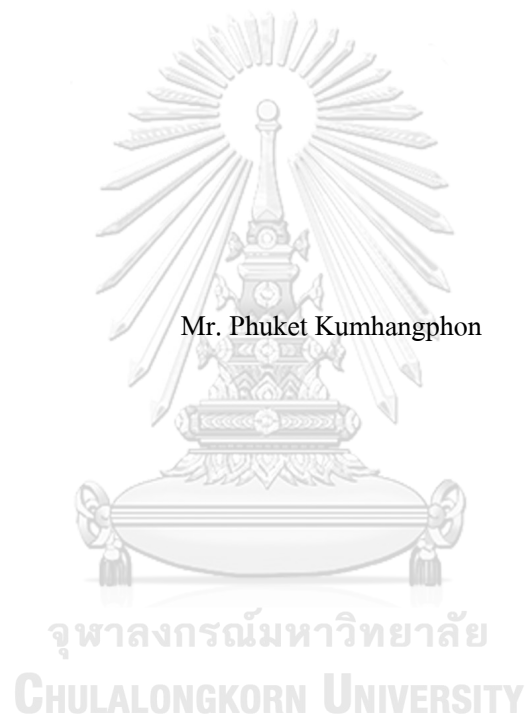


The Impact of Derivative Warrant Introduction: Evidence from Stock Exchange of Thailand



An Independent Study Submitted in Partial Fulfillment of the Requirements

for the Degree of Master of Science in Finance

Department of Banking and Finance

FACULTY OF COMMERCE AND ACCOUNTANCY

Chulalongkorn University

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ผลกระทบจากการใช้ "ใบสำคัญแสดงสิทธิอนุพันธ์" ต่อหุ้นในตลาดหุ้นไทย



สารนิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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ภูเก็ต คำแหงพล : ผลกระทบจากการใช้ "ใบสำคัญแสดงสิทธิอนุพันธ์" ต่อหุ้นในตลาด
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ในปัจจุบันการใช้ "ใบสำคัญแสดงสิทธิอนุพันธ์" ได้มีจำนวนเพิ่มขึ้นอย่างมากในหมู่ผู้
ลงทุนในตลาดหุ้นไทย ผลกระทบจากตราสารอนุพันธ์ต่อหุ้นในตลาดหุ้นไทยจึงเป็นเรื่องที่สำคัญ
และเป็นสิ่งที่ต้องคำนึงถึง การวิจัยนี้ได้ทำการศึกษาเพื่อตรวจหาผลกระทบของการเริ่มใช้
ใบสำคัญแสดงสิทธิอนุพันธ์ต่อหุ้นอ้างอิงของตราสารอนุพันธ์โดยได้คำนึงถึงผลกระทบต่อ
สภาพคล่องของหุ้น (วัดจากปริมาณการซื้อขายของหุ้น) และผลกระทบต่อความเสี่ยงในหุ้น (วัด
จากความผันผวนของราคาและ systematic risk) งานวิจัยนี้ได้ใช้ t-test และ regression analysis
ในการศึกษาผลกระทบต่อสภาพคล่องของหุ้นหลังจากที่มีการประกาศใช้ใบสำคัญแสดงสิทธิ
อนุพันธ์ ในส่วนของผลกระทบต่อความเสี่ยงในหุ้น งานวิจัยนี้ใช้วิธีการ f-test และ GARCH(1,1)
model ในการตรวจหาความเปลี่ยนแปลงของค่าความผันผวนของราคาหุ้นในตลาดหุ้นไทย
หลังจากที่มีการประกาศใช้ใบสำคัญแสดงสิทธิอนุพันธ์ และในส่วนของ systematic risk งานวิจัย
นี้ได้ regression analysis ในการตรวจสอบความเปลี่ยนแปลงของค่า systematic risk ของหุ้น
หลังจากที่มีการประกาศใช้ใบสำคัญแสดงสิทธิอนุพันธ์

ผลลัพธ์ที่ได้พบว่าการประกาศใช้ใบสำคัญแสดงสิทธิอนุพันธ์มีผลกระทบต่อหุ้นใน
ตลาดหุ้นไทยโดยทำให้หุ้นมีสภาพคล่องที่ลดลง มีความผันผวนต่อราคาลดลง และไม่มี
ผลกระทบต่อค่า systematic risk ในตัวหุ้น ผลลัพธ์ของงานวิจัยทางผู้จัดทำคาดว่าน่าจะเป็นป
ประโยชน์ต่อคณะกรรมการกำกับหลักทรัพย์ในการร่างกฎของบังคับในการควบคุมการใช้
ใบสำคัญแสดงสิทธิอนุพันธ์ของนักลงทุนในตลาดหุ้นและน่าจะเป็นประโยชน์ต่อนักลงทุนใน
ตลาดหุ้นไทยในการปรับปรุงกลยุทธ์การลงทุนในปัจจุบัน

สาขาวิชา การเงิน

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ลายมือชื่อนิติต

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KEYWORD: Liquidity, Derivative Warrant, Stock Exchange of Thailand, stock price
volatility, Volatility, Systematic Risk

Phuket Kumhangphon : The Impact of Derivative Warrant Introduction:Evidence
from Stock Exchange of Thailand. Advisor: Tanawit Sae-Sue, Ph.D.

The impact that derivative instrument has on the underlying stocks is important for regulators and investors to concern. This paper tries to examine the impact of derivative warrant introduction on liquidity (measured by trading volume) and risk (measure by volatility and systematic risk beta) of the underlying stocks in stock exchange of Thailand. This paper examines the impact on trading volume by using t-test for testing the equality of two means between pre-derivative warrant introduction period and post-derivative warrant introduction period and using dummy variable regression for finding a change in the underlying's trading volume after the introduction of derivative warrant. For the impact on the underlying's risk, this paper uses f-test to determine the equality of two variance by using the ratio of variance between pre-derivative warrant introduction period and post-derivative warrant introduction period and also uses GARCH (1,1) model with dummy variable to find a change in volatility of the underlying stocks after derivative warrant introduction, the dummy variable is also applied to investigate a change in the underlying's beta after derivative warrant introduction.

Overall, the results from the impact after derivative warrant introduction, reduction in liquidity, reduction in volatility and no change in systematic risk beta, could provide additional information for regulators to improve market efficiency and for investors to enhance their trading strategy.

