THE RELATIONSHIP BETWEEN BUSINESS CYCLES AND LEVERAGE: EVIDENCE FROM LISTED FIRM IN THAILAND

BY

MR. THARADOL RIMCHALA

AN INDEPENDENT STUDY SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF SCIENCE
PROGRAM IN FINANCE (INTERNATIONAL PROGRAM)
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ABSTRACT

This study focuses on investigating the effect of business cycle to the firm leverage of Thai listed companies from year 2005 to 2014. The total liability to total asset is used to reflect the leverage level. The expansion period is used as proxy for business cycles. In addition, the examination of financial constraint, financial unconstraint, and industry specific effect are also included in this study. In expansion phase, the result exhibits the significant negative effect to the leverage. Hence, the leverage level is lower in expansion phase of business cycles. Furthermore, the result suggests a negative relationship between leverage and 1-period lagged financial unconstraint indicating that the firm without financial constraints will use less debt. The 1-period lagged financial constraint does not have significant effect to the leverage level. The firm with financial constraint will not have different leverage level with other firms. The result also indicates the positive relationship between leverage and financial industry reflecting higher leverage usage in financial industry.

Keywords: Leverage level, Business cycles, Financial constraint, Industry specific

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CHAPTER 1
INTRODUCTION

The change in economic business cycles affects the profitability and cost management differently in each industry. Most industries performed well in the expansion period while the others may perform better in contraction period. Adaptation of usage of leverage is very important along the business cycle since it affects the survivorship of the company by adding the smoothness of business operation and maintaining the profit. The capital structure is known as balance between equity and debt which the company uses to finance main operation and future growth. It influences almost everything including risk profile, ways to get funding, cost of funding, and the return which investors and lenders expect. Good management of level of leverage will definitely pull out maximum performance of the company.

The company needs to cautiously check whether the cost of equity is higher than the cost of debt and try to get the lowest cost of capital to fund the firm by choosing the optimal level of equity and debt. Many finance researchers try to find the determination of the capital structure since the market in business world is not perfect. The determinants of optimal capital structure are profitability, asset tangibility, and firm size. While the trade-off theory explains one way of the relationship between leverage and its determinants, the pecking order theory give totally opposite direction. Natalia and Marek study (2013) suggests that the macroeconomic factor in monetary and fiscal policy such as government debt acts as an un observed variable which has significant effect on capital structure while Hsien-Hung Herman Yeh study (2011) indicate that the macroeconomics has no significant effect to capital structure in Taiwan.

Most research papers studied the capital structure in developed country but not in developing country which has different economic environment as stated in Glen and Singh (2004) that company capital structure in developing countries is different from that in developed countries. However, there are not many studies about capital structure and business cycle in emerging countries except HSIEN-HUNG HERMAN YEH (2011) which focus on construction industry in Taiwan.

In year 2008, when Lehman Brothers declared bankrupt, US economy went into slump. The crisis had its origin in the investment banking sector, when their financial assets called Mortgaged- Backed securities (MBS) underwent a series of multiple defaults in their underlying housing mortgages causing a dramatically decline in value of those toxic assets. The inability to pay off the interests and principals to investors, leading to closing down of many savings and loans, small banks and government bailouts to those banks that are "too big to fail"

Thai economy is an open system, the crisis in the US had exerted a negative impact in many facets of Thai economy. Firstly, financial institution: After Tom Yum Kung crisis, Thai banks had become conservative in making loans and risk management. Its exposure to foreign financial assets was minimal, only 1.6% with 13% foreign bond as investment vehicle, mostly government insured foreign credit instrument. Report from Bank of Thailand revealed only 4,800 million baht, equivalent to 0.1% loss. Compared to 9.4 trillion baht credits issued. But a larger loss was reported from government pension fund, with 74,056.83 million baht loss. It was questioned that foreign investment fund might have suffered a severe loss which was underestimated. Secondly, the closing of Lehman brother Thailand: LB Thailand owned some real estate in Thailand. When it declared bankrupt, those assets had to be sold which caused a downward pressure in real estate price. Lastly, fluctuation in Stock Exchange of Thailand: Stock Exchange of Thailand was opened to foreign investors. When they dumped Thai stocks, moving their money back home causing a negative pressure on stock price.

The Hamburger crisis also had impact to Thai Economy. Firstly, export: US, EU, and Japan account for 35% Thai export market. China, the dominant exporter to US, import intermediate goods from Thailand, as US import from China slowed down. Thailand export to China decreased by 20% to 30% (about 100 billion Baht). Garments, computer parts, electric appliances, cars, leather products, shoes, furniture, Ceramics, plastics, seafood, and jewelry export were all affected. Export account for more than 70% of Thai GDP. Export decline exerted a huge negative impact on Thai GDP. Secondly, tourism: After 1997 crisis, 10.5 million tourists came to Thailand creating 500-600 million baht income per year. Thailand has always been a famous tourist

destination. In the year 2007, tourists increased to 14.5 million. Tourism can be considered to be a luxury product. When income declined, visitors decreased in number, those who came stayed for a shorter time, spent less. USA, UK, and Japan visitors constitute premier group of tourists. Tourism as another engine of Thai GDP slowed down when global economy slumped. Thirdly, credit and investment: credit crunched in global financial system causing dollar loan to be scanty and cost of loan increased. The corporation switched to domestic loan market While Thai banking system became more conservative and risk averse after 1997 crisis. SME which comprised 90% of Thai business may found a hard time searching for credit. Fourthly, employment: International labor organization estimated that 210 million work force would be unemployed by 2009. In Thailand, when export decline reach 30%, 10-15% (1 million work force will be forced out of job together with 700,000 newly graduates had found a hard time searching for job). Lastly, agricultural product price decrease: crisis lowered global purchasing power causing decreased agricultural product prices especially where supply is more than demand. Product such as rubber, tapioca, used to have high price due to increased demand in China. But when China halted, export slowed down. The decreased demand for these products caused price to go down. As majority of Thai people are farmers, this did cause a decrease in domestic purchasing power.

In year 2011, Bangkok had faced a heaviest flooding crisis in 50 years causing over 10,000 factories to lay off over 350,000 workers and be temporary suspended. The estimated damage of flooding is $6.2 billion to the Thai industry. Thailand, as export manufacturing leadership position, needed to recall the confidence in eastern seaboard investors. The flooding situation was relieved with 4.2 million dollars in government spending. Furthermore, the government had promised to build a new water management system. At that time, the world economy is struggling due to the weakness in US and Europe. The flooding caused a dramatic decline in GDP in fourth quarter of year 2011 due to the decrease in output level from the factories being temporarily shut down.

