CORPORATE TAX AND LEVERAGE: EVIDENCE FROM FIRMS' RESPONSE TO THE TAX REFORM IN THAILAND

BY

MR. TAWEEPOL JANTANASARO

AN INDEPENDENT STUDY SUBMITTED IN PARTIAL
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PROGRAM IN FINANCE (INTERNATIONAL PROGRAM)
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was approved as partial fulfillment of the requirements for the degree of Master of Science (Finance)

on 03 MAY 2016

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Independent Study Title	CORPORATE TAX AND LEVERAGE: EVIDENCE FROM FIRMS' RESPONSE TO THE TAX REFORM IN THAILAND
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Degree	Master of Science (Finance)
Major Field/Faculty/University	Master of Science Program in Finance (International Program) Faculty of Commerce and Accountancy Thammasat University
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Academic Year	2015

ABSTRACT

This study explores how the tax reform, which ultimately lower the effective tax rate, affects management decisions for firms in The Stock Exchange of Thailand. This study takes a deeper analysis into by separating firms into financial and non-financial firms to compare the similarities and differences. The result of this test shows that the leverages of the firms in both sectors are affected by the tax reform supporting the trade-off theory. However, financial firms adjust their leverage more aggressively and their leverage decisions are based on the effective tax rate in the prior year, while non-financial firms are affected by the effective tax rate in the same year. Lastly, this study tested whether the initial tax rate before the tax reform affects the magnitude of change or not. The result shows that the initial level of effective tax rate is irrelevant.

Keywords: Leverage, Tax Reform, Trade-off Theory, The Stock Exchange of Thailand

ACKNOWLEDGEMENTS

The completion of this paper has involved guidance from many people; hence, I would first want to express my sincere gratitude to Associate Professor Seksak Jumreornvong, Ph.D. who has been guiding me with knowledge, patience, and enthusiasm from the beginning of this study until the end. Also, I would like to thank you my committee, Assistant Professor Chaiyuth Padungsaksawasdi, Ph.D. for all your suggestions throughout my research study and keeping me on the right track. Next, I would like to say express my appreciation to Thammasat University and the staffs of MIF for providing the facilities and convenience during my project. Furthermore, I am grateful for my classmates as well for being with me and supporting me at MIF. Last but not least, I want to thank my family for giving me the opportunity to study and supporting in every aspects of my life.

Mr. Taweepol Jantanasaro

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CHAPTER 1
INTRODUCTION

The degree of leverage of a firm has a significant impact on a firm's profitability. High leverage firm is believed to have higher risk from the fact that the cash flow fluctuate more violently because the amount of debt that amplifies the upside gain and also the downside lost. On the other hand, the cash flows of firms with lower degree of leverage do not change as much in a good and bad time.

Researchers have been studying about capital structure and leverage extensively and there is no single conclusion of what really is the determinant of leverage level. However, there are some factors that are more popular than others such as taxes, financial flexibility, cost of financial distress and market condition. To be able to study the effect of each factor, we need a control experiment where we change only one variable and keep other factors constant. Fortunately, Thailand had undergone a tax reform in 2012 reducing the corporate tax rate from 30% to 23% and another subsequence reduction in 2013 from 23% to 20%. This initially a temporary policy to stimulate investment and economy, however, in 2015 this policy was made permanent. This event will allow us to form a proxy of a control experiment where only tax rate changes and observe how the change in corporate tax rate affects the manager's decisions in choosing the optimal level of leverage.

Although, the relationship between corporate tax rate and level of leverage of a firm has been a hot topic in corporate finance for many decades, the empirical results vary across time and countries. This is why it is interesting to know whether the relationship between corporate tax rate and level of leverage exists in Thailand. We can also observe the transition between the two ways of financing, debt and equity. This study will help the stakeholders such as managers, banks, or even policy makers to be able to prepare for the effect of changing the tax rate in the future. It could also help understand the reason behind choosing some certain level of leverage and what influences those decisions. Lastly, this study could be a starting point for a further

study of how the firm reacts to the change in corporate tax rate in the longer run since adjusting the leverage is somewhat costly and time consuming in some cases.

An event study such as this one does not come around very often. Since there has never been a study like this for Thailand before, due to the fact that this is the first corporate tax rate change in at least 15 years, it is interesting to see the perception of Thai firms' manager. We can also compare the result with the choice of other international firms' manager from other studies and find the reason for the divergent in optimal level of leverage.

1.1 Tax Reform

The Royal Decree Issued under the Revenue Code Governing Reduction of Tax Rate and Exemption from Revenue Taxes (No. 564) B.E. 2556 (2013) was in effect in 2012. However, the announcement of the tax reduction was in late 2011. This revenue code reduced the tax rate for non-listed company from 30% to 23% and another subsequent reduction in 2013 from 23% to 20%. While for listed company, the initial tax rate was 25% and it was reduced to 23% in 2012 and 20% in 2013. Currently, the tax rate between listed and non-listed companies is the same at 20%. Initially, this corporate tax scheme was announced as a temporary policy but in 2015, this policy was made permanent. Furthermore, personal income tax was also reduced from the maximum of 37% down to 35% and the step in the progressive tax also got divided into more steps. This, in effect, reduced the total tax payment even the person is paying the same marginal tax rate.