Field of Study: Finance

Student's Signature

Academic Year: 2021

Advisor's Signature

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Phuket Kumhangphon



TABLE OF CONTENTS

	Page
ABSTRACT (THAI)	iii
ABSTRACT (ENGLISH).....	iv
ACKNOWLEDGEMENTS.....	v
TABLE OF CONTENTS.....	vi
CHAPTER 1 INTRODUCTION	1
Objectives.....	4
Hypothesis Development	5
CHAPTER 2 LITERATURE REVIEW	8
CHAPTER 3 DATA	11
CHAPTER 4 METHODOLOGY	12
The impact on underlying's volume.....	12
The impact on underlying's volatility	15
Systematic Risk Beta measurement	18
CHAPTER 5 EMPIRICAL RESULT.....	20
The impact on underlying's volume.....	20
The impact on underlying's volatility	24
Systematic Risk Beta measurement	27
CHAPTER 6 CONCLUSION.....	28
REFERENCES	30
Appendix.....	33
VITA.....	59

CHAPTER 1 INTRODUCTION

Derivative warrants are one of the derivative instruments. Its characteristics is similar to the option contract instruments but derivative warrants issued by financial institutions approved by regulators. The issuer gives the holders the right to buy (Call DW) or sell (Put DW) the underlying asset at the fixed price within the maturity date of contract. For a “Call DW”, Investors who held this contract will expect to gain the profit when the underlying asset price goes up. For a “Put DW”, The price of “Put DW” will be opposed to the underlying price. The Put DW holder will gain the profit when the underlying price goes down. Generally derivative warrants have a lifespan at 2 months till 2 years and the DW value will decrease until maturity date. In the present, many investors have increased their interest in option market including derivative warrants market because investors can use less money to trade in derivative warrants than to trade in the underlying stock and they can gain benefit from derivative warrant whether upside or downside market. Moreover, investors use derivative warrant to improve their trading strategy. For instance, investors use derivative warrants for hedging their portfolio when they predict the underlying price will fall or protecting the loss in high volatility market. From these characteristics of derivative warrant, it changes the behavior of investor when they invest in the underlying stock and the consequence could have the impact on the underlying stocks.

Derivative warrant has been traded in Thailand since 2009. In 2009, KGI Securities (Thailand) Public Limited Company launched 3 derivative warrants which the first three underlying were PTT, KBANK, and PTTEP. After derivative warrant was introduced, the derivative warrant market has grown significantly due to its characteristics. In 2012, the monthly trading value was approximately 4,000 million bath with the number of derivative warrant of 300. In 2015 the monthly trading value was approximately 40,000 million bath with the number of derivative warrant of 900. In 2019 the monthly trading value was approximately 120,000 million bath with the number of derivative warrant of 1800. The chart of the monthly derivative warrant trading value and the number of derivative warrants in 2012, 2015, 2019 is shown in figure1, figure2, figure3 respectively. As chart shown, the number of trading value have significantly

increased 10 times and the number of derivative warrants has significantly increased 3 times from 2012 to 2015 and from 2015 to 2019 the number of trading value have also increased 3 times and the number of derivative warrants has also increased 2 times. The higher number of growths also implied that the number of investors who decided to trade in derivative warrant tend to increase every year and this led to the concern that derivative warrant might have an impact on its underlying stock which we will study in this paper.

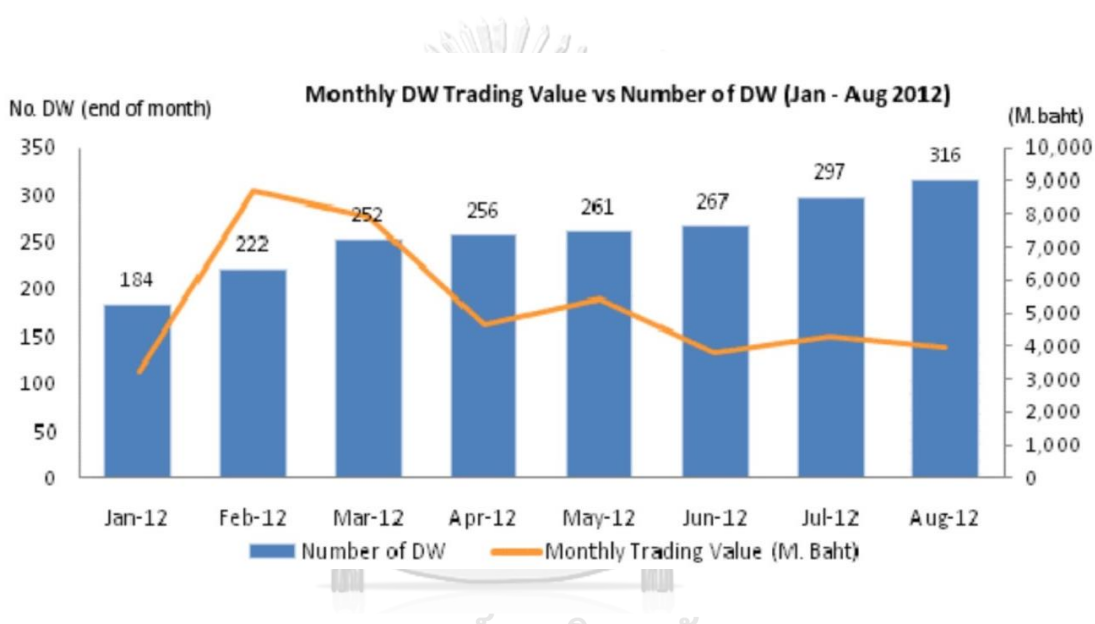


Figure1. Derivative warrant trading value and the number of derivative warrant in 2012

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From : <https://www.set.or.th/site/products/dw/statistics>

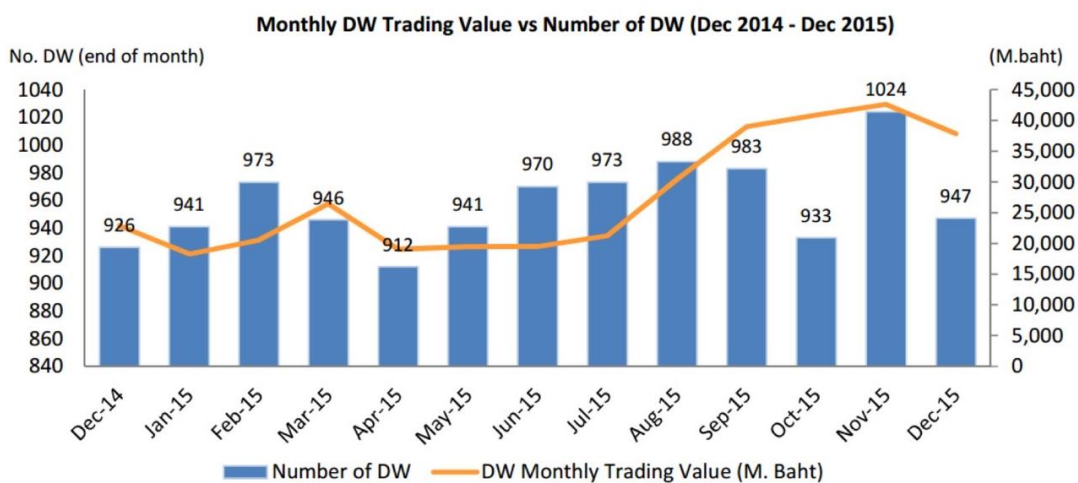


Figure2. Derivative warrant trading value and the number of derivative warrant in 2015