In conclusion, each financial crisis has a huge impact to the economy including lower employment, investment, and productivity which all leads to lower level of output. This crisis slowed the economy down and sometimes stopped. This situation

increased default probability in loan and caused many companies to go bankrupt including Lehman Brothers.

CHAPTER 2
REVIEW OF LITERATURE

The leverage level had been analyzed to search for its determinants. The research included the firm in United Stated and had found negative relationship between firm size, profitability and leverage. Other variables, for example asset growth and tax advantages, were considered insignificant (Titman and Wessels (1988)). While another studies analyzed country members of Group of Seven (G7) excluding Germany and had revealed negative relationship between profitability and leverage but positive relationship between firm size and debt which was consistent partly with previous study (The Rajan and Zingales (1995)).

In European traded companies during year 2005 to year 2010, the relationship between leverage and its determinants were tested and it was found that the relationship between profitability, firm size, asset growth and leverage were negative while the asset tangibility and tax shield turned out to be positively correlated with leverage Arvanitis (2012).

The leverage level was tested further on business cycles effect Merika (2015). This study used the relationship between leverage and profitability as the measurement of selecting choice of capital structure. Their research focused on 4 different phase of business cycle in 60% of internationally listed shipping companies and uses Generalized Method of Moments (GMM) to estimate the interaction of relationship. The result suggested that size, asset tangibility, and firm performance were the main factors for determining capital structure in shipping sector. These findings also suggest that there is negative relationship between leverage and profitability in expansion period (2013), trough period (2008), and sideway movements period (2010) but positive relationship in peak period (2007).

The relationship between business cycles and leverage was tested further in Lemmon (2008) research. The business cycles including expansion, peak, contraction, and trough were used as part of leverage components to test the effect and the result indicated that business cycles have a significant effect to the leverage ratio. After

adding the business cycles effect, there existed a relationship between business cycles and leverage ratio and the model became more powerful in explaining the dependent variable (Shumi (2012)).

According to Modigliani and Miller (1958) studies and analysis, they suggested that, in perfect capital market, it makes no difference using equity or debt as main capital to finance the operation of the firm and the weighted average cost of capital should be the same with different weight of equity and debt. The M&M proposition is based on the assumption that there is no tax cost, no transaction cost, no bankruptcy cost, the borrowing cost is the same among firms and investors, and information symmetry. However, in the imperfect world, increasing in debt level benefits the firm with tax shield and also increase the cost of debt with bankruptcy cost.

In trade-off theory, the firm tries to balance the dead-weight costs of bankruptcy and tax saving benefits of debt. Most of the firms usually finance their operations with partly debt and partly equity. The advantage of financing with debt is tax shield but the disadvantage is increasing cost of debt. Whenever the firms increase their debt level, the marginal benefit decrease and the marginal cost increase. Optimal level of capital structure where the marginal benefit equals marginal cost will give the most benefit of financing with debt to the firm (Kraus and Litzenberger (1973)).

According to pecking order theory, the firms have three financing choices, internal financing from retained earnings, debt, and equity, the determinant of optimal capital structure is based on asymmetric information between managements and investors. The management usually select internal financing as the most preferred choice since it provides the least amount of information to the investor, then to debt if the internal financing is not enough, equity will be chosen as the last choice of financing since it decreases information asymmetry (Donaldson (1961)).

Profitability is the main factor that determines the capital structure .The trade-off theory suggests that whichever firms that can generate good profit should have lower cost of debt and try to issue more debt resulting in high leverage ratio as in Huang & Ritter (2009) while the pecking order theory suggests that profitable firms always

finance with retained earnings first, resulting in low leverage ratio as in Rajan & zingales (1995). The profitability is measured by return on asset (ROA)

The tangibility is also an important factor in determining capital structure. The tangible assets are often used as collateral to reduce the risk and cost of debt. When the firm can finance with low cost debt, the leverage ratio rises as in the trade-off theory. The tangibility tends to be positively related to leverage as in Frank and Goyal (2009). However, in pecking order theory, the asset tangibility increase information symmetry leading to lower information cost of issuing new equity. The relationship between tangibility and leverage tend to be negatively correlated in Shyam-Sunder and Myers (1999). The tangibility is measured by natural logarithm of fixed asset over total asset

Firm size is another factor that plays in determining capital structure. Most of research studies (Frank and Goyal, 2009) support Trade-off theory which suggests that as larger firms have relatively lower cost of debt comparing to smaller firms due to lower default risks leading these firms to issue more debt instruments, thus higher leverage ratio. So the relationship between firm size and leverage seems to be positive. On the other hand, the pecking order theory states that the larger firm is well-known and have access to capital leading to negative relation between firm size and leverage.

The financial unconstraint is one of important variables in explaining the leverage (Lemmon (2008), Shumi (2012)). In pecking order theory, the firm without a financial constraint is considered to be a well-operated firm that can manage the business activity efficiently enough to earn high profit which is collected in form of retained earnings. The firm use the retained earnings as first choice of financing rather than issuing new debt or equity. The direction of relationship should be negative.

The business cycle also has indirect significant effect to leverage (Merika, Theodoropoulou, Triantafyllou, Laios study (2015)). There exists direct relationship between leverage and business cycle as in Shumi (2012) studies which suggest that the relationship between leverage and expansion and peak phase should be negative while positive in contraction and trough.

CHAPTER 3
RESEARCH METHODOLOGY AND DATA

3.1 Research Hypotheses

In expansion period, almost all firms can perform its production and service efficiently as can be seen through the economic growth. Those firms gain profit from business operation and give a sign of lower probability of default. The bankruptcy cost decrease reflecting the lower risk that the lender takes. Since the marginal cost of bankruptcy is lower, the new optimal capital structure which is the level where marginal benefit of tax shield equals to marginal cost of bankruptcy move to the right. The manager exploits this opportunity to increase more debt to achieve new optimal level of capital structure creating higher firm value. The relationship between leverage and expansion period should be positive as stated in trade-off theory. However, most of managers in Thailand do not believe in trade-off theory and they rather consider more about information cost in the information asymmetry between the management team and investor and decide to use internal money gaining from the profit to finance the operation instead of issuing new debt or equity. The relationship between leverage and expansion is supposed to be negative in pecking order theory. The first hypothesis is conducted to test the existence of this relationship. The peak period is the turning point from expansion to recession and is considered to exert much less effect to capital structure.