CHAPTER 2
REVIEW OF LITERATURE

2.1 MM proposition I & II

One of the most studied theory relating to capital structure was capital structure irrelevance originated by Modigliani F. and Miller M. (1958). They proved that the level of leverage or the capital structure have no effect on the firm value by setting up two propositions. Proposition I stated that value of the lever firm and unlevered firm are equal because value of a firm is determined by the cash flow and the value does not change whether the cash flow goes to the debt holders or the equity holders. Moreover, the investor can also choose the preferable level of leverage of any company through homemade leverage, borrowing or lending themselves. Proposition II showed that the amount of leverage does not affect the firm cost of capital. When the level of debt, which has lower cost compare to cost of equity, increases, the cost of equity also increases from the more volatile outcome or higher risk keeping weighted cost of capital unchanged. With the same weighted cost of capital, the value of a firm will remain the same. These two propositions support the theory of capital structure irrelevance. However, this theory would hold under the assumptions that there is no taxes, no transaction cost, no bankruptcy cost, investors and companies can borrow at the same cost, and no asymmetric information.

Later on, there was a revision of these two propositions that include tax into the consideration of capital structure, Modigliani F. and Miller M. (1963). Since debt is tax deductable and equity is not, the cash flow to a company is not the same at each level of capital structure anymore. From Proposition I and II with tax, the firm can maximize the value by financing purely from debt and it is also the optimal capital structure. Nevertheless, other assumptions, which are no transaction cost, no bankruptcy cost, same cost of borrowing and symmetric information, are still in place in order for this theory to hold.

2.2 Trade-off Theory

Kraus A. and Litzenberger R. (1973) agreed that in the perfect world with no taxes and bankruptcy cost, the capital structure of a firm is irrelevant to its value. However, when applying the theory to practice, we should consider both tax and bankruptcy cost into optimizing a firm's capital structure. Increasing the amount of debt would benefit the firm from interest tax shield but it also increase the bankruptcy cost at the same time. As leverage increases, the marginal benefit of debt decreases while the marginal cost of bankruptcy increases. This means that the optimal structure is where marginal benefit of debt equal to the marginal cost of bankruptcy. So the value of a levered firm is equal to the value of unlevered firm plus the present value of tax shields and minus the present value of the cost of bankruptcy.

2.3 Pecking Order Theory

Pecking order theory was first introduced by Donaldson (1961) and Myer S. and Mujluf N. (1984) made them popular in the field of capital structure research. The model is focused on the asymmetric information between managers and investors. They believe that managers have superior information of the firm than the investors and managers will choose the way to raise fund in order to maximize the benefit of the company. So the way of raising capitals give different signal to the investors. If managers believe that their company is undervalue, they will issue debt instead of equity because the received fund would also be undervalue. On the other hand, if they believe that their company is overvalued, they will issue equity. So when a firm announced that they will issue more equity, price of stock should drop from the investors' expectation. This gives rise to the pecking order theory where it states that if a firm need more capital, they will first use the internal fund or retain earning. If internal finance is not enough, they will issue debt, then, the last choice is equity when the cost of debt is too high. This is for the managers to avoid giving the signal that the firm value is overpriced.

2.4 Agency Theory

Jensen and Meckling (1976) define the agency theory that it is the problem of disparity of the interest between principals and agents. Agency cost by Jensen and

Meckling include monitoring cost, bonding cost, and residual loss. Monitoring cost is the cost of inspecting the agents so that the agent will not move away from principals' interest. Bonding cost is the cost to the agents that may commit to a contractual agreement written by the principals so that the agent will act in the principals' interest. Residual loss will happen when both monitoring and bonding are not enough to align the benefit of principals and agents so that the divergent of benefits between the two still exists. Agency cost also affects capital structure because the amount of leverage can influence the managers' investment decision and different degree of monitoring from the debt holders.

2.5 Empirical Studies

The studies relating effect of tax on leverage shows a mixing result. Scholes, Wilson, and Wolfson (1990) and Hemmelgarn T. and Teichman (2014) both found a relationship between tax and capital structure in the commercial banking sector. Givoly D., Hayn C., Ofer A. and Sarig O. (1992) who studied the 1986 tax reform in the U.S. also concluded that the reduction in marginal tax rate is one of the determinants of capital structure. In addition, the personal tax rate has a significant impact on capital structure as well. Miller R., Morris M., and Scanlon K. (1994) studied the capital structure of the IPO companies to eliminate the transition cost and past experience effect and it gives a significant relationship between tax rate and capital structure. While, DeAngelo and Masulis (1980) concludes that empirical evidence does not support the theory.

Table 2.1 Summary of Empirical Evidences from Previous Studies

	Relationship between corporate tax rate and leverage?
Scholes, Wilson, and Wolfson (1990)	✓
Givoly D., Hayn C., Ofer A., and Sarig O. (1992)	✓
Klapper L. and Tzioumis K. (2008)	✓
Miller R., Morris M., and Scanlon K. (1994)	✓
PFAFFERMAYR M., STÖCKL M., and WINNER H. (2013)	✓
Hemmelgarn T. and Teichman (2014)	✓
DeAngelo and Masulis (1980)	x

For the previous studies about capital structure in Thailand, Thippayana P. (2014) studied what are the possible factors that affect the capital structure of the firms in the Stock Exchange of Thailand. She found out that the firm's leverage is affected by firm size and profitability but it is not affected by tangibility, growth opportunity, and business risk. However, she did not take tax level into account of her study. Another study by Haron R. (2014) studied the determinant of capital structure in Thailand, Malaysia and Singapore but also leave out tax level as one of the independent variable.

Three keys observations from these papers are the differences in control variables, the differences in the regression models that are used, and the definition of leverage in each paper.

There are varieties of control variables, for example, Givoly D., Hayn C., Ofer A., and Sarig O. (1992) used firm size, business risk, and bankruptcy cost, while, Miller R., Morris M., and Scanlon K. (1994) controlled for industry differences only. For the two papers that are related to Thailand, Thippayana P. (2014) and Haron R. (2014), the variables that are significant, meaning that they have an impact in determining capital structure, can be used as control variables for further studies.