From : <https://www.set.or.th/site/products/dw/statistics>

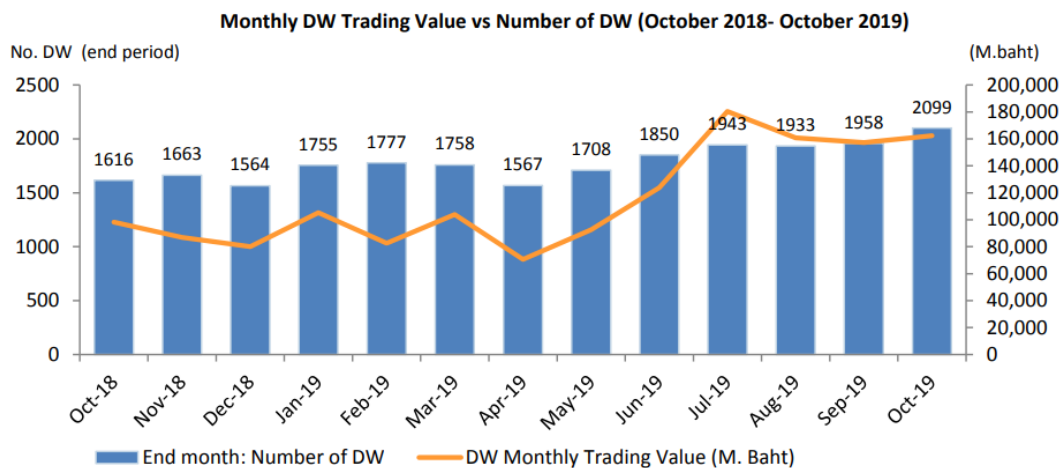


Figure3. Derivative warrant trading value and the number of derivative warrant in 2019

From : <https://www.set.or.th/site/products/dw/statistics>

Due to fast growing in trading volume and number of derivative warrants, there could be some concerns of the impact of derivative warrant instruments on the underlying stocks. Therefore, the purpose of this paper is to examine the impact on trading volume and risk of the underlying stocks after derivative warrant was introduced.

Objectives

Base on the statement above, the significant growth of derivative market produces some concerns about the impact of derivative warrants on the underlying stocks. For instance, derivative warrant can give a leveraged position in the underlying stocks. These characteristics might attract the investors to move from the underlying market to the derivative warrant market and resulting the reduction on trading volume of the underlying market. On the other hand, derivative warrants offer an investor a different opportunity set to invest than the underlying stocks only. The expansion of the opportunity set to invest allow more optimal position in the market and this could induce some investors to shift the demand in the underlying market. The increase in trading volume of underlying stocks after derivative warrant introduction can be used by investors to manage their investment strategy. A higher trading volume causes a good effect in liquidity and this can lead to the fair price of the underlying stock for investors but another concern is for regulator, due to its characteristics such as leverage or low friction, these may lead the underlying stock market become illiquidity because investors tend to move to the more attractive market. Therefore, the first objective in this research is **to examine the trading volume impact of the underlying stocks after derivative warrant introduction.**

Another concern is the risk impact of the underlying stocks which implied from volatility and the systematic risk beta. From Faff & Hillier (2003), they indicated that the volatility of the underlying stocks had increased after option introduction. Also in contrast with Conrad (1989), she found a reduction in the underlying's volatility after the introduction of option. The result could be either way due to the characteristics of derivative warrant that could change trading strategy of investors and this led to the price volatility of the underlying stocks. The result from

volatility impact could be benefit for investors to manage their trading strategy when the underlying market are volatile. Moreover, this could be benefit for the regulator to manage the volatility of the market. In the case that derivative warrant introduction causes a decrease in the underlying's volatility, the regulator could issue derivative warrant to alleviate the market volatility. On the contrary, the regulator could be very discreet when they issue new derivative warrant for preventing an increase in volatility of the underlying stock market. Therefore, the second objective in this research is **to examine the volatility impact of the underlying stocks after derivative warrant introduction**. Besides the volatility, the underlying's risk also implied by the systematic risk beta. Conrad (1989) indicated that the systematic risk beta unchanged after option introduction, this result was also supported by Watt, Yadev and Draper (1992) and Long, Schinski & Officer (1994). In general, the systematic risk beta result should be consistent with the volatility result. The systematic risk beta is one of the interesting factor that indicate whether derivative warrant introduction has an effect on the risk of the underlying stocks. Therefore, the third objective in this research is **to examine a change in the systematic risk beta after derivative warrant introduction**

Hypothesis Development

From the previous empirical studies, there are many studies indicated the trading volume of the underlying stocks after option introduction. Kumar, Sarin & Shastri (1998), they defined that the underlying's trading volume had increased after option introduction. Also supported with Faff & Hillier (2005), they tested the changes in trading volume in the UK market and found a significant increase in volume of the underlying stocks. Long, Schniski & Officer (1994), they also indicated that average trading volume of all firms increased more than 28% after the introduction of option. These results from the previous studies supported the complete market theory which defined that the improved opportunity sets to invest will attract new investors to participate in the market. Therefore, their results associate with the complete market theory that the option introduction increased investors interest in the underlying stock due to an increment of

investment opportunity sets. However, some researcher argued with the previous results. Clarke, Gannon, Vinning (2005), they examined the impact of warrant introduction in Australian market, they found a reduction in trading volume of the underlying stocks after the warrant introduction. From their result, they explained that the warrant products are speculative investment, therefore, this product could be used by speculators and traders who have superior information sets. Inside traders or speculators used the high leveraged product to substitute their investment in the underlying stocks and this shifting from the underlying stock market to the warrant market is referred to the substitution theory. The results on the previous empirical studies seem to be either way in the oversea market. Due to the characteristics of Thailand market that most of big cap stocks are retail company and food company, this difference from the oversea market that most of big cap stocks are tech company. This is very interesting to find whether the result in Thailand market will be the same as the previous research, however, this can still be expected the same result as the oversea market that the introduction increase trading volume of the underlying stock. Therefore, this research aims to investigate the impact of derivative warrant introduction on the underlying's trading volume in Thailand.

Hypothesis 1 : The trading volume of underlying stocks increase after derivative warrant introduction

For the volatility impact, there are various result from the previous empirical researches. Chaudhury and Elfakhani (1997) investigated the impact of option introduction in Canada and they also found a decrease in variance. Draper, Mak and Tang (2001), they investigated the impact of derivative warrant introduction on the underlying stock and they also found a reduction in volatility over 80% of the underlying stocks, from their empirical result, they explained that the decrease in variance is due to hedging strategy of derivative product. The increment of investor interest led to an increase in trading volume of the underlying stocks and this caused a variance stabilization effect. Consequently, volatility declined. However, some also indicated the opposite result. Faff & Hillier (2003), they indicated that the volatility of the underlying stocks had increased after option introduction. They explained their argument that option introduction

caused speculation in stable stock and led to an increase in volatility. However, they also mentioned in their research that they only used 10 days period before and after option introduction to avoid the existence of possibility event during the study period therefore the result from Faff & Hillier (2003) only captured the short-term impact of option introduction. Due to the characteristics of derivative warrant that allow investors to improve their trading strategy, this can induce investors to increase their demand in the underlying stock market, leading to the decreased volatility of underlying's price. Therefore, we expect the introduction of derivative warrant reduce volatility of the underlying stocks.