In contraction period, the economic growth decreases and most firms cannot generate as much profit as usual and loss occur in some of them. The bankruptcy cost and interest rate increase due to higher probability of default. Because the marginal cost of financial distress increase, the new optimal capital structure moves in the opposite direction of the expansion period, the firm has to decrease debt level in the capital structure. Therefore, in trade-off theory, the relationship between leverage and contraction should be negative, while in pecking order theory, the firm's retained earnings will be less than the expansion period and the manager who prefer internal financing need to issue more debt, which is the second choice of financing. The relationship between leverage and contraction period should be positive. This

relationship is also tested in third hypothesis. The trough is the last period of contraction before it changes into the expansion period and this is considered to be not much different from normal situation since it occurs in a very short period of time.

This paper focus on the business cycles effect on leverage level. It also considers the financial constraint and industry specific effect to the leverage level. The answer of research question can be found through the following hypothesis.

Hypothesis 1:

1.1 There does not exist the relationship between leverage and financial constraint

1.2 There does not exist the relationship between leverage and financial unconstraint

Hypothesis 2:

2.1 There does not exist the relationship between leverage and expansion period

Hypothesis 3:

3.1 There does not exist the relationship between leverage and financial industry

3.2 There does not exist the relationship between leverage and industrial industry

Each company have their own financial constraint and industry. The difference in nature of business affect the firm behavior in financing decision. Therefore, this research anticipates vary in leverage level in different financial constraint and different industry especially in financial industry which the business nature is different from other business.

3.2 Research Methodology

To study the business cycles effect on firm leverage level, the research is divided into 4 models. First, the firm leverage without business cycles effect. The second model describe the business cycles effect on leverage ratio. The third tests further on business cycles and financial industry effect on leverage level. The last model focuses on the business cycles and industrial industry effect on the leverage level. The panel data regression is utilized on the research

3.2.1 The leverage without business cycles effect

$$Lev = \beta_0 + \beta_1 Prof_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Tang_{i,t-1} + \beta_4 MB_{i,t-1} + \beta_5 Div_{i,t-1} + \beta_6 Cons_{i,t-1} + \beta_7 Uncons_{i,t-1} + \beta_8 Expan_{i,t} + \varepsilon_{i,t}$$

Where:

i = 1, 2, 3,… denotes firm
t = 1, 2, 3,…, 10 denotes period t each year

Firm leverage level is described by using debt to asset ratio (leverage ratio) which is the current debt level in proportion of firm total capital. The leverage ratio indicates the firm current usage of debt and equity which reflect the firm leverage level. The leverage ratio is defined as

$$Lev = \frac{Total\ Liability}{Total\ asset}$$

The profitability measures the firm's operating efficiency which the firm processes the business operation into profit. The profitability is measured as return on asset (ROA). The ROA is commonly used as the profitability (Jose, Lancaster and Stevens (1996), Nazir and Afza (2009), Merika, Theodoropoulou, Triantafyllou, and Laios (2015). The ROA is defined as

$$Prof = \frac{Net\ Income}{Total\ Asset}$$

In trade-off theory, almost all profitable firms have lower probability of default and can get lower cost of bankruptcy due to the lower default risk so the management decide to increase more debt to reach to the new optimal level of leverage and this results in positive relationship between profitability and leverage while, in pecking order theory, the profitable firm prefer using the internal money to finance their operation and project instead of using debt and equity so the relationship should be negative between leverage and profitability. Many papers support for pecking order theory (Fama and French, 2002).

The firm size is determined by natural logarithm of total asset

$$Size = \ln(total\ asset)$$

Basically, the larger firm has lower default risk or better credit. It has lower bankruptcy comparing smaller firm. Therefore, larger firm prefer raising the debt to get more benefit of tax shield until it reach new optimal level of leverage level as stated in trade-off theory. However, in pecking order theory, the larger firm make the information among management and investor more symmetry so the firm face a lower cost of issuing new equity. Since the information cost is reduced, the manager prefers using equity to finance their business operation instead of debt. Most of research paper support the trade-off theory (Frank and Goyal, 2009; Bevan and Danbolt, 2004; Gaud, Ellion, Hoesli, and Bender, 2005).

The tangibility is calculated by natural logarithm of fix asset over total asset.

$$Tang = \frac{Total\ fixed\ asset}{Total\ asset}$$

The firm with higher fixed asset commonly use it as collateral to reduce the cost of debt. In trade-off theory, the firm with higher tangible asset prefer issuing more debt due to its lower cost. Therefore, the firm that has higher tangible asset usually have higher leverage. In contrast, in pecking order theory, the tangible asset makes the information cost decreased so the firm prefers issuing new equity to raise fund instead of debt leading to lower leverage level. Some research support trade-off theory (Frank and Goyal, 2009) while some research support pecking order theory (Bauer, 2004) and the rest give a result as in conclusive (Serrasqueiro and Nunes, 2009).

The market to book ratio is the proportion of market value of equity over book value of equity

$$MB = \frac{Market\ value\ of\ equity}{Book\ value\ of\ equity}$$

The firm which has market to book ratio more than one reflect the firm has growth opportunity which has less leverage comparing to the other firm. The relationship between leverage and market to book ratio should be negative.

The dividend payout ratio is the percentage of the net income that distribute to the shareholder

$$Div = \frac{Dividend}{Net\ income}$$

The firm use portion of net income to pay the dividend to shareholder and use the remaining money to finance business operation. If the firm dividend policy is fixed, the firm pay dividend every year without concerning of economic situation. This firm may need to issue more debt to feed in the operation since the money in retained earnings is partly distributed to shareholder and may not be enough to finance. The relationship of leverage and dividend payout ratio is expected to be positive.

3.2.2 The effect of business cycles on leverage

$$Lev = \beta_0 + \beta_1 Prof_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Tang_{i,t-1} + \beta_4 MB_{i,t-1} + \beta_5 Div_{i,t-1} + \beta_6 Cons_{i,t-1} + \beta_7 Uncons_{i,t-1} + \beta_8 Expan_{i,t} + \varepsilon_{i,t}$$

Where:

i = 1, 2, 3,… denotes firm

t = 1, 2, 3,…, 10 denotes period t each year

After the business cycle is identified by using change in economic growth, it is added to second model using dummy variable technique. Whenever the expansion phase occurs, the value of expansion variable will turn to 1 and other phase variable is still 0. The relationship between leverage and expansion phase of business cycle can be either positive or negative depending on the chief financial officer of each firm who decide to favor the tax shield benefit and bankruptcy cost in trade-off theory or the information symmetry in pecking order theory. The industry variable is also added to

test the industry specific effect. The relationship between leverage and each industry can be negative or positive due to the variety of each firm's behavior in each industry.