The second observation is that the definition of leverage from each model is not necessary the same. Leverage can be calculated by using market value of debt and market value of equity or book value of debt and book value of equity. The amount of debt can vary from total liabilities to just long term debt. However, many of studies try to check for the robustness by testing whether changing the definition of leverage will alter the result. For example, Haron R. (2014) tested 6 different definitions of leverage which give different results or in Givoly D., Hayn C., Ofer A., and Sarig O. (1992) reported 2 leverage definitions in the paper but actually test other 7 definitions which give similar result compare to the 2 definitions reported.

The last observation is the differences in the model. The model that each study used varies from one another depending on the objectives of each paper and limitations of data. Givoly D., Hayn C., Ofer A., and Sarig O. (1992) studied firms' response to the Tax Reform Act of 1986. They run the data one year before the tax reform and found that the change in tax rate is not significant. Then, they used the data during the year

that the reform was announced and became effective and they found that the change in tax rate has an impact on the change in capital structure. Klapper L. and Tzioumis K. (2008) also studied how the tax reform affects capital structure but instead of cross sectional regression, they used multiple regression on panel data. Haron R. (2014) and Thippayana P. (2014) both studied the variables that have an effect on capital structure so they used multiple regression with panel data. Haron R. (2014) expanded his study further into the generalized method of moments which is the dynamic model under the assumption that the adjustment of capital structure is not perfect and there is the speed of adjustment. Miller R., Morris M., and Scanlon K. (1994) used cross-sectional regression because they have data limitation. They focused on the IPO companies so they did not have an access to the data before the IPOs. Scholes, Wilson, and Wolfson (1990) tested the relationship between marginal tax rate and their investment and financing decision. Instead of using tax rate as independent variables, they use tax rate as dependent variable to see the partial effect of each asset. Their independent variables were balance sheet item such as municipal bonds, preferred stock and common stock and they are serially correlated with each other. This led to the used of seemingly unrelated model.

Table 2.2 Past literature model and definition of leverages

	Model	Definition of Leverage
Givoly D., Hayn C., Ofer A., and Sarig O. (1992)	Cross-Sectional Regression	2 Reported definitions 7 Unreported Definitions
Klapper L. and Tzioumis K. (2008)	Multiple Regression	2 Definitions
Thippayana P. (2014)	Multiple Regression	3 Definitions
Haron R. (2014)	Multiple Regression GMM (Dynamic Model)	6 Definitions
Miller R., Morris M., and Scanlon K. (1994)	Cross-Sectional Regression	$\frac{\text{BV of Debt}}{\text{MV of Equity + BV of Debt}}$
Scholes, Wilson, and Wolfson (1990)	Seemingly Unrelated Regression	-

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Theoretical Framework

This research bases on the trade-off theory. Since it will try to isolate the other factors except tax and see how the change in the tax rate affects leverage. From the theory earlier explained, the optimal capital structure is achieved when marginal benefit of debt is equal to marginal cost of debt. If we assume that our sample firms' levels of leverages are already at the optimal level, when the effective tax rate is reduced from the tax reform, the marginal benefit of debt would decrease. The firms would adjust their leverage by reducing the amount of debt to balance the marginal benefit and marginal cost of debt. If the result showed otherwise, it could favor other theories such as pecking order theory because the reduction in debt could result from increase in equity and managers might be cautious of giving unintended signal.

3.2 Hypotheses

In this study, we want to find the answer to two main questions relating to corporate tax rate.

Hypothesis I: Thailand tax reform causes a change in firms' level of leverage. According to tradeoff theory, we expect that the decreasing in statuary tax rate which result in the reduction in effective tax rate will cause firms to shift from using debt to equity.

Hypothesis II: Firms with higher level of effective tax rate will reduce their leverage more than the firms with lower effective tax rate. This hypothesis is also derived from tradeoff theory since the firms with high initial level of leverage will lose more benefit from interest tax shield so they have to reduce more debt in order to be at the optimal level of leverage, where marginal benefit of debt equals the marginal cost of financial distress.

3.3 Methodology

To find the effect of the Thailand tax reform on firms' leverage, we follow Klapper L. and Tzioumis K. (2008) panel regression.

(1) $Lev_{it} = \alpha_i + \beta_1 ETR_t + \beta_2 SIZE_t + \beta_3 BRISK_t + \beta_4 TBQ_t + \beta_5 Prof_t + \beta_6 \text{NDTS}_t + \beta_7 DY_t + \varepsilon_{it}$

The dependent variable, LEV, is the level of leverage. Our interest independent variable is ETR, which is effective tax rate. Other control variables to account for non-tax factor are kept in line with Givoly D., Hayn C., Ofer A., and Sarig O. (1992), which are firm size (SIZE), business risk (BRISK), bankruptcy cost (TBQ), and dividend yield (DY). However, we will also add two control variables that are profitability (Prof) because it has proven to affect capital structure in Thailand by Thippayana P. (2014) and depreciation (NDTS) that is a substitute for debt tax shield. The data that will be used is between 2011-2014 which will consist of both before and after the tax reform. If β_1 is significant then we can conclude that Thailand tax reform has an impact on leverage. We expect further that β_1 will be positive because when effective tax rate is reduced, firms will have less incentive in having debt from lower tax shield benefit.

(2) $Lev_{it} = \alpha_i + \beta_8 ETR_{t-1} + \beta_9 SIZE_t + \beta_{10} BRISK_t + \beta_{11} TBQ_t + \beta_{12} Prof_t + \beta_{13} \text{NDTS}_t + \beta_{14} DY_t + \varepsilon_{it}$

Furthermore, we also testes the relationship between leverage and effective tax rate in the previous period by using the lag effective tax rate. This method was used in Jeffrey K. and Mackie-Mason (1990) and Klapper L. and Tzioumis K. (2008) used it to test for robustness. If ETR in this model shows a significant result, this means that managers use the effective tax rate in the previous period to adjust their leverage in this period. Klapper L. and Tzioumis K. (2008) found a significant relationship using this method.