Hypothesis 2 : The volatility of underlying stocks decrease after derivative warrant introduction

Apart from the volatility, the systematic risk beta can be use to measure the risk of the underlying asset in the market. The empirical results of the systematic risk beta also vary. Conrad (1989), she indicated that the systematic risk beta was unchanged after option introduction. However, she also found a decrease in the underlying's variance. She concluded that introduction didn't associated with systematic risk but for a decline in variance, she attributed to the selection bias from options exchanges. Contrast with Conrad (1989), Detemple and Jorion (1990) found a significant decrease in the systematic risk beta after the option introduction. Chaudhury and Elfakhani (1997) also found a decrease in the systematic risk beta after the listing of put options in Canada market. However, there are many researches that supported Conrad (1989) result. Clarke, Gannon, Vinning (2005), investigated the impact of derivative warrant introduction in Australian market, they concluded that derivative warrant introduction didn't have impact with the underlying's risk. From the previous empirical results, they conclude that the introduction of derivative product doesn't have any impact with systematic risk but for some results that found a change in systematic risk beta, this caused by the selection bias from sample of stocks. Due to some different characteristics of Thailand stock exchange as we explained above, this could be expected that Thailand market have a different result from the previous research.

Hypothesis 3 : The systematic risk beta of underlying stocks decrease after derivative warrant introduction

CHAPTER 2 LITERATURE REVIEW

There are many researches that studied about the impact on the underlying stock when the option contracts including warrant contract and derivative warrant contract were introduced. The majority of research in this field has used data from US option and stock markets such as American Stock Exchange (AMEX) and Chicago Board Option Exchange (CBOE). Many researches have studied base on older pre-90's data, this part will mainly focus on the researches that examine the empirical result about trading volume impact and risk impact which implied by volatility and systematic risk beta of the underlying stock.

The previous empirical results of trading volume impact seem to associate with the complete market theory which indicated that new investors will participate in the underlying stock market due to the increase of investment opportunity set. Long, Schinski & Officer (1994), they studied on the level of changes after option introduction. They found that average trading volume of every size of firms increased more than 28% and the smallest and mid-size firms tend to have the most significant effects, they also indicate that option increased investor interest due to its characteristics. Kumar, Sarin & Shastri (1998) examined the impact of option trading on the market quality. They used volume, quote depth and bid-ask spreads offered by market makers as market quality and they found an increase in trading volume of underlying securities after option listing. Ho & Liu (1997) examined price behavior surrounding option introduction by using longer test windows and they defined the price effect is accompanied by an increase in trading volume. Whiteside, Dukes & Dunne (1983) studied the short-term impact of option trading and they indicated that there were a significant increase in the volatility of volume. Besides the empirical researches in the US market, the volume effects of the underlying stock have also been studied in oversea market. Draper, Mak & Tang (2001) studied on the derivative warrant market in Hong Kong and they found a significant increases in trading volume after the introduction of derivative warrant. Chen, K.C. & Wu, L. (2000) also examined an introduction and expiration effect of derivative warrant market in Hong Kong. Faff & Hillier (2005) tested the changes in trading volume in the UK market by using regression analysis with a dummy variable for the day

after option introduction and they found a significant increase in volume of the underlying stocks. In contrast with the previous empirical result, Clarke, Gannon, Vinning (2005) studied the impact of warrant listing in Australian market and they found a decrease in the underlying's trading volume. They concluded that speculators who have inside information use the leveraged products to substitute their investment in the underlying stocks, they also referred this result to the substitution theory.

This can be seen that trading volume impact of option introduction on the underlying stock seem to consistently positive. This can imply that characteristics of option and derivative warrant seem to be attractive to investor and the improvement of opportunity sets encouraged new investor but there were some researchers argued that when speculators shift their trading activities in the derivative market it might decrease trading volume in the underlying stock market.

For the empirical researches on risk impact. Conrad (1989), she studied the price effect of option introduction. She examined that variance decreased after option introduction but there were unchanged in beta. Watt, Yadav and Draper (1992) also supported Conrad (1989), they studied the impact of option introduction in UK market, the result showed that the volatility decreased for 25.3% and systematic risk beta unchanged. From the results, they concluded that the introduction of option didn't have an impact with the systematic risk of the underlying stock. St Pierre (1998) used an EGARCH equation to define that there is no effect on the conditional volatility after option introduction but there is a decrease in unconditional volatility after option introduction. Skinner (1989) used the information content of accounting earning release to investigate a before/after ratio and also found that volatility decrease after option listing but the betas of the underlying stocks were insignificant. Elfkani & Chuadhury (1997) examined the effect of Canadian put option listing on the volatility of the underlying stock. The result showed a decrease in the beta risk and a decrease in variance after put option introduction. They concluded that the decrease in variance was due to an increased liquidity leading to a variance stabilization effect. Draper, Mak & Tang (2001) studied on the derivative warrant market in Hong Kong by using GARCH equation and they found that volatility decrease more than 80% of all stock in the

Hong Kong market. McKenzie, Brailsford & Faff (2001) studied on the impact of the introduction of Individual Stock Future (ISF) by using GARCH model. They found a general reduction in systematic risk and unconditional volatility on individual stocks after the listing of futures.

Also in contrast, some researches indicated that the introduction of option or future contract positively related with volatility. Faff & Hillier (2003) used GARCH model to examine the changes in volatility after option introduction. They found an increase in volatility after the introduction of option. Harris (1989) studied volatility of the underlying price comparing between S&P 500 and non S&P 500 stocks by using cross-sectional analysis. He found an increase in volatility of the underlying stocks after the introduction of S&P 500 index future. Butterworth (2000) also found an increase in volatility of the underlying price after future trading began by using the GARCH model.

From the previous risk impact measurement researches, the most result indicated that option introduction decreased the volatility of the underlying stocks but there were no significantly change in systematic risk beta of the underlying stocks.

Although there are many researches that examine the listing effect of option, future, warrant and derivative warrant on the underlying stocks but most of the researches are based on the U.S. market and oversea market. Derivative warrant market has been used worldwide and also in Thailand. It has become one of the most popular market in the present day but there are still few researches that study on the impact of derivative warrant market on the underlying market in Thailand. Therefore, the result of this research could be useful for understanding the derivative warrant market of Thailand.

CHAPTER 3 DATA

Derivative warrant contracts were introduced to Thai market in 2009. Therefore, this research uses data of the underlying stocks and derivative warrants beginning on 1 January 2009. Our data ends on 31 December 2019, a few years before the current date, for the reason that data after 2019 is expected to be strongly influenced by the effect of covid-19 which will likely dominate the effect of derivative warrant listing. Nevertheless, several analyses in this work will focus on the time windows around the first time listing of a derivative warrant of the firm.