3.2.3 The effect of business cycles and financial industry on leverage

$$Lev = \beta_0 + \beta_1 Prof_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Tang_{i,t-1} + \beta_4 MB_{i,t-1} + \beta_5 Div_{i,t-1} + \beta_6 Cons_{i,t-1} + \beta_7 Uncons_{i,t-1} + \beta_8 Expan_{i,t} + \beta_9 Fin_{i,t} + \varepsilon_{i,t}$$

Where:

i = 1, 2, 3,… denotes firm
t = 1, 2, 3,…, 10 denotes period t each year

The financial industry usually has different leverage level due to the nature of financial business which provide lending and credit service to the firm in other industries. Banking is the main sector in financial industry and has liability in a form of deposit which make the leverage of financial industry generally high. Therefore, comparing to other industries, the financial sector should have higher leverage ratio and positive relationship with leverage.

3.2.4 The effect of business cycles and industrial industry on leverage

$$Lev = \beta_0 + \beta_1 Prof_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Tang_{i,t-1} + \beta_4 MB_{i,t-1} + \beta_5 Div_{i,t-1} + \beta_6 Cons_{i,t-1} + \beta_7 Uncons_{i,t-1} + \beta_8 Expan_{i,t} + \beta_9 Indus_{i,t} + \varepsilon_{i,t}$$

Where:

i = 1, 2, 3,… denotes firm
t = 1, 2, 3,…, 10 denotes period t each year

The industrial industry issues debt when it needs to purchase new machine or replace the old one but generally its debt changes little compared to other industry. The industrial industry does not issue high debt since they usually have cash on hand. The relationship between leverage ratio and industrial industry is expected to be negative. However, in other point of view, the firm in this industry can be viewed as one with

high tangible assets which they can use it as collateral when they want to issue new debt and get a lower borrowing rate due to lower risk the lender takes. In this view, the relationship is expected to be positive.

The definition of the variables used in the analysis is provide in Table 3.1.

Table 3.1 Variables

Variable	Variable Name	Description
Endogenous variable		
$Lev_{i,t}$	Leverage	This indicates the leverage level of measured by total liability over total asset
Control variable		
$Prof_{i,t-1}$	Profitability	The return on asset (ROA) measured by net income over total asset is used as proxy for profitability
$Size_{i,t-1}$	Firm Size	Firm size is computed by the natural logarithm of total assets.
$Tang_{i,t-1}$	Asset Tangibility	This indicates the firm's tangible asset level measured by net plant property and equipment over total asset
$MB_{i,t-1}$	Market value of equity to book value of equity	The ratio is calculated by market value of equity divided by book value of equity. If this ratio is lower than 1, the firm may be in financial constraint which reflect the market value of equity is lower than book value of equity.
$Div_{i,t-1}$	Dividend Payout	This dummy variable indicates whether the firm pay out the dividend. Its value equal to 1 if the firm pay out dividend in fiscal year and 0 otherwise
Exogenous variable		
$Expan_{i,t}$	Expansion Phase	These dummy variables specify the current business cycle phase in that fiscal year. When the phase occurs, the variable value turns into 1, otherwise the value is 0.
Fin_i	Financial Industry	These dummy variables indicate the industry specific effect. The value equals to 1 when the
$Indus_i$	Industrials Industry	

Variable	Variable Name	Description
		financial data represent the industry.
$Cons_{i,t-1}$	Financial Constraint	Firms which is considered to be financial constrain (e.g. firm do not pay dividend and market to book value > 1) are ranked from low to high based on their total assets. Value equals to 1 for the firm located in first quartile and 0 otherwise
$Uncon_{i,t-1}$	Financial Unconstraint	Firm which is not considered to be financial constrain are ranked from low to high based on their total assets. Value equals to 1 for the firm located in fourth quartile and 0 otherwise

3.2.5 The Panel Data Regression

The data in this research includes many listed firm in Thailand and several period of time ranging from year 2005 to 2014. The data has both cross-section and time-series dimension. Therefore, the panel regression is employed. Omitted variable is the problem of panel regression and it can be solved using fixed effects and random effects regression technique. The omitted variable which change through the cases but constant overtime is control in fixed effect regression. In random effect model, it captures the effect of independent variables on the dependent variables by using the change in the variables over time. The assumption is there is not existent of correlation between individual specific effects and independent variables.

The Hausman test is applied to test which model should be employed between fixed effect model and random effect model. The Hausman test result indicates the best regression model **(Reyna (2011))**. The Hausman test hypothesis is described as

H_0: Omitted variables are not correlated with independent variables.

H_a: Omitted variables are correlated with independent variables.

The result of the test can be interpreted as when the null hypothesis is rejected, the omitted variables are correlated with independent variables. The appropriate model is fixed effect regression model. On the contrary, when the test fails to reject the null

hypothesis, the omitted variables are not correlated with independent variables. The appropriate model is random effect regression.

The Hausman test result indicates that the model fails to reject the null hypothesis meaning that the omitted variables are not correlated with independent variables. Therefore, the random effect regression is employed for panel data analysis.

3.3 Data

This research includes the financial data of listed firm in Stock Exchange of Thailand (SET) from year 2005 to 2014. The main source of financial statement data is collected from Datastream and use SET, SETTRADE, an SETSMART to randomly confirm the financial data. The business cycles data is collected from Office of the National Economic and Social Development Board (NESDB) from year 2005 to 2015. This study uses balanced panel data. The data using in determination of business cycle is Thailand quarterly real gross domestic product. The data of financial statement and output of business cycles determination result is both in annual basis. The dependent and independent variables are winsorized at the 1% and 99% levels to reduce the outliers effect.

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table B.1 represent the statistical summary for all variables. The data includes the information from listed firms in stock exchange of Thailand (SET) from year 2005 to 2014. The dependent variable is leverage ratio which is proxy for firm leverage level. The independent variables are expansion period, proxy for the healthy economy, financial industry, as proxy for financial industry specific effect, and industrial industry which is used as proxy for industrial industry specific effect. Furthermore, this papers also includes the control variable into the business cycle and industry effect to leverage level test. Those control variables are firm profitability, firm size, asset tangibility, market value of equity to book value of equity, and dividend payment.