To answer the second question of how will high leverage and low leverage firms react differently to the reduction in corporate tax rate, our model will follow Givoly D., Hayn C., Ofer A., and Sarig O. (1992). They used the change in leverage as dependent

variable and effective marginal tax rate as independent variable. They concluded that the higher the marginal tax rate, the higher the change in leverage

(3) $\Delta Lev = \alpha + \beta_{15} ETR + \beta_{16} SIZE + \beta_{17} BRISK + \beta_{18} TBQ + \beta_{19} Prof + \beta_{20}\text{NDTS} + \beta_{21} DY + \varepsilon_t$

Model (3) looks the same as model (1) but model (3) will be using cross-sectional regression instead of panel regression as in model (1). We will run the data between 2011, 2012, 2013, and 2014 separately. We expect β_{15} in the year 2011, which is before the tax reform, to be insignificant and should not contribute to the change in leverage. β_{15} is expected to be negative and significant in 2012 and higher in magnitude in 2013 and 2014 after the reduction is fully in effect and there was more time for the firms to adjust their leverage. Negative sign means that the firms with higher effective tax rate tend to decrease leverage more than the firm with lower effective tax rate.

For the robustness, four definitions of leverage will be used which divided into book value and quasi market value as suggested by Haron R. (2014). Book value leverages are total book value of debt divided by book value of equity and book value of long term debt divided by book value of equity. Quasi market value leverages are defined as total book value of debt divided by market value of equity and long term book value of debt divided by market value of equity

3.4 Variables

3.4.1 Leverage (LEV) and Change in Leverage (ΔLEV)

In this study, we will use 2 definitions of leverage which divided into book value and quasi market value. The advantages of using book value of equity and book value of debt in calculating leverage are book value reflects the intention of the manager to set a certain leverage level that they perceived as optimal level. Market value will change continuously depending on the views and expectations of investors. And management can adjust book value of leverage through repurchasing, issuing new debt and equity over the long run Givoly D., Hayn C., Ofer A., and Sarig O. (1992). However, using market value also has its advantages. In theory, leverage can be adjusted faster toward optimal level and the cost of adjusting is lower. It also reflects

the optimal level of the market and not the manager alone which could be biased from past experience. We define leverage as follow:

$$LEV_1 = BVD_t/(BVD_t + BVE_t)$$

$$LEV_2 = BVD_t/(BVD_t + MVE_t)$$

Where; BVD is book value of debt, BVE is book value of equity, and MVE is market value of equity.

For the change of leverage, it is simply the difference of the level of leverage between the current and previous year.

$$\Delta LEV = LEV_t - LEV_{t-1}$$

Some studies such as Givoly D., Hayn C., Ofer A., and Sarig O. (1992) include market value of short term debt in to leverage analysis. We choose to exclude short term debt because short term debt takes into account only short term financing and can be change according to short term needs which can be biased. Total debt emphasizes more on the longer and permanent change in leverage. So it is a better representative for intentional change and less situational.

3.4.2 Effective Tax Rate (ETR)

The effective tax rate used in this model is from a widely used ratio by many studies, including Shackelford and Shevlin (2001), Buijink W., Janssen B., and Schols Y. (2002), and Klapper L. and Tzioumis K. (2008). This is the accounting tax which is not the actual cash flow that firms pay. However, this is a better representation of the effective tax rate since Thai firms pay taxes for first half of the year profit in August and the second half in June next year. Using the actual tax cash flow would be misleading since there is the lag in tax payment.

$$ETR = \frac{Tax\ expense}{Pretax\ income\ over\ period}$$

3.4.3 Firm size (SIZE)

This control variable is common in controlling for size as seen in Klapper L. and Tzioumis K. (2008) and Givoly D., Hayn C., Ofer A., and Sarig O. (1992). The size of a firm is used to control for the ability to adjust their firm leverage since big firm might be able to change their level of leverage more easily from the advantage of return to scale. However, there are some differences in studies of how size is being defined. Some studies choose the natural log of total sale, while other studies choose the natural log of total firm value. We choose the latter definition because sale sometime could not represent the size of firms. Firms with high sale but small firm value would not get the return to scale benefit.

$$SIZE = \ln(\text{Total firm value})$$

3.4.4 Business risk (BRISK)

The business risk measures the variation in operating income. It is calculated by using standard deviation of operating income after depreciation over 5 years divided by mean of operating income after depreciation over 5 years. This method is similar to Givoly D., Hayn C., Ofer A., and Sarig O. (1992) instead they were using 10 years instead of 5 years.

$$BRISK = \frac{Std.Dev.of\ operating\ income\ after\ depre.over\ 5\ yrs.}{|Mean\ of\ operating\ income\ after\ depre.over\ 5\ yrs.|}$$

3.4.5 Bankruptcy cost (TBQ)

We use the inverse of Tobin's Q ratio to define our bankruptcy cost. Brealey and Myers (1988) suggested that the bankruptcy cost for high growth opportunity firms and firms that depend on intangible asset because these firms lose the potentially high benefit in the future and their intangible asset value will be affected harshly in the case of bankruptcy. The bankruptcy cost is calculated as follow:

$$TBQ = \frac{(Book\ value\ of\ equity) - (Intangible\ assets)}{(Market\ value\ of\ equity)}$$

3.4.6 Profitability (Prof)

Profitability is found to be a significant determination of capital structure in many studies, especially Thippayana P. (2014) and Haron R. (2014) found that it is significant for firms in Thailand. We use the same definition of profitability as Haron R. (2014). Using EBIT instead of net income also avoids the problem of serial correlation between profitability and the effective tax rate since EBIT is pretax income which is not affected by the tax rate.

