Statistics

Table I: Descriptive Statistics

The sample of the 10 publicly traded commercial banks in Thailand from the Bankscope database from 2004 to 2011. The mean of the evidence in developed countries from Gropp and Heider (2009) and developing countries from Octovia and Brown (2010) are provided. See Appendix 1 for the definition of variables

	Mean	Median	St.Dev.	Max	Min	Mean (Developed Countires)	Mean (Developing Countires)
Book Assets (mill US)	23 600	20 130	18 091	66 483	1 471	64 100	21 674
Market to Book Ratio	1,005	1,000	0,107	1,158	0,428	1,065	1,025
Asset Risk	0,033	0,026	0,022	0,145	0,013	0,036	0,004
Profits	0,013	0,015	0,015	0,041	-0,070	0,051	0,067
Collateral	0,296	0,281	0,092	0,586	0,069	0,266	0,435
Deividend	0,768	1,000	0,425	1,000	0,000	0,944	0,583
Book Leverage	0,903	0,907	0,449	1,000	0,781	0,926	0,083
Market Leverage	0,914	0,912	0,063	1,000	0,781	0,873	0,100
Deposit Book	0,768	0,827	0,066	0,936	0,582	0,685	-
Deposit Market	0,820	0,836	0,086	0,939	0,370	0,646	-
Non-Deposit liab. (book)	0.185	0,171	0,067	0.418	0.064	0,241	-
Non-Deposit liab. (market)	0,180	0,164	0,086	0,630	0,061	0,277	-

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Correlations

	Book Leverage	Market Leverage	Book Assets	Profit	Market to Book	Collateral	Dividends	Asset Risk
Book Leverage	1							
Market Leverage	0,236	1						
Book Assets	0,158	-0,398	1					
Profit	-0,654	-0,126	0,095	1				
Martket to Book	-0,263	0,821	-0,311	0,060	1			
Collateral	0,264	0,142	-0,066	-0,297	0,180	1		
Dividend	-0,454	-0,094	0,395	0,597	0,076	-0,252	1	
Asset Risk	0,380	0,257	-0,337	-0,513	0,093	0,234	-0,642	1

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5. Analysis

Table III: The Predicted effects on explanatory variables in leverage: Corporate Finance, Buffer View and Bank Capital Structure in developing and developed countries

	Corperate Finance	Bank in Developed Countries	Bank in Developing Countries	Buffer View
Market-to-Book	-	-	+/-	+
Profits	-	-	-	+
Log(size)	+	+	+	+/-
Collateral	+	+	+/-	0
Dividends	-	-	+/-	+
Risk	-	-	-	-

Source: Gropp and Heider (2009) and Octovia and Brown (2010)

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Bank Characteristics and Market Leverage

The first column shows the result of the sample of the 10 Commercial Bank in Thailand from the Bankscope database from 2004-2011 by using equation 3: $L_{it} = \beta_0 + \beta_1 MTB_{it-1} + \beta_2 Prof_{it-1} + \beta_3 Ln(Size_{it-1}) + \beta_4 Coll_{it-1} + \beta_5 Div_{it} + c_t + u_{ti}$ The dependent variable is Market Leverage. Column 2 reports the result of 56 Banks in Developing countries including Brazil, India, Jordan, South Korea, Malaysia, Mexico, Pakistan, Thailand, Turkey and Zimbabwe from Octavia and Brown (2010). Column 3 presents Banks in USA and 15-EU countries from Gropp and Heider (2009). The t-statistic is shown in parentheses and p-value is shown in bracket. ***, **,* is significant level at 1%, 5% and 10% Note: Thai Banks and Banks in Developed countries are using OLS but Banks in Developing countries using fixed effect model

Dependent variable	Thai Banks	Banks in Developing countries	Banks in Developed Countries
Market-to-Book ratio	0,89*** (18,294) [0,000]	-0,289*** (-5,37) [0,000]	-0,560***
Profits	-0,87 (-0,6460) [0,521]	-0,032 (-0,32) [0,748]	-0,298***
Log(size)	0,03** (3,187) [0,002]	0,035*** (2,81) [0,0005]	0,006***
Collateral	-0,01 (-0,212) [0,833]	0,083** (2,81) [0,030]	0,020*
Dividends	-0,02 (-1,193) [0,239]	-0,007 (-1,24) [0,218]	-0,019***
Constant	-0,26** (-2,198) [0,03]		
Number of observations	80	318	2415
R^2	0,82	0,774	0,79

Bank Characteristics and Book Leverage

Dependent variable	Thai Commercial Banks	Bank in Developing countries	Bank in Developed Countries
Market-to-Book ratio	-0,003 (-0,052) [0,959]	0,008** (2,43) [0,016]	-0,66*** (-8,44)
Profits	-0,804 (-0,594) [0,556]	-0,153* (-1,83) [0,068]	-0,21*** (-5,65)
Log(size)	0,026** (2,779) [0,008]	0,018** (2,16) [0,032]	0,006*** (17,65)
Collateral	-0,014 (-0,241) [0,81]	-0,030** (-2,00) [0,047]	0,032*** (7,37)
Dividends	-0,020 (-1,147) [0,257]	0,007*** (2,27) [0,006]	-0,009*** (-4,13)
Constant	0,671*** (5,591) [0,000]		0,886***
Number of observations	80	318	2415
R^2	0,82	0,762	0,54