The table shows descriptive statistic including mean, median, standard deviation, minimum value and maximum value of the variables. The leverage has mean and median value equals to 0.439 and 0.443 respectively. Its standard deviation is 0.23 with a minimum value of 0 and maximum value of 0.998. The mean and median value of profitability is almost equal with value of 0.044 and 0.045 respectively with standard deviation value is 0.098 and range value from -1.06 to 0.79. Firm size has mean value of 15.39 and median value of 15.12. The distribution of firm size is dispersed with standard deviation equals to 1.67 with a minimum of 10.96 and maximum of 21.74. For asset tangibility, it has mean of 0.35 and median of 0.32. The standard deviation is 0.25. The value range from 0.0001 to 0.974.

The dummy variable is the variable which has value equal to either 0 or 1. The minimum value is always be 0 and the maximum value is 1. The dividend payment has mean of 0.72 and median of 1 with standard deviation of 0.45. The financial constraint has mean of 0.0295 and median of 0. The distribution is very low with a standard deviation of 0.17. The mean value and median value of financial unconstraint is 0.22 and 0 respectively. The standard deviation value is 0.42. For business cycles, the expansion period has mean of 0.6 and median of 1 with a standard deviation of 0.49.

The financial industry has mean and median of 0.13 and 0 respectively with standard deviation of 0.34. The industrial industry has mean of 0.15 and median of 0 with standard deviation of 0.36.

In addition, the correlation coefficient matrix of variable using in the panel regression is exhibited in table C.1. The leverage ratio shows a positive correlation with financial constrained firm and negative correlation with the firm that does not have financial constraint which can be implied that the firm with financial constraint use less debt while the firm without financial constraint use more debt. The correlation between leverage ratio and expansion period of business cycle has a value of 0.0049 which is relatively low comparing to other independent variables which can be implied that the firm leverage level is almost not changed in expansion period. The correlation between leverage and financial industry has a value of 0.3 which is quite stronger comparing to business cycles correlation. The leverage using in financial industry is higher than other industries. The industrial industry has a correlation of -0.11 implying that the firm in this industry tend to use less debt.

4.2 Empirical Results

Table D.1 shows regression estimated result to test the hypothesis. The table presents a relationship between leverage ratio, as proxy for the leverage level, and business cycles effect, industry specific effect, and financial constraint effect.

4.2.1 The leverage without business cycles effect

The results indicate significance in the relationship between leverage ratio and 1-period lagged financial unconstraint at 10% significant level. The model rejects the null hypothesis stating that the leverage level is affected from financial unconstraint. The financial unconstraint coefficient is negative meaning that the firm without financial constraint will have relatively lower debt. This result conforms to Shumi (2012). The reason behind this is, in Thailand, most of the firms prefer to finance their main business operation, expansion, and research and development with their retained earnings rather than issuing new debt or equity. This conservative behavior has its root from the Tom Yam Kung crisis in year 1997 which is the collapse in value of Thai baht

after the Thai government was forced to float Thai Baht because of lacking of foreign currency to peg Thai baht to the U.S. dollar.

The control variables are also included in the regression to see the impact to leverage level. First, the 1-period lagged profitability, which use return on asset as proxy, has a significantly negative relationship with the leverage ratio with 1% significant level meaning that those firms with high profitability will use less debt and use more retained earnings from the profit they gain. There also exist a significant positive relationship between leverage and 1-period lagged firm size with 99% confidence level. The larger firms will have tendency to use more debt comparing to smaller firm since those larger firms has a better credit rating which the lender sees it as lower default probability. Therefore, the larger firms can issue a loan at lower interest rate which attracts the manager to borrow. The 1-period lagged asset tangibility is also having a negative significant effect to leverage level with a 95% confidence level. This result indicates that firms with high tangible assets tend to use less debt since the tangible assets can be seen as one source of information provided to investors. Therefore, the information asymmetry is lower and the firms change the financing method to equity.

The 1-period lagged market to book ratio has a positive significant impact to leverage ratio with a 10% significant level. The reason behind this is the firm which has market to book value more than 1 is considered to be a firm with high growth opportunity. The rational risk averse investor chooses to put their money in the firm with good future and this is reflected in the stock price. Therefore, most of the firms with high market to book value will issue more loan to fund the high growth project. For the dividend payment, the result shows that there exists a significant negative relationship with 1% significant level indicating that firms that can pay dividend will have less debt comparing to the firms which do not pay dividend. The explanation is the dividend paying firms could make enough profit to not only finance their business operation but also distribute dividend to shareholders. Since the firms have enough retained earnings, they do not have to issue new debt. In case of dividend recapitalization or, in other word, the firms raise debt to pay the dividend, this is a rare case in Thailand since Thai firms have a conservative behavior which is the lesson

learned from Tom Yam Kung crisis in the year 1997. By issuing more debt to pay dividend, the firm is pressing itself to payback more debt in the future and if it cannot cover its loan covenant, or rollover its debt, it enters into financial distress which usually leads to bankruptcy.

4.2.2 The business cycles effect on leverage

The result indicated the significant effect between 1-period lagged financial unconstraint and leverage with a 10% significant level. The direction of the coefficient is negative indicating that the firm without financial constraint will use less debt. This result is in accordance with Shumi (2012) and the first model. In addition, there exist a significant negative relationship between leverage and expansion period of business cycles with 95% confidence level. In the expansion period, every firm have less debt compared to other business cycles. The reason is that they can make more profit in this period and collect it retained earnings. Therefore, the main business operation and investment can be financed by internal money the firm has instead of issuing new debt or equity.

The second model includes control variables as well as the first model to capture the effect to leverage level. The result indicates that 1-period lagged return on asset, as proxy for profitability, has significant negative effect to the leverage with 99% confidence level. The firms that can make high profit keep their money in retained earnings and use it as the first choice of financing rather than any other financing choices. Furthermore, there also exist a significant positive relationship between leverage ratio and 1-period lagged firm size with 1% significant level meaning that the larger firms will use more debt than smaller ones due to lower borrowing rate which is the result of higher credit rating larger firms get. For asset tangibility, the result shows a significance in negative sign to leverage with 95% confidence level. The higher the tangible asset the firm has, the less debt the firm use. The reason is the firm with high tangible assets lowers information asymmetry level. The use of equity is higher in high tangible asset firms which lowers the firms' debt level.