$$Prof = \frac{EBIT}{Total\ Asset}$$

3.4.7 Non-Debt Tax Shield (NDTS)

DeAngelo and Masulis (1980) proposed that non-debt tax shield is a substitute for debt tax shield since some non-debt items can also be used to deduct tax expense. Non-debt tax shield that were suggested by DeAngelo and Masulis are investment tax credits and depreciation. Since depreciation is a major non-debt tax shield for Thai company, we will include depreciation tax shield as our control variable. Titman and Wessels (1988) defined depreciation as depreciation divided by total asset but since our data source is limited, we use depreciation, amortization and depletion instead of depreciation. This is, in our opinion, a better proxy of non-debt tax shield because amortization is also tax deductible.

$$NDTS = \frac{Depreciation + Amortization + Depletion}{Total\ Asset}$$

3.4.8 Dividend Yield (DY)

DeAngelo and Masulis (1980) suggested that not only corporate tax rate that affects capital structure but also personal income tax. Since there was a reduction in personal income tax from the maximum of 37% to 35% in 2013, we need to control for this change in our model. Many studies, including Givoly D., Hayn C., Ofer A., and Sarig O. (1992), shows that dividend yield can be used to determine the tax clientele of investors so we will also adopt their approach.

$$DY = \frac{Dividend\ Payment}{Price}$$

3.5 Data Sources

The data that will be used to calculate these variables are all the firms that have been listed in the Stock Exchange of Thailand (SET) for at least 5 years (2010-2014). The reason is we will use the data from 2010 as our base case before the announcement of the tax reform in 2011 and the actual rate reduction in 2012 and 2013. The data is from DataStream. All of the industry will be included even though all industries are affected differently because these varieties will provide us a stronger result.

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Descriptive Statistics

The sample consists of 413 firms from The Stock Exchange of Thailand for all year. The sample includes all trading stocks that are listed during 2010-2014 excluding property fund and mutual fund. The descriptive statistics of the sample in 2011 and the sample during 2012-2014 are shown in Table 4.1. We separate two samples because we want to point out the change in the descriptive statistics between pre and post tax change. The mean and median of the effective tax rate, ETR, during 2012-2014 is 16.32% and 18.96% compare to the mean and median in 2011 of 21.47% and 25.15%. This reduction was the result of the new revenue code which reflected into the company effective tax rate. We can also observe the reduction in our dependent variable the degree of leverage. The mean of leverage calculating from book value, Lev_1, and leverage using market value, Lev_2, in 2012 – 2014 are 0.4586 and 0.4064 which were lower than 0.4697 and 0.4267 in 2011. The table also shows the reduction in the median from the two samples for about the same magnitude. The descriptive statistics of the control variables can also be found in the table.

Table 4.1 Descriptive Statistics of regression variables

	2011			2012-2014		
Variable	Mean	Median	SD	Mean	Median	SD
Lev_1	0.4697	0.4685	0.2424	0.4586	0.4616	0.2358
Lev_2	0.4267	0.4126	0.2408	0.4064	0.3883	0.2376
ETR	0.2147	0.2515	0.3219	0.1632	0.1896	0.3073
Size	15.4246	15.1415	1.6394	15.6162	15.3086	1.6736
TBQ	0.9665	0.8166	0.7006	0.9229	0.7796	0.6857
Prof	0.0738	0.0709	0.1144	0.0719	0.0684	0.0973
NDTS	0.0348	0.0281	0.0395	0.0333	0.0265	0.0343
BRISK	0.1826	0.3965	6.0941	0.7339	0.3944	11.974
DY	0.0335	0.0289	0.0301	0.0355	0.0307	0.0403

Note: All of the data are from DataStream. Firms that are not listed during the year 2010-2014 are removed from both set of the samples leaving the remaining of 413 firms. Property fund and mutual fund that were traded in The Stock Exchange of Thailand during this period are also removed. Lev_1 is the ratio of book value of debt divided by book value of debt plus book value of equity. Lev_2 is the ratio of book value of debt divided by book value of debt plus market value of equity. Market value of equity uses the stock price at year end. ETR is accounting tax expense over pretax income. Size is the natural log of total asset. TBQ is the difference between book value of equity and intangible asset divided by market value of equity. This is the inverse of Tobin's Q. Prof is earning before interest and tax (EBIT) divided by total asset. NDTS is the sum of depreciation, depletion, and amortization divided by total asset. BRISK is the standard deviation of the operating income over 5 years divided by the mean of the operating income over 5 years. DY is dividend payment over price of the stock at year end.

4.2 Result

We started with model (1) but the model uses panel data so we first need to check whether fixed effect or random effect model is more appropriate. The result of Hausman test is shown in appendix 1 and appendix 2. The Hausman test shows that the model is better with fixed effect and this is intuitively correct since each firm is unique from one another so it is better to treat them as a separate entity. Fixed effect model is also consistent with Klapper L. and Tzioumis K. (2008).

The result of model (1) is shown in Table 4.2. Model (1) tests whether the new revenue code that reduce the tax rate affects the degree of leverage of the Thai firms. This model tests the relationship between the level of effective tax rate to the level of leverage without using any lag term. The control variables are firm size, the inverse of

Tobin's Q, profitability, non-debt tax shield, business risk, and dividend yield. Our dependent variable is divided into 2 types consisting of leverage calculating from book value and leverage calculating from market value. Table 4.2 shows that effective tax rate is significant at 10% significant level in the model that has book value leverage as a dependent variable. The coefficient is positive meaning that the degree of leverage moves in the same direction as the tax rate. In this case, the reduction in tax causes the degree of leverage to decreases. This reaction of the Thai firms' managers is in line with the previous research and providing an additional support for the trade-off theory. For the control variables, Size is significant at 1% significant level and having a positive sign. This means that firm size has an effect on the degree of leverage of the firms and bigger firms can take higher leverage due to the economy of scale. The inverse of Tobin's Q is significant at 1% significant level and its coefficient is negative. The rest of the control variables, including profitability, non-debt tax shield, business risk, and dividend yield, are not significant at least at 10% significant level. The R-square of the model is 0.1864.