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Adding Risk and examining explanatory power of bank characteristics

Dependent variable	Thai Banks		Bank in Developing Countries		Bank in Developed Countries	
	Market Leverage	Book Leverage	Market Leverage	Book Leverage	Market Leverage	Book Leverage
Market-to-Book ratio	0,884***	-0,012	-0,266***	0,118***	-0,472***	-0,02
	(17,678)	(-0,2316)	(-4,79)	(3,37)		
	[0,000]	[0,817]	[0,000]	[0,001]		
Profits	-0,846	-0,779	-0,039	-0,153*	-0,262***	-0,192***
	(-0,615)	(-0,625)	(-0,38)	(-1,76)		
	[0,541]	[0,534]	[0,701]	[0,080]		
Log(size)	0,030***	0,026**	0,030**	0,019**	0,005***	0,006***
	(3,211)	(3,126)	(2,32)	(2,40)		
	[0,002]	[0,003]	[0,021]	[0,017]		
Collateral	-0,012	-0,014	-0,000	-0,000***	0,020**	0,032***
	(-0,211)	(-0,258)	(-1,23)	(-3,29)		
	[0,834]	[0,797]	[0,221]	[0,001]		
Dividends	-0,014	-0,014	-0,008	0,008***	-0,019***	-0,009***
	(-0,596)	(-0,642)	(-1,27)	(3,15)		
	[0,554]	[0,524]	[0,205]	[0,002]		
Risk	0,173	-0,014	-0,007**	-0,008***	-0,024***	-0,013***
	(0,631)	(0,574)	(-3,63)	(-2,21)		
	[0,532]	[0,524]	[0,000]	[0,028]		
Constant	-0,261*	0,674***			1,195***	0,799***
	(-2,200)	(6,097)				
	[0,033]	[0,000]				
Number of observations	80	80	318	318	2415	2415
R^2	0,82	0,58	0,758	0,778	0,80	0,58

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Decomposing Bank Leverage

Dependent Variables	Thai Commercial Banks			
	Non-Deposit (Market)	Deposit (Market)	Non-Deposit Book)	Deposit (Book)
Market-to-Book ratio	0,189*	0,699***	-0,043	-0,112
	(2,326)	(6,217)	(-0,2126)	(-1,164)
	[0,0246]	[0,000]	[0,833]	[0,251]
Profits	0,019	-0,865	1,602	-0,802
	(0,0377)	(-1,102)	(0,472)	(-0,473)
	[0,970]	[0,277]	[0,639]	[0,638]
Log(size)	-0,003	0,032*	0,024	0,028
	(-0,476)	(2,122)	(0,766)	(2,569)
	[0,636]	[0,039]	[0,447]	[0,014]
Collateral	0,057	-0,070	0,299	-0,074*
	(0,809)	(-0,695)	(1,117)	(-0,866)
	[0,423]	[0,490]	[0,270]	[0,391]
Dividends	0,018	-0,031	-0,044	-0,030
	(0,677)	(-1,148)	(-0,653)	(-0,778)
	[0,502]	[0,257]	[0,517]	[0,441]
Risk	0,497**	-0,324	0,619	-0,341
	(0,834)	(-0,909)	(0,655)	(-0,544)
	[0,404]	[0,368]	[0,516]	[0,589]
Constant	-0,122	-0,139	-0,227	0,715***
	(-1,022)	(-0,579)	(-0,689)	(4,092)
	[0,312]	[0,566]	[0,495]	[0,000]
Number of observations	80	80	80	80
R^2	0,32	0,50	0,07	0,45

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Time Fixed Effect Least Square Dummy Variables

Dependent variable Market Leverage	Market Leverage		Book Leverage	
	OLS	LSDV	OLS	LSDV
Market-to-Book ratio	0,884***	0,876***	-0,012	-0,016
	(17,678)	(14,826)	(-0,2316)	(-0,282)
	[0,000]	[0,000]	[0,817]	[0,779]
Profits	-0,846	-0,969	-0,779	-0,907*
	(-0,615)	(-1,683)	(-0,625)	(-1,696)
	[0,541]	[0,101]	[0,534]	[0,098]
Log(size)	0,030***	0,031***	0,026**	0,027**
	(3,211)	(3,191)	(3,126)	(3,128)
	[0,002]	[0,003]	[0,003]	[0,003]
Collateral	-0,012	0,009	-0,014	0,005
	(-0,211)	(0,1616)	(-0,258)	(0,084)
	[0,834]	[0,872]	[0,797]	[0,933]
Dividends	-0,014	-0,011	-0,014	-0,011
	(-0,596)	(-0,580)	(-0,642)	(-0,582)
	[0,554]	[0,565]	[0,524]	[0,564]
Risk	0,173	0,122	-0,014	0,114
	(0,631)	(0,589)	(0,574)	(0,571)
	[0,532]	[0,558]	[0,524]	[0,571]
Constant	-0,261*		0,674***	
	(-2,200)		(6,097)	
	[0,033]		[0,000]	
Number of observations	80	80	80	80
R^2	0,82	0,999	0,58	0,9994