Moreover, the result also indicates a significant positive relationship between leverage and 1-period lagged market to book ratio with 5% significant level. The firm

with higher market to book ratio reflects high growth opportunity. The firm needs a large source of funding. It can use new investment projects as collateral to issue high level of debt with lower interest rate. Therefore, the firms with high market to book ratio tend to use more debt. The reason is not only because the firm can borrow at lower interest rate but also the higher benefit of tax shields the firm receives. In addition, the result shows the existence of significant relationship between the leverage and 1-period lagged dividend payment with 1% significant level. The explanation is the dividend paying firm has more retained earnings comparing to the firm which does not pay dividend. The dividend paying firm can not only use the retained earnings to finance their business operation but also to pay dividend. Hence, the dividend-paying firm will have lower debt level.

4.2.3 The business cycles and financial industry effect on leverage

The study shows significant relationship between financial industry and leverage level with 99% confidence level. The financial firms use more debt comparing to firm in other industries. The main sector of financial industry is banking which has its liability as deposit. For example, if there is 100 Baht in the deposit account, there will also be 100 Baht in other debt account, the banking business is to use the deposit to create profit by lending to the borrower and gain the margin difference in deposit rate and lending rate. Therefore, comparing to other industry, the financial industry tends to use more debt.

Moreover, there exist a significant negative relationship between leverage and expansion with 10% significance level meaning that the firm use less debt while in the expansion period. The explanation is, when the economy grows, the firm enjoy gaining more profit from business activities and use it as the first choice of financing. Therefore, the firm need less debt in expansion period. In addition, the result of financial unconstraint indicates a significant impact to the leverage with 90% confidence level. The firm without a financial constraint is considered to be a well-operated firm and it usually also a profitable firm since they can manage their financial status well. They also have more retained earnings and enough liquidity to finance their business operation and need less debt to finance new projects. Therefore, the firm without

financial constraint use less debt comparing to the firm with financial constraint. The result of financial unconstraint and expansion period is consistent with the first and second model.

The 1-period lagged profitability has a significant effect to leverage ratio with 1% significant level. The direction of coefficient is negative meaning that the profitable firms will use less debt. The reason is the profitable firms will prefer to use retained earnings as financing choice before issuing new debt and equity. There also exist a significant positive relationship between leverage and 1-period lagged firm size with 99% confidence level meaning that the larger firms will use more debt than smaller firms. This can be explained in a way that the larger firms have higher creditability due to lower probability of default. Therefore, the larger firms will have tendency to use more debt because of lower borrowing rate. Furthermore, the result indicates the existence of significant impact from 1-period lagged market to book ratio to leverage level with 5% significant level. The coefficient is positive meaning that the firms with higher market to book ratio will use more debt than firms with lower market to book ratio. The reason is that higher market to book ratio reflects growth opportunity which need a large funding source. The debt is the main source of money since the firms could use the project investment as collateral to decrease the interest rate. Therefore, the high market to book ratio firms tend to use more debt. The 1-period lagged Dividend payment also has a significant negative relationship with leverage level with 99% confidence level. The firms that pay dividend will use less debt. This can be explained that the dividend-paying firm has more internal money left to finance the business operation and payout the dividend. Therefore, comparing to firm that does not pay dividend, the dividend-paying firm has less need for debt.

4.2.4 The business cycles and industrial industry effect on leverage

For industrial industry, the result suggests that there is no significant to leverage level since the model fails to reject the hypothesis stating that there does not exist the relationship between leverage and industrial industry. Furthermore, the result suggests that there exists a significant negative effect of expansion period to firm leverage level with 5% significant level meaning that the firms use less debt in expansion period. The

reason is, in expansion period, the economic output rises and the firms can make more profit to keep for future usage. The firms can use this profit as business operation financing, paying dividend, and future investment. Therefore, since the firms have enough money to do business activities, they need less debt. Moreover, the result also indicates a significant negative relationship between leverage ratio and financial unconstraint with 90% confidence level showing that the firms without financial constraint use less debt than the financial constraint firms. The explanation is the firms without financial constraint can manage their business operation and financial status well enough to be a profitable firm. Because the firms can make good profit, they can then use that money for the first choice of financing instead of debt or equity. Therefore, the firms without financial constraint is likely to use less debt.

The control variables included in this model also show significant effect to the leverage level. First, the 1-period lagged profitability has a negative relationship with the leverage ratio with 1% significant level showing that the firms with high profit will use less debt comparing to the non-profitable firms which can be explained that the firms could use their profit gaining from the last period to finance rather than issuing new debt or equity. Second, the 1-period lagged firm size also is significant to leverage ratio with 99% confidence level. The direction of coefficient is positive meaning that the larger firms will have tendency to use more debt than smaller firms because of the better credit rating that make the borrowing rate lower. Third, the 1-period lagged asset tangibility, the result suggests that there exists significant negative effect to leverage ratio with 5% significant level. The firms with high tangible assets reduce the information asymmetry which make equity financing more attractive. Therefore, the usage of debt will be higher with the firms with high tangible asset. Fourth, the result also indicates a significant positive relationship between 1-period lagged market to book ratio and leverage ratio with 5% significant level meaning that the firms with high market to book ratio will have a tendency to use more debt. The reason is high market to book ratio reflects growth opportunity. With this ongoing future, the firms can borrow at a lower rate using the new project as collateral. Unsurprisingly that the firms with high market to book ratio will increase the debt level since they could also gain the benefit from tax shield. Lastly, for the 1-period lagged dividend payment, the result

suggests a significant effect to leverage ratio in a negative direction with 1% significant level. One explanation for this is the dividend-paying firm is considered as firm that have high retained earnings which can be used not only for financing the business operation but also paying out the dividend to shareholder. Therefore, the dividend-paying firm will have less need for debt and equity.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

The business cycle plays an important role in explaining the firm leverage level. This research has investigated the business cycles effect to the leverage level in Thailand. The data of Thai listed firms is collected from the Stock Exchange of Thailand. It has been collected from year 2005 to year 2014. The leverage ratio is used to determine the debt level in leverage level and the real gross domestic product is used as main determination of business cycles. Furthermore, this research also tests the impact from financial constraint and industry specific effect.

The research result indicates that when the firm is in expansion stage, the firm can obtain more profit from business activities and may use it as first choice of financing instead of issuing new debt or equity. In addition, there also exist the financial unconstraint effect to the leverage level but there does not exist the financial constraint effect. The firm without financial constraint will have a tendency to use less debt while the firm with financial constraint will not have debt level different from other firms. Moreover, this research paper test the effect of industry specific as well and the result shows the existence of the finance industry effect but not the industrial industry effect. The firm located in financial industry tends to use more debt comparing to firm in other industries. Overall, this paper is consistent with Shumi (2012). The incorporation of a business cycle explains the leverage ratio variation well as an unobserved variable.