An alternate model (1) is having market leverage as a dependent variable. However, in this model, our interested variable, effective tax rate, ETR, is not significant implying that the effective tax rate does not play a role in determining the degree of leverage. For the control variables, only firm size and the inverse of Tobin's Q is significant at 1% significant level. The rest of the control variables are not significant at least at 10% significant level. The R-square of this model is 0.0040. So this alternate model does not support the relationship between tax rate and the level of leverage.

Model (1) provides some evidence of the relationship between the reduction in tax rate and the decreased in leverage but it is still a weak evidence. The reason is that only the model with book leverage is significant and only at 10% significant level. We need more evidence so we will continue with the second model to increase the robustness of the test.

Table 4.2 Regression Analysis of Model (1) (no lag term)

	Lev (Book)	Lev (Market)
Intercept	-0.3801	-0.7636
	(-2.72)***	(-3.66)***
ETR	0.0008	0.0014
	(1.93)*	(0.47)
Size	0.0571	0.0608
	(6.36)***	(5.19)***
TBQ	-0.0475	0.0845
	(-8.05)***	(12.35)***
Prof	-7.14e-08	-0.0003
	(-0.03)	(-1.46)
NDTS	8.32e-06	0.0086
	(0.15)	(1.46)
BRISK	0.00001	-0.0002
	(0.05)	(-0.65)
DY	6.84e-06	0.0160
	(0.08)	(1.46)
R-square	0.1864	0.0040

Note: Fixed-effects regression for the year 2011-2014. T-statistics are reported in the parenthesis. The asterisks represent the significant level of each variable, (*) is 10%, (**) is 5%, and (***) is 1%. R-square is overall R-square of the model.

In model (2), there is a slight different in our interested independent variable. Instead of using the level of effective tax rate, we use the lag of the level of effective tax rate. For example, we regress the 2012 level of leverage on the 2011 effective tax rate. Since doing this will reduce our sample size for one year, we add 2010 to the dataset to keep the amount of data the same as in model (1). The result of the second model is shown in Table 4.3 for both using the book and market leverage as dependent variable.

For the first model using book leverage as a dependent variable, our interested independent variable, ETR, showing a significant relationship at 5% significant level and this is a stronger support compare to the first model. The coefficient is 0.0019 which is positive and supporting the trade-off theory. This means that for every one percent increase in the effective tax rate, 0.0019 unit of leverage will increase. For the control variable, size is positive and significant at 1% significant level. Tobin's Q is also significant at 1% significant level and has a negative sign coefficient meaning that high

growth firm tends to have lower leverage. The rest of the control variables are not significant at least at 10% significant level. The R-square is 0.1874.

The alternate model for model (2) is also using market leverage. The result of this model shows that the interested model effective tax rate is significant at 1% significant level when using the lag term of the ETR. The coefficient stands at 0.0030 which means that for every 1% increase in the effective tax rate, leverage using the market value will increase by 0.0030 unit. This is an even stronger evidence of the effect of the tax rate on the level of firm leverage. Firm size and TBQ are also significant at 1% percent and both having positive signs. The rest of the control variables, profitability, non-debt tax shield, business risk, and dividend yield, are not significant at least at 90% confidence level. The R-square of this model is 0.2269.

Model (2) gives better and stronger evidence toward hypothesis one since both version of model (2) give a significant relationship between ETR and the level of leverage (one at 5% and the alternate model at 1%). This implies that Thai firms' managers are backward looking. They used the effective tax rate from the previous year to adjust their leverage level to the optimal point. This piece of information is additional information to most of the past study such as the study done by Givoly D., Hayn C., Ofer A. and Sarig O. (1992) who use just the coincidence level of effective tax rate. However, this result is in line with Klapper L. and Tzioumis K. (2008) who did the robustness check with his model and also found a significant relationship between the lag term of the effective tax rate and the level of leverage. Their study was done with the Croatian firms.

Table 4.3 Regression Analysis of Model (2) (lag ETR)

	Lev (Book)	Lev (Market)
Intercept	-0.3719	-0.4901
	(-2.66)***	(-3.41)***
ETR	0.0019	0.0030
	(2.00)**	(3.01)***
Size	0.0565	0.0525
	(6.29)***	(5.68)***
TBQ	-0.0469	0.0912
	(-7.92)***	(14.97)***
Prof	-1.10E-07	-3.22E-08
	(-0.05)	(-0.01)
NDTS	9.63E-06	6.75E-06
	(0.17)	(0.12)
BRISK	-1.46E-05	6.07E-07
	(-0.06)	(0.00)
DY	7.58E-06	5.50E-06
	(0.09)	(0.06)
R-square	0.1874	0.2269

Note: Fixed-effects regression for the year 2011-2014. T-statistics are reported in the parenthesis. The asterisks represent the significant level of each variable, (*) is 10%, (**) is 5%, and (***) is 1%. R-square is overall R-square of the model.