Furthermore, the derivative warrants have also been filtered based on the available data. The firms of derivative warrant must have 100 days of trading volume and daily price data before and after derivative warrant listing date. Additionally, we want to also filter out firms that are involved in mergers & acquisitions event or internal public offering event during the relevant 200 days period (100 days before listing and 100 days after listing).

In the analysis of this research, the time series data is used, the daily data of underlying stocks, in term of market capitalization and trading volume in the Stock Exchange of Thailand, were collected from SETSMART and Refinitiv Workspace. The derivative warrant data were also collected from SETSMART.

CHAPTER 4 METHODOLOGY

According to the literature, several methods can be employed to examine the impact of DW introduction on the underlying stock. Some authors used event study-based method while others analyze with simple OLS or panel data analysis with control variables. In this research, we will use a mixture of both methods to investigate 3 different aspects of impacts on the underlying stocks in Thai market, namely the trading volume, volatility and the systematic risk measure (beta). In the past studies, these 3 aspects were documented to be significantly impacted in many stock markets around the world.

The impact on underlying's volume

Because trading volume of the underlying stock is highly volatile with large variance and generally not normally distributed, therefore, we first apply the exponential smoothing process, a standard process to tone down the extreme shock from daily trading volume data. The normalized trading value will be tested in all of the analysis. The exponential smoothing process is computed from the following equation.

$$S_{i,t} = \alpha Y_{i,t} + (1 - \alpha) S_{i,t-1} \quad (1)$$

where : $S_{i,t}$ is the normalized trading volume of the underlying stock i on day t

$Y_{i,t}$ is the actual trading volume of the underlying stock i on day t

α is Smoothing factor

$S_{i,t-1}$ is the normalized trading volume of the underlying stock i on day t-1

Next, we investigate whether the derivative warrant introduction event caused a permanent change in the underlying's volume. Following the work by Damodaran & Lim (1991) and Watt, Yadev & Draper (1992), the average normalized trading volume is used to compare between the 100 days before and the 100 days after the introduction of DW.

A second method is based on the regression analysis on every stock with DW listing in the data. To find the change in trading volume that originated from the listing of DW, variables that typically influence the end of day trading volume, such as trading value and price range of the day, are added as control variables in the regression. The regression is then applied to time series data of individual stock, where the dummy variable marked all the dates at which the DW is already listed for the stock. The estimated regression model is presented below,

$$\mathit{LnV}_{i,t} = \alpha_i + \beta_{1i}\mathit{LnValue}_{i,t} + \beta_{2i}\mathit{Range}_{i,t} + \beta_{3i}\mathit{DUMMY}_{i,t} + \varepsilon_{i,t} \quad (2)$$

where : $\mathit{LnV}_{i,t}$ is the natural logarithm of trading volume of the underlying stock i on day t

$\mathit{LnValue}_{i,t}$ is the natural logarithm of trading value of the underlying stock i on day t

$\mathit{Range}_{i,t}$ is the intraday price range computed from the range between the highest price and the lowest price of the underlying stock i on day t

$\mathit{DUMMY}_{i,t}$ is 0 for the pre-derivative warrant introduction period and 1 for the post-introduction period

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The mainly interested term in this regression is dummy coefficient (β_3) which indicates whether derivative warrant introduction increases or decreases the trading volume of the underlying stocks. In the case that β_3 is positive, we can imply that derivative warrant introduction, on average, increases the trading volume, but if β_3 is negative, the derivative warrant introduction would instead decrease the trading volume. Finally, the terminal result of this method is concluded based on the statistic of β_3 , whether the majority of underlying stocks have increasing or decreasing trading volume post DW introduction.

The third method is based on a panel data regression with sample of stocks that include both with and without DW listing. The purpose of this method is to eliminate some factors other than the effect from derivative warrant introduction such as macroeconomic factors or calendar effects, therefore, the control group of non-derivative warrant listing, which is the underlying stock in SET100, are included with derivative warrant listing stock to test in the panel data regression.

From Wuthisatien (2021), he found Monday effect and January effect occurred in Thailand market. Therefore, we use dummy variable to control impact of calendar effect and seasoning effect on trading volume of the underlying stocks. Moreover, we also add free float and SET50 variable to control the impact from size of the underlying stocks. The panel data regression model is presented below.

$$V_{i,t} = \alpha_1 + \beta_1 V_{i,t-1} + \beta_2 MON_{i,t} + \beta_3 JAN_{i,t} + \beta_4 FLOAT_{i,t} + \beta_5 DUMMY_{i,t} + \varepsilon_1 \quad (3)$$

where : $V_{i,t}$ is the turnover ratio of the underlying stock i on day t

$V_{i,t-1}$ is the turnover ratio of the underlying stock i on day t - 1

$MON_{i,t}$ is 1 for trading volume on Monday and 0 otherwise

$JAN_{i,t}$ is 1 for trading volume in January and 0 otherwise

$FLOAT_{i,t}$ is the free float of the underlying stock i on day t

$DUMMY_{i,t}$ is 0 for the pre-derivative warrant introduction period and 1 for the post-introduction period

The mainly interested term in this regression is dummy coefficient (β_5) which indicates whether derivative warrant introduction increase or decrease trading volume of the underlying stocks. In the case that β_5 is positive, we can imply that derivative warrant introduction, on

average, increases the trading volume of the underlying stock. Instead, if β_5 is negative, we can imply that derivative warrant introduction decreases the trading volume of the underlying stock.

The impact on underlying's volatility

To examine the impact on volatility of the underlying stocks, Damodaran & Lim (1991) and Watt, Yadev & Draper (1992) calculated variance of the underlying price within 100 days before and after the introduction of derivative warrant and applied an f-test to test the variance. In this research, we also use this method.

$$F = \frac{s_1^2}{s_2^2} \quad (4)$$

Equation (4) is test statistic from f-test

where ; s_1^2 is variance for pre-event period

s_2^2 is variance for post-event period

Another method for determining a change in volatility is borrowed from Faff & Hillier (2003). In their work, they used GARCH (1,1) with an additional dummy in the volatility equation, aiming to capture a structural change in the volatility. The GARCH(1,1) model shown below will be applied to all stocks individually,

$$R_{i,t} = \alpha_i + \beta_{1,i}R_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

$$\sigma_{i,t}^2 = \delta_{0,i} + \delta_{1,i}\varepsilon_{i,t-1}^2 + \eta_{1,i}\sigma_{i,t-1}^2 + \gamma_{1,i}DUMMY_{i,t} \quad (6)$$

Equation (5) is a generalized estimation model is used to generate the residuals required for the GARCH analysis where; $R_{i,t}$ is the return of the underlying stock i at time t

α_i is a constant term

$R_{i,t-1}$ is an auto-regressive term for the return of the underlying stock i at time t-1

Equation (6) is the conditional variance equation

where; $\sigma_{i,t}^2$ is the conditional variance of the underlying stock i on time t

$\varepsilon_{i,t-1}^2$ is the relevant information (ARCH term)

$\sigma_{i,t-1}^2$ is lagged conditional variance (GARCH term)

$DUMMY_{i,t}$ is 0 for the pre-derivative warrant introduction period and 1 for the post-introduction period

The most interesting term in this regression is the dummy coefficient (γ_1). We can use this coefficient to indicate whether derivative warrant introduction has an impact on the underlying's volatility and this coefficient also indicate that derivative warrant increase (positive) or decrease (negative) the underlying's volatility.