The result of financial unconstraint, expansion period, profitability, and dividend payout are in the same direction which can be interpreted that for profitable firm, the firm without financial constraint, the dividend-paying firm, and the firm which operates in expansion period will have less leverage.

The study proposes a useful understanding in the effect of business cycles to leverage level since, when the phase of business cycles changes, the decision making in investment might change as well. The research also provides a helpful guide in managing the firm leverage level which is important since every business activities including business expansion, research and development, and new project investment

needs financing as money feed in. Selecting the right financing options is a way to maximize the firm value.

Further research recommendation includes adding more criteria in determining each business cycle phases and more extension of observation period to see wider pictures of economic situation and to see whether the leverage level can be well explained with business cycles in a longer period. The future research may add more criteria to dividing the firm with financial constraint and without financial constraint. In addition, other industry specific may be added to test the unique characteristic effect of that industry.

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APPENDICES

APPENDIX A

BUSINESS CYCLES

Figure A.1 11-year Thailand Historical Quarterly Real Gross Domestic Product

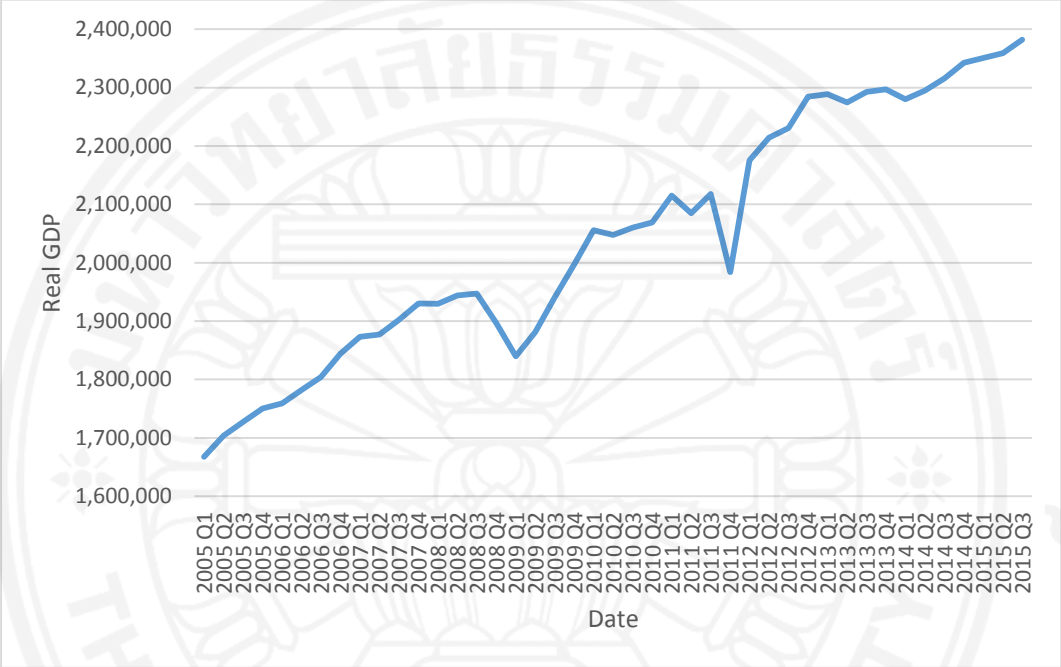

Figure A.2 11-year Thailand Historical Quarterly Change in Real GDP

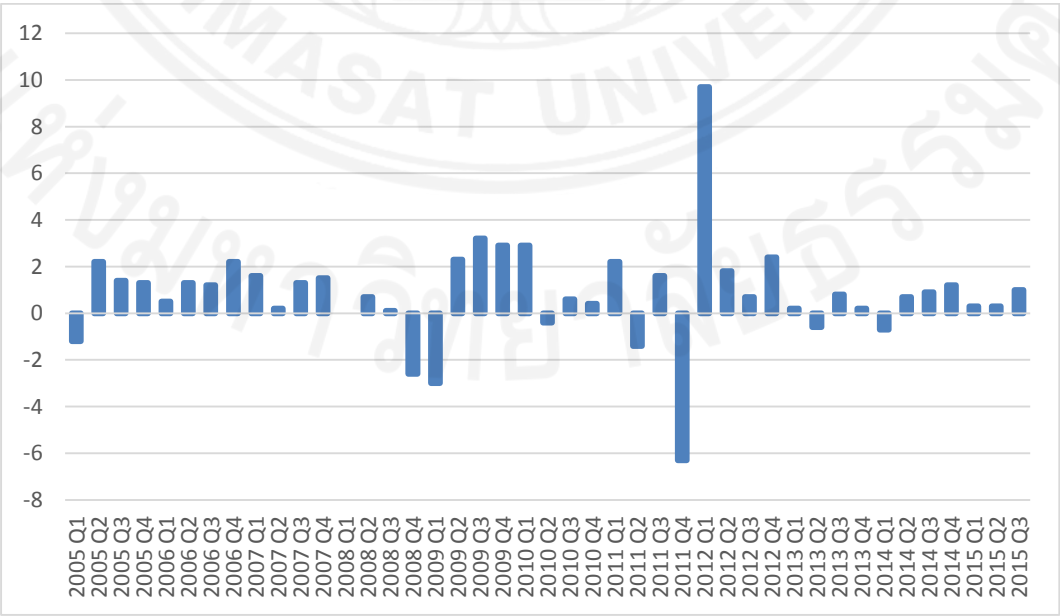

Table A.1 Business Cycles

Year	Economic Event	Business Cycle Phase
2005	Sustainable rising GDP	Expansion
2006	Sustainable rising GDP	Expansion
2007	Sustainable rising GDP	Peak
2008	Two consecutive decline in GDP	Contraction
2009	Sustainable rising GDP	Expansion
2010	Sustainable rising GDP	Peak
2011	Significant decline in GDP that affect all economy	Contraction
2012	Sustainable rising GDP	Expansion
2013	Sustainable rising GDP	Expansion
2014	Sustainable rising GDP	Expansion

Using guideline of determining business cycle from The National Bureau of Economic Research (NBER), the expansion phase occur if and only if there exist a sustainable rising in real GDP and its period usually last for several years. The contraction phase occurs in the event of 2 consecutive quarters of falling in real GDP or significant decline in economic activity spread across the economy. The contraction period can last from few months to few years. Peak phases exist in turning point of changing from the last expansion to contraction while trough happen in the opposite direction. According to Thailand economic growth, year 2008 and 2011 is considered to be contraction due to 2 consecutive quarter of declining in real GDP and significant decline in real GDP respectively. Other year is considered to be expansion since it has sustainable in positive growth.