Table 4.4 shows the result of Model (3) which we will use these information to answer our second hypothesis. Hypothesis 2 states that firms that initially face higher effective tax rate will reduce their leverage more compare to the firms face lower effective tax rate. The reason is that firms with high effective tax rate will forgo higher benefit of tax shield therefore they will reduce their leverage more to achieve where marginal befit of tax shield is equal to the marginal bankruptcy cost. The result shows that in the year 2011 our interested variables, ETR, are not significant in both book leverage and market leverage models. These are in line with our expectation because in 2011 the new revenue code has not been in effect yet. However, we expect that the effective tax rate will be a significant variable for the year 2012 – 2014, but the result suggests otherwise. This implies that the level of leverage before the change in the tax rate has no role in determining the change in leverage. This evidence is different from Givoly D., Hayn C., Ofer A. and Sarig O. (1992) who found a significant relationship.

Table 4.4 Regression Analysis of Model (3)

	2011		2012-2014	
	ΔLev (Book)	ΔLev (Market)	ΔLev (Book)	ΔLev (Market)
Intercept	-0.0574	-0.1634	-0.0152	-0.1961
	(-1.11)	(-2.99)***	(-0.53)	(-6.27)***
ETR	0.0134	-0.0024	0.0055	0.0142
	(0.68)	(-0.11)	(0.59)	(1.39)
Size	0.0050	0.0108	0.0024	0.0091
	(1.63)	(3.36)***	(1.41)	(4.88)***
TBQ	-0.0079	0.0244	-0.0204	0.0318
	(-1.13)	(3.26)***	(-4.59)***	(6.56)***
Prof	-0.1229	-0.1113	-0.1806	-0.1186
	(-2.64)***	(-2.26)**	(-5.98)***	(-3.60)***
NDTS	-0.1455	-0.0298	-0.1595	0.0727
	(-1.00)	(-0.19)	(-1.85)*	(0.77)
BRISK	0.0002	-0.0003	-0.0002	-0.0003
	(0.69)	(-0.93)	(-0.97)	(-1.14)
DY	0.0028	0.0175	0.2490	0.5208
	(0.18)	(1.10)	(3.48)***	(6.67)***
Adjusted R-square	0.0176	0.0736	0.0457	0.0851

Note: Fixed-effects regression for the year 2011-2014. T-statistics are reported in the parenthesis. The asterisks represent the significant level of each variable, (*) is 10%, (**) is 5%, and (***) is 1%.

We also did some further analysis regarding the tax effect on 2 major groups of Thai firms. We separate our dataset into 2 groups, financial and non-financial. Then, we repeat the regression in model (2) (using lagged ETR) for both industries. The result as shown in table 4.5 is somewhat surprising. For financial sector, in the book leverage model, the effective tax rate is significant at 10% and the coefficient is positive. Size and business risk are significant at 1% significant level. Non-debt tax shield and the inverse of Tobin's Q are significant at 5% significant level. Profitability and business risk are not significant. The R-square dramatically improves from around 0.18 to around 0.41. For the market leverage model, ETR is significant at 1% and it also has a positive coefficient in line with the original model. All of the control variables are significant at 1%, except non-debt tax shield that is significant at 5% and business risk that is not significant. The R-square of this model also increase from about 0.23 in the original model to 0.40. On the other hand, the dataset consists of non-financial firms show an insignificant relationship between effective tax rate and the degree of leverage.

We then repeat the model I (using ETR instead of lag ETR in model II) with separate industries dataset. The result in table 4.6 shows that the effective tax rate has no effect on leverage for financial sector but for non-financial sector, it is significant at 5% in the model with book leverage. The sign of the coefficient shows the same positive sign as the original model. Size and Tobin's Q are significant at 1% significant level for the model with book leverage using non-financial sector data.

The importance of this finding is that the managers in firms coming from different sectors have different time frame in deciding the change in leverage. Managers from financial sectors seem to use past information from the previous period to adjust their level of leverage in this period. On the other hand, managers from non-financial sector use the information within the same period to adjust their leverage level. Moreover, when we make an analysis on the magnitude of the coefficient of the effective tax rate, we found that the coefficient of the firms in financial sector is significantly higher (0.0014 of financial firms compare to 0.0009 of non-financial firms). This implies that firms in financial sectors adjust their leverage more aggressively. Possible explanation for the aggressiveness is that the balance sheets of firms in financial sectors are more flexible. Their balance sheet in general should contain more financial products, deposits, and loans, which are somewhat more liquid and adjustable. Non-financial firms' balance sheets should have more physical asset that are less liquid meaning that they have higher transaction cost.

Table 4.5 Regression Analysis of Model (2) with separating industries

	Financial Sector (with lagged ETR)		Non-Financial Sector (with lagged ETR)	
	Lev (Book)	Lev (Mkt)	Lev (Book)	Lev (Mkt)
Intercept	-1.605	-2.3939	-0.071	-0.0059
	(-5.98)***	(-8.93)***	(-0.45)	(-0.04)
ETR	0.0014	0.0024	0.0024	0.0049
	(1.92)*	(3.31)***	(0.74)	(1.48)
Size	0.1349	0.1715	0.0356	0.0195
	(8.89)***	(11.31)***	(3.45)***	(1.85)*
TBQ	-0.0430	0.1142	-0.0463	0.0908
	(-2.08)**	(5.52)***	(-7.51)***	(14.47)***
Prof	-0.7130	-0.4719	-1.49E-07	-1.07E-07
	(-5.18)	(-3.43)***	(-0.06)	(-0.04)
NDTS	7.4386	6.1579	8.47E-06	5.50E-06
	(2.58)**	(2.14)**	(0.15)	(0.09)
BRISK	0.0001	0.0006	-0.0001	-5.38E-05
	(0.12)	(0.57)	(-0.22)	(-0.22)
DY	0.8223	1.2494	8.06E-06	6.72E-06
	(3.70)***	(5.62)***	(0.09)	(0.07)
R-square	0.4113	0.4017	0.1276	0.1641

Note: Fixed-effects regression for the year 2011-2014. T-statistics are reported in the parenthesis. The asterisks represent the significant level of each variable, (*) is 10%, (**) is 5%, and (***) is 1%. R-square is overall R-square of the model.