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Bank Characteristics and Leverage with the Least Square Dummy Variables (LSDV)

Dependent variable	Banks Leverage		Non-Deposits Liabilites		Deposits Liabilites	
	Market Leverage	Book Leverage	Over market value of assets	Over Book value of assets	Over market value of assets	Over Book value of assets
Market-to-Book ratio	0,87***	-0,017	0,079	-0,35	0,797***	-0,004
	(15,254)	(-0,311)	(0,974)	(-0,997)	(9,224)	(-0,050)
	[0,000]	[0,757]	[0,336]	[0,324]	[0,000]	[0,960]
Profits	-0,97	-0,905	-0.22	0.26	-0,753	-0,697
	(-1,587)	(-1,604)	(-0,632)	(0,119)	(-0,930)	(-0,928)
	[0,121]	[0,117]	[0,531]	[0,905]	[0,358]	[0,359]
Log(size)	0,03**	0,026**	-0,003***	-0.012	0,054***	0,049***
	(3,178)	(3,098)	(-3,62)	(-0,541)	(4,577)	(4,561)
	[0,003]	[0,004]	[0,001]	[0,592]	[0,000]	[0,000]
Collateral	-0,01	-0,015	-0,055	0,178	-0,065	0.056
	(0,2074)	(0,126)	(-1,051)	(0,754)	(0,914)	(0,796)
	[0,837]	[0,899]	[2,997]	[0,455]	[0,367]	[0,431]
Dividends	-0,016	-0,015	0,017	-0,032	-0,028	-0,025
	(-1,034)	(-1,068)	(1,038)	(-0,533)	(-1,012)	(-0,922)
	[0,308]	[0,292]	[0,306]	[0,597]	[0,318]	[0,362]

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Bank Characteristics and Leverage with the Least Square Dummy Variables (LSDV) Cont…

Risk			0,404	0,023	-0,282	-0,272
			(1,674)	(-0,040)	(-0,934)	(-0,922)
			[0,102]	[0,968]	[0,356]	[0,362]
factor(year)2005	-0,264 *	0,677 ***	0,200*	0,491	-0,465**	0,382**
	(-2,610)	(-2,610)	(1,757)	(1,372)	(-2,982)	(2,489)
	[0,013]	[0,000]	[0,087]	[0,178]	[0,004]	[0,017]
factor(year)2006	0,098*	0,669 ***	0,208*	0,508	-0,482***	0,366**
	(-2,691)	(7,095)	(1,769)	(1,398)	(-3,050)	(2,359)
	[0,010]	[0,000]	[0,085]	[0,170]	[0,0042]	[0,026]
factor(year)2007	0,100*	-0,264 *	0,208*	0,400	-0,488**	0,357**
	(-2,691)	(6,862)	(1,804)	(1,220)	(-3,106)	(2,319)
	[0,010]	[0,000]	[0,07]	[0,230]	[0,004]	[0,026]
factor(year)2008	-0,253 *	-0,264 *	0,224*	0,557	-0,489**	0,354**
	(-2,536)	(6,978)	(1,185)	(1,442)	(-2,992)	(2,191)
	[0,015]	[0,000]	[0,072]	[0,157]	[0,005]	[0,036]
factor(year)2009	-0,262*	-0,264 *	0,238**	0,535	-0,512***	0,335**
	(-2,594)	(6,854)	(2,103)	(01,459)	(-3,278)	(2,176)
	[0,013]	[0,000]	[0,042]	[0,153]	[0,002]	[0,036]
factor(year)2010	-0,272*	-0,264 *	0,265**	0,542	0,547***	0,300*
	(-2,626)	(6,646)	(2,288)	(1,486)	(-3,554)	(1,983)
	[0,0123]	[0,000]	[0,027]	[0,146]	[0,001]	[0,055]
factor(year)2011	-0,268*	-0,264 *	0,268**	0,559	0,547***	0,300*
	(-2,571)	(6,639)	(2,215)	(1,494)	(-3,473)	(1,935)
	[0,014]	[0,000]	[0,032]	[0,143]	[0,001]	[0,06]
Number of observations	80	80	80	80	80	80
R^2	0,99	0,994	0,32	0,34	0,998	0,9985

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6. Conclusion

1. The standard determinants of capital structure have little explanatory power to bank capital structure in Thailand for both book and market leverage since few variables are significant.

2. Some sign of the coefficients such as collateral are unexpected.

3. When asset risk is controlled, the overall significance does not change. Risk has positive relation with market leverage but negative relation with book leverage.

4.Risk is not significant to explain the bank leverage. This may suggests that regulations predominantly determine bank capital structure and insignificant regulations' impact cannot be confirmed in case of Thailand Banking Sector.

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