APPENDIX B

DESCRIPTIVE STATISTICS

Table B.1 Descriptive Statistics

Variable	Mean	St. Dev.	Minimum	Median	Maximum
Lev	0.4388	0.2310	0.0000	0.4425	0.9976
Prof	0.0441	0.0976	-1.0573	0.0450	0.7942
Size	15.3916	1.6736	10.9627	15.1183	21.7377
Tang	0.3450	0.2482	0.0001	0.3245	0.9739
MB	1.4386	1.4151	0.0129	1.0303	16.0869
Div	0.7238	0.4472	0.0000	1.0000	1.0000
Cons	0.0295	0.1691	0.0000	0.0000	1.0000
Uncons	0.2215	0.4153	0.0000	0.0000	1.0000
Expan	0.6000	0.4900	0.0000	1.0000	1.0000
Fin	0.1331	0.3398	0.0000	0.0000	1.0000
Indus	0.1501	0.3573	0.0000	0.0000	1.0000

This table represent the summary statistic for the variable using in testing the hypothesis. The sample includes the listed firm from year 2005 to year 2014. Leverage ratio (Lev) is defined as total liability over total asset. The profitability (Prof) is measured as return on asset (ROA) which can be calculated by net income divided by total asset. Firm size (Size) is the natural logarithm of total asset. The asset tangibility (Tang) is derived from net property plant property and equipment over total asset. Market to book (MB) is the market value of equity divided by book value of equity. Dividend payment (Div) value equals to 1 if the firm pay out the dividend and 0 otherwise. To obtain financial constrain (Cons) value and financial unconstraint (Uncons) value, the firm which does not paying dividend and has market to book ratio lower than 1 is considered to be financial constrain. The sample is divide into 2 group which is financial constrain group and financial unconstraint group. The financial constrain group is ranked base on their total asset. The financial constrain value equals to 1 for the firm which locate in the first quartile of ranked firm in the first group and 0 other wise. The financial unconstraint group is also ranked base on their total asset and give a value of 1 to financial unconstraint value for the firm located in fourth quartile and 0 otherwise. By using the Table A.1, the expansion equals to 1 for expansion period and 0 otherwise. The financial industry (Fin) has value 1 if the firm is in this industry and 0 otherwise. The Industrial industry value equals to 1 for the firm in this industry and 0 otherwise.

APPENDIX C

PEARSON'S CORRELATION MATRIX

Table C.2 Pearson's Correlation Matrix

Variable	Lev	Prof	Size	Tang	MB	Div	Cons	Uncon	Expan	Fin	Indus
Lev	1.0000										
Prof	-0.2066*	1.0000									
Size	0.4419*	0.0981*	1.0000								
Tang	-0.0957*	0.0162	-0.0566*	1.0000							
MB	0.1449*	0.1126*	0.1305*	0.0427*	1.0000						
Div	-0.09810*	0.3015*	0.2134*	-0.0356*	0.0789*	1.0000					
Cons	-0.0365*	-0.2016*	-0.2085*	0.0019	0.0965*	-0.1846*	1.0000				
Uncons	0.2502*	0.0503*	0.7284*	0.0209	0.0954*	0.1709*	-0.0929*	1.0000			
Expans	0.0049	0.0150	0.0276	-0.0132	0.0258	0.0259	0.0055	-0.0017	1.0000		
Fin	0.3008*	-0.0754*	0.2131*	-0.4216*	-0.0525*	0.0108	-0.0387*	0.0761*	0.0000	1.0000	
Indus	-0.1182*	0.0147	-0.1332*	0.1426*	-0.1276*	-0.0206	-0.0263	-0.1326*	0.0000	-0.1647*	1.0000

This table represents the correlation coefficient matrix among the variables used for regression. The null hypothesis of Pearson's correlation is that the variables do not have a linear relationship in the population represented by the sample. * indicate the statistical significance level at 5%.

APPENDIX D

RESULTS

Table D.1 The regression result

	(1)	(2)	(3)	(4)
Prof	-0.2748***	-0.2732***	-0.2672***	-0.2725***
	(-11.53)	(-11.47)	(-11.21)	(-11.45)
Size	0.0704***	0.0721***	0.0697***	0.0717***
	(17.12)	(17.38)	(16.86)	(17.26)
Tang	-0.0425**	-0.0470**	-0.0290	-0.0455**
	(-2.27)	(-2.51)	(-1.52)	(-2.42)
MB	0.0032*	0.0045**	0.0048**	0.0044**
	(1.67)	(2.31)	(2.45)	(2.27)
Div	-0.320***	-0.326***	-0.0322***	-0.0325***
	(-5.37)	(-5.47)	(-5.42)	(-5.46)
Cons	-0.0004	-0.0001	-0.0001	-0.0003
	(-0.03)	(-0.01)	(-0.01)	(-0.02)
Uncons	-0.0192*	-0.0201*	-0.0205*	-0.0208*
	(-1.68)	(-1.77)	(-1.80)	(-1.82)
Expan		-0.0097***	-0.0106***	-0.0111***
		(-2.08)	(-2.83)	(-2.96)
Fin			0.1238***	
			(4.72)	
Indus				-0.0329
				(-1.32)
Constant	-0.5937***	-0.6130***	-0.6005***	-0.6030***
	(-9.26)	(-9.52)	(-9.42)	(-9.30)
Prob > F	0.0000	0.0000	0.0000	0.0000
Overall R^2	0.2640	0.2648	0.2963	0.2674
Observations	3177	3177	3177	3177

This table exhibits the results of regression the relationship between business cycle and leverage level. The dependent variable is Leverage ratio (Lev). Financial Constraint, Financial Unconstraint, Expansion period, Financial industry (Fin), and Industrial industry (Indus) are the independent variables. The control variables are Profitability (Prof), Firm Size (Size), Asset Tangibility (Tang), Market to Book value of equity (MB), and Dividend payment (Div). ***, ** and * indicate the statistical significance level at 1%, 5% and 10% respectively.

BIOGRAPHY

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