Similar to the panel data analysis for the trading volume, in order to eliminate effects other than the effect from derivative warrant introduction, the control group of non-derivative warrant issued and time variable controlling calendar effect are used in the panel data regression.

$$\sigma_{i,t} = \alpha_1 + \beta_1 \sigma_{i,t-1} + \beta_2 MON_{i,t} + \beta_3 JAN_{i,t} + \beta_4 FLOAT_{i,t} + \beta_5 DUMMY_{i,t} + \varepsilon_1 \quad (7)$$

where : $\sigma_{i,t}$ is the volatility of the underlying stock i on day t

$\sigma_{i,t-1}$ is the volatility of the underlying stock i on day t - 1

$MON_{i,t}$ is 1 for trading volume on Monday and 0 otherwise

$JAN_{i,t}$ is 1 for trading volume in January and 0 otherwise

$FLOAT_{i,t}$ is the free float of the underlying stock i on day t

$DUMMY_{i,t}$ is 0 for the pre-derivative warrant introduction period and 1 for the post-introduction period

The mainly interested term in this regression is dummy coefficient (β_5) which indicates whether derivative warrant introduction increase or decrease volatility of the underlying stocks. In the case that β_5 is positive, we can imply that derivative warrant introduction increase volatility of the underlying stock and if β_5 is negative, we can imply that derivative warrant introduction decrease volatility of the underlying stock.

Systematic Risk Beta measurement

Beta is a measure of the underlying's relative volatility, which calculated by the equation (8) below

$$\beta_{i,t} = \frac{Cov(R_{i,t}, RM_t)}{Var(RM_t)} \quad (8)$$

where ; $R_{i,t}$ is return of the underlying stock i at time t

RM_t is return of SET100 at time t

The ordinary least squares regression model is also used to calculate between the lognormal return of the underlying stocks and the lognormal return of the market index, a period is 100 days before and after the derivative warrant introduction. The regression analysis is used to find relationship between each individual stock and market. The dummy variable regression is used to capture a change in the systematic risk beta.

$$R_{i,t} = \alpha_i + \beta_{1i}RM_t + \beta_{2i}(RM_t \cdot DUMMY_t) + \beta_{3i}DUMMY_{i,t} + \varepsilon_{i,t} \quad (9)$$

where ; $R_{i,t}$ is the underlying return of stock i at time t

α_i is a constant term

RM_t is the return of SET100 at time t

$DUMMY$ is 0 for the pre-derivative warrant introduction period and 1 for the post-introduction period

The mainly interested term in this regression is β_2 which can test the change in correlation between stock return and market return. We can use this coefficient to indicate whether the derivative warrant introduction leads to a change in systematic risk beta by using the p-value of this coefficient.

The panel data regression analysis does not cover in this part because a result from panel data regression presents only 1 result of beta but the systematic risk beta should not be the same value across the market, therefore, the systematic risk beta is only tested by using time-series regression analysis for individual stock.



CHAPTER 5 EMPIRICAL RESULT

The purpose of this chapter is to describe and to report the statistic of empirical results in order to examine the impact of derivative warrant introduction on the underlying stocks.

The first set of derivative warrant were issued in Thailand since 2009. After which an immense number of derivative warrants have been regularly issued every month until this day. After collecting data of derivative warrant from SETSMART and filtering by the selection criteria given in chapter 3, there are the total of 134 companies with DW listing in the data.. The name of company, derivative warrant, issued date are shown in Table A1 in appendix.

The impact on underlying's volume

The impact of derivative warrant introduction on trading volume of the underlying stock was tested in 2 methods, the first method is tested by comparing between the average normalized trading volume pre-derivative warrant introduction period and post-derivative warrant introduction period, the second method is performed by dummy regression analysis.

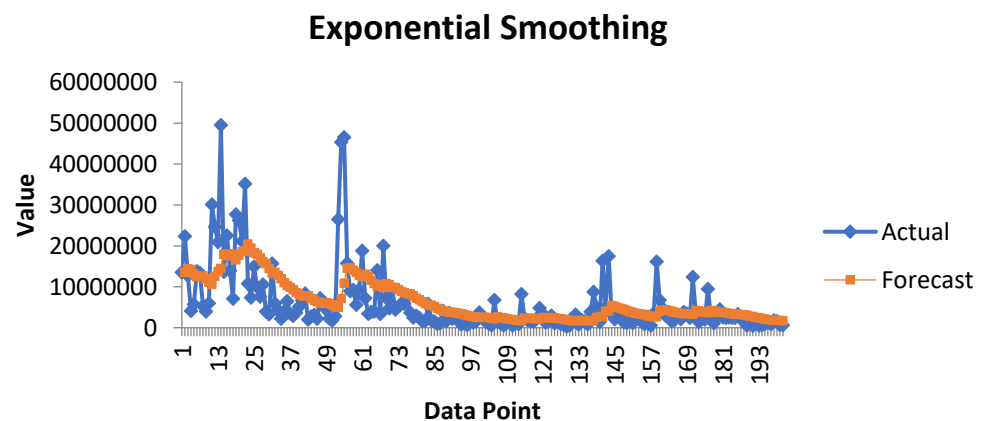


Figure4. Normalized (smoothed) volume

Figure 4 depicts the normalized daily trading volume (orange) of sample, after an exponential smoothing process was performed in the actual data (blue). The forecasted value is a weighted average of the past values of the series where the weights decline exponentially with time (higher weight allocated to more recent data.)

The individual results of trading volume are shown in Table B in appendix. Panel A in Table B shows the results from t-test which tested a change in the mean of normalized trading volume between pre derivative warrant introduction period and post derivative warrant introduction period. The results of t-test indicate that 111 out of 134 companies have significant result and the majority (63 out of 111 companies) have significant decrease in the normalized trading volume.

Panel B in Table B shows the result from dummy regression analysis which also conforms with the result from panel A. The mainly interesting term in this regression is β_3 , which is coefficient of dummy variable. The results from dummy regression analysis concluded from the coefficient of dummy variable show that 122 out of 134 companies have a significant result with the majority (73 out of 122 companies) having a significant decrease in the normalized trading volume. The summary statistics is shown in Table 1 below.