Table 4.6 Regression Analysis of Model (1) with separating industries

	Financial Sector (no lagged term)		Non-Financial Sector (no lagged term)	
	Lev (Book)	Lev (Market)	Lev (Book)	Lev (Market)
Intercept	-1.6606	-2.2890	-0.2352	-0.2277
	(-6.89)***	(-8.87)***	(-1.92)*	(-2.87)***
ETR	-0.0024	-0.0012	0.0009	0.0006
	(-0.52)	(-0.26)	(2.12)**	(1.30)
Size	0.1422	0.1704	0.0467	0.0247
	(10.16)***	(11.38)***	(5.88)***	(2.93)***
TBQ	-0.0325	0.1040	-0.0493	0.0847
	(-2.17)**	(6.51)***	(-10.42)***	(16.88)***
Prof	-0.6116	-0.3685	-8.70E-08	-3.10E-08
	(-4.49)***	(-2.53)**	(-0.04)	(-0.01)
NDTS	1.3450	0.3291	7.95E-06	3.31E-06
	(0.75)	(0.17)	(0.13)	(0.05)
BRISK	-0.0003	-0.0008	0.0002	0.0002
	(-0.37)	(-0.86)	(1.53)	(1.59)
DY	0.3779	0.7520	8.45E-06	5.45E-06
	(1.91)*	(3.55)***	(0.09)	(0.06)
R-square	0.4841	0.4054	0.1173	0.1676

Note: Fixed-effects regression for the year 2011-2014. T-statistics are reported in the parenthesis. The asterisks represent the significant level of each variable, (*) is 10%, (**) is 5%, and (***) is 1%. R-square is overall R-square of the model.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion and Recommendation

The result of Model (1) that testing the relationship between the tax rate and the level of leverage without any lag term provides some evidence of the existing relationship between the tax rate and the degree leverage. Model (2) that changes the variable effective tax rate to the lag term of effective tax rate strengthens the evidence in model (1) and confirms the existence of trade-off theory within the Thai firms. Model (2) also suggests that the managers of Thai firms make the transition of leverage base on the effective tax rate in the prior year. The sign of the coefficients all point to the same direction that when the tax rate is reduced, they are likely to reduce their debt relatively to equity to cope with the lower benefit of interest tax shield. This finding confirms the result of many studies in the past both using the lag effective tax rate and the tax rate in the same year.

Model (3) tests whether the level of the tax rate that firms is initially facing affects the magnitude of change in leverage. The result shows that the level of tax that the firms are facing before the tax reform has no effect on the magnitude of change in leverage. This evidence is a proof of the divergent in the managers' point of view, since a study about US firms and US tax reform find a significant relationship between the initial tax rate and the change in leverage.

Lastly, we look further into the industries within The Stock Exchange of Thailand and divided the firms into financial sector and non-financial sector. We repeated model (1) and model (2) over again but instead of pooling all firms together, we separate them into financial and non-financial firms. The result that we found provides a deeper analysis about financial and non-financial sectors and their uniqueness. For model (2) that use the lag term of effective tax rate, only firms in financial sector show a significant relationship between the tax rate and leverage. On the other hand, in model (1) that uses the tax rate in the same year as leverage shows that only firms in non-financial sector react to the change in tax rate. When we compare

the coefficient, we also observe that the financial firms have higher coefficient. From these result, we can conclude that firms in financial sector uses tax rate of the last year to assess what should be their optimal level of leverage this year and financial firms adjust their leverage more aggressively than the firms in non-financial sector. A possible explanation about the aggressiveness is that financial firms' balance sheets are in some degree more flexible than the non-financial firms because their balance sheets consist more of financial instrument and less of physical assets. This advantage gives the ability for the financial firm to adjust their leverage with lower transaction cost thus they can make more changes.

The result of this study provides an additional support to the trade-off theory. It shows that Thai firm's managers are aware of the effect from the change in tax rate and the benefit and loss of the action. From the models that we tested, it seems that there exists an undeniable relationship between the benefit of tax shield and the financial distress cost.

For further studies and recommendation, the sample of this study is limited by the amount of time after the tax reform so it leaves the scope of studying the leverage adjustment in the longer run. This study also uses only total debt so further studies can extend the definitions of leverage into long term or even short term debt. Lastly, industries could be broken down into more industries rather than just financial and non-financial sectors.

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APPENDIX

APPENDIX A
HAUSMAN TEST FOR MODEL (1)

Table A.1 Hausman test for model (1) without lag term

	Fixed	Random	Difference
ETR	0.0008	0.0008	0.0001
Size	0.0571	0.0576	-0.0004
TBQ	-0.0475	-0.0496	0.0021
Prof	-7.14e-08	-3.49e-06	3.42e-06
NDTS	8.32e-06	0.0001	-0.0001
BRISK	-0.00001	0.00003	-0.00004
DY	6.84e-06	0.0002	-0.0002
Chi-Square		19.60	
P-value		0.0033	

Table A.2 Hausman test for model (1) with lag term

	Fixed	Random	Difference
ETR	0.0019	0.0019	0.0001
Size	0.0565	0.0573	0.0076
TBQ	-0.0469	-0.0490	0.0020
Prof	-1.10e-07	-3.54e-06	8.95e-07
NDTS	9.63e-06	0.0001	0.00002
BRISK	-0.00001	0.00002	0.00002
DY	7.58e-06	0.0002	0.0001
Chi-Square		18.37	
P-value		0.0054	

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