Table 1. Summary statistics of the impact derivative warrant introduction on the underlying's trading volume

T-Test (Volume)			Volume regression		
Significant Increase	48	35.82%	Significant Increase	49	36.57%
Significant Decrease	63	47.01%	Significant Decrease	73	54.48%
Non-Significant	23	17.16%	Non-Significant	12	8.96%
total	134	100.00%	total	134	100.00%

The results from t-test and dummy regression analysis indicate that the introduction of derivative warrant caused a reduction in trading volume of the underlying stocks in the stock exchange of Thailand. The result is different from the literature in other overseas markets, for instance, Long and Schinski (1994), Ho and Liu (1995), Faff and Hillier (2003), which found an increase in the trading volume of the underlying stocks after the introduction of derivative products. Nevertheless, we suspect that the decrease in trading volume in Thai market might

occur due to several reasons. First, this could be assumed that Thai market are governed by individual investors, due to special characteristics of derivative warrant, this could lead individual investors to highly leveraged derivative products, substituting form trading in the underlying stock. This could classify derivative warrant as speculative instruments, convincing speculative investors to shift their trading activity away from the underlying market to derivative market. Second, derivative warrant products were new financial instrument for Thai investors at that time. When derivative warrants were introduced to an underlying stock, there could be some unknown effect with an underlying stock and investors always concern about uncertainty, leading to a reduction in trading volume of the underlying stock of that firm.

However, the results in Table B are tested by using only the data from the stocks that issued derivative warrant. In some situation, there may be other factors other than the introduction of derivative warrant that could affect trading volume and volatility of the underlying stocks, therefore, the panel data regression which also considers the non-derivative warrant issued stocks in the data (data includes all stocks in SET100) could possibly give a better insight. The name of non-derivative warrant issued companies are shown in Table A2 in appendix.

Table 2. Volume results with control group

Variables	Turnover
Turnover_{t-1}	0.6563*** (0.000)
MON	-0.0005*** (0.001)
JAN	0.0003* (0.065)
FREEFLOAT	0.0048*** (0.000)
DUMMY	-0.0009*** (0.000)
Constant	-0.0000 (0.819)
Observations	35,136
P-value in parentheses *** p<0.01, ** p<0.05, * p<0.1	

Table 2 reports the results from panel data regression that examines the impact of derivative warrant introduction on trading volume of the underlying stocks. The result from a coefficient of Turnover_{t-1} shows a significant result, indicating a high correlation between turnover ratio and its past value of the underlying stocks. The mainly interesting term in this regression analysis is coefficient of dummy variable (β_5) whose result is statistically negative. This can be implied that the introduction of derivative warrant can lead to a decrease in trading volume of the underlying stocks in stock exchange of Thailand. The result from panel regression analysis is also consistent with the results from t-test and dummy regression analysis, suggesting a strong confirmation of the reduction in the trading volume of the underlying stocks in stock exchange of Thailand.

The impact on underlying's volatility

A change in volatility of the underlying stock is tested by using two methods. As a preliminary method, a F-test is used to test on the ratio of variances pre- and post- derivative warrant introduction period.. The second method is a Generalized Conditional Autoregressive Heteroskedasticity model, or GARCH (1,1), with dummy variable detecting any changes in volatility of the underlying stocks. Stocks are tested individually and all the results are shown in Table C in the appendix.

Panel A in Table C exhibits the F-test result between historical variances of pre derivative warrant introduction period and post derivative warrant introduction period. The majority of companies (96 out of 134 companies) result in a significant change with 54 companies show a significant decrease in volatility. The result from f-test could be inferred that the introduction of derivative warrant seemed to reduce volatility of the underlying stocks.

Panel B in Table C shows the result from GARCH (1,1) with the dummy variable. It can be seen that most of the companies have a significant result in ARCH and GARCH terms, indicating that the return of stock price showed a pattern of persistent volatility clustering. In other words, the impact of a shock to stock price seemed to persist for several subsequent days On the other hand, for companies whose result from ARCH and GARCH are not significant, it indicated that the impact of shock only lasted for one day. The mainly interesting term in this regression is the dummy variable. Based on the result of coefficient of dummy variable (β_3) in the GARCH model, the majority of companies (93 out of 134 companies) show a non-significant result. Only 22 companies have a significant decrease in volatility. Overall, the result from GARCH (1,1) can be inferred that the introduction of derivative warrant did not change the volatility of stock price. The summary statistics are shown in Table 3 and Table 4.

Table 3. Summary statistics of F-test results

F-Test (variance)		
Significant Increase	42	31.34%
Significant Decrease	54	40.30%
Non-Significant	38	28.36%
Total	134	100.00%

Table 4. Summary statistics of GARCH (1,1) results

GARCH (1,1)	ARCH Term		GARCH Term		Dummy	
Significant Increase	53	39.55%	97	72.39%	19	14.18%
Significant Decrease	24	17.91%	4	2.99%	22	16.42%
Non-significant	57	42.54%	33	24.63%	93	69.40%
Total	134	100.00%	134	100.00%	134	100.00%

The summary statistics in Table 3 shows the results from f-test, indicating a reduction in volatility of the majority of underlying stocks after derivative warrant introduction. For the summary results of GARCH (1,1) in Table 4, among the companies whose significant result in ARCH term was found, the majority of companies (53 of 77 companies) have an increase result in ARCH term, meaning that most of the companies have a fast dissemination of new news to their stock price. For GARCH term, the majority of companies (97 of 111 companies) also have a significant increase result, these could be implied that the effect of past news still existed in the stock price. The dummy coefficient in GARCH (1,1) also indicated that most of the companies have non-significant change in volatility. The result from GARCH (1,1) seems to be different with the result from f-test. The results of reduction in volatility in f-test are consistent with previous research such as DeTemple and Jorian (1990), Johannes (2008). Meanwhile, the result of no change in volatility from GARCH (1,1) also conforms with many previous researches such as St Pierre (1998), Long and Schinski (1994), Clarke Gannon and Vinning (2005). Although a result from f-test is different from GARCH (1,1) model, this could still be inferred that the introduction of derivative warrant did not lead to an increase in volatility of the underlying stocks which is the main concern of investors in the market. Therefore, the results from both tests could

confirm that the introduction of derivative warrant in Thailand did not increase the volatility of the underlying stock in the stock exchange of Thailand

In order to make the robustness of results and to eliminate the effect from other factors such as macroeconomic factors or market factors, the non-derivative warrant issued stocks are included to test in panel data regression analysis.

Table 5. Volatility results with control group

Variables	Volatility
Volatility_{t-1}	0.9454*** (0.000)
MON	-0.0003*** (0.002)
JAN	-0.0000 (0.909)
FREEFLOAT	0.0007*** (0.001)
DUMMY	-0.0005*** (0.000)
Constant	0.0014*** (0.000)
Observations	35,064
P-value in parentheses *** p<0.01, ** p<0.05, * p<0.1	

The results in Table 5 show that the lag past volatility highly correlate with the volatility of the underlying stocks in the market. The mainly focused term in Table 5 is a coefficient of dummy variable (β_5), which turned out to be negative and statistically significant, implying that the introduction of derivative warrant reduced the volatility of the underlying stocks. The result from panel data regression is consistent with the results from the previous method, reaffirming that the introduction of derivative warrant did not make the underlying stock being more volatile as many believed, but instead likely provide more stability to the underlying stock price.

Systematic Risk Beta measurement

The impact on systematic risk beta of the underlying stock is tested by using the ordinary least squares regression to calculate slope between the lognormal return of the underlying stocks and the lognormal return of the market index. We are interested in testing whether a change in beta exists from prior to post derivative warrant introduction to the stock. A dummy variable added to the regression of beta specifically assigned to detect the change. The regression results are presented in Table D in the appendix.

The results in Table D show that the majority of companies (101 from 134 companies) do not have a significant change in beta (see coefficient in front of the dummy variable). The results suggest that the introduction of derivative warrant in Thailand did not have any effect with systematic risk beta. The summary statistics are shown in Table 6.

Table 6. Summary statistics of the impact derivative warrant introduction on the systematic risk beta

Beta regression		
Significant Increase	17	12.69%
Significant Decrease	16	11.94%
Non-Significant	101	75.37%
total	134	100.00%

A non-significant change in systematic risk is consistent with previous research including Conrad (1989), Long and Schinski (1994), Clarke and Vinning (2005). Furthermore, this could be confirmed that the introduction of derivative warrant didn't have any effect with a risk of the underlying stocks in stock exchange of Thailand.

CHAPTER 6 CONCLUSION

The main concern of this research is whether the introduction of derivative warrant in Thailand caused a negative impact on liquidity and risk of the underlying stocks in stock exchange of Thailand. Many previous studies examined the impact of futures or other derivative products on the underlying stocks in oversea markets. The results were inconclusive as stock and relevant markets do differ from countries to countries. Nevertheless, a majority of studies seemed to indicate that the introduction events resulted in increased trading volume, decreased volatility and unchanged beta. Therefore, this research attempts to examine the impact of derivative warrant introduction that could occur in stock exchange of Thailand corresponding to the rapidly growth and popularity of the product in Thai market.

For the impact on trading volume, most of previous research indicated an increase in trading volume after the introduction. This study expands the methodology from previous studies by controlling price effect and calendar effect which were documented to exist in Thailand. The results from individual regression and control group regression indicate that the introduction of derivative warrant caused a reduction in trading volume of the underlying stocks in stock exchange of Thailand, this could be assumed that individual investors in Thailand shifted their trading activities in the stock market to trade in other market like future market or derivative warrant market due to some special characteristics of derivative products such as hedging and leverage that could attract individual investors. Moreover, this could be assumed that derivative warrant products were new financial instrument for investors in Thailand at that time, when firm issued derivative warrant, investors might concern with unknown effect and they did not want to deal with uncertainty, leading to a reduction in trading volume of the underlying stock of that firm.

For the impact on risk which measured by volatility and systematic risk beta, the impact on volatility is also tested by individual regression and control group regression. The majority of the companies resulted in a significant decrease in volatility, moreover, these results are also confirmed by the result from control group regression, indicating that the introduction of

derivative warrant cause a decrease in volatility of the underlying stocks in stock exchange of Thailand. For systematic risk beta, the majority of the companies showed an unchanged beta after derivative warrant introduction, therefore, this could be implied that the introduction of derivative warrant did not change the relationship between company and market. Furthermore, from the result of risk measurement (volatility and systematic risk beta), it can be concluded that the introduction of derivative warrant did not make the underlying stocks become riskier.

In summary, this study reveals that the introduction of derivative warrant in stock exchange of Thailand caused less liquidity, less volatility and unchanged company-market relationship (beta) to the underlying stocks. The empirical results in this study might benefit financial institutions who plan to issued derivative warrant product and policy maker in order to decide on rules that control/restrict/prohibit investors from trading derivative warrant. This is also useful for investors to manage their portfolio and to improve their trading strategy.

REFERENCES



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- Whiteside, M. M., et al. (1983). "SHORT TERM IMPACT OF OPTION TRADING ON UNDERLYING SECURITIES." Journal of Financial Research **6(4)**: 313-321.
- Conrad, J. (1989). "The price effect of option introduction." The Journal of Finance **44(2)**: 487-498.
- Harris, L. (1989). "S&P 500 cash stock price volatilities." The Journal of Finance **44(5)**: 1155-1175.
- Skinner, D. J. (1989). "Options markets and stock return volatility." Journal of Financial economics **23(1)**: 61-78.
- Detemple, J. and P. Jorion (1990). "Option listing and stock returns: An empirical analysis." Journal of Banking & Finance **14(4)**: 781-801.
- Damodaran, A. and J. Lim (1991). "The effects of option listing on the underlying stocks' return processes." Journal of Banking & Finance **15(3)**: 647-664.
- Damodaran, A. and J. Lim (1991). Put listing, short sales and return processes, Working Paper, Stern School of Business, New York University.
- Watt, W. H., et al. (1992). "The impact of option listing on underlying stock returns: The UK evidence." Journal of Business Finance & Accounting **19(4)**: 485-503.
- Long, D. M., et al. (1994). "The impact of option listing on the price volatility and trading volume of underlying OTC stocks." Journal of Economics and Finance **18(1)**: 89-100.
- Chaudhury, M. and S. Elfakhami (1997). "Listing of put options: Is there any volatility effect?" Review of Financial Economics **6(1)**: 57-75.
- Ho, L.-C. J. and C.-S. Liu (1997). "A reexamination of price behavior surrounding option introduction." Quarterly Journal of Business and Economics: 39-50.
- Kumar, R., et al. (1998). "The impact of options trading on the market quality of the underlying security: An empirical analysis." The Journal of Finance **53(2)**: 717-732.
- St. Pierre, E. F. (1998). "The impact of option introduction on the conditional return distribution of underlying securities." Financial Review **33(1)**: 105-118.

Butterworth, D. (2000). "The impact of futures trading on underlying stock index volatility: the case of the FTSE Mid 250 contract." Applied Economics Letters 7(7): 439-442.

Mihov, V. T. and S. Mayhew (2000). "Another Look at Option Listing Effects." Available at SSRN 223128.

Chen, K. and L. Wu (2001). "Introduction and expiration effects of derivative equity warrants in Hong Kong." International Review of Financial Analysis 10(1): 37-52.

Draper, P., et al. (2001). "The derivative warrant market in Hong Kong: Relationships with underlying assets." The Journal of Derivatives 8(4): 72-84.

McKenzie, M. D., et al. (2001). "New insights into the impact of the introduction of futures trading on stock price volatility." Journal of Futures Markets: Futures, Options, and Other Derivative Products 21(3): 237-255.

Faff, R. and D. Hillier (2005). "Complete markets, informed trading and equity option introductions." Journal of Banking & Finance 29(6): 1359-1384.

Clarke, M., et al. (2011). "The impact of warrant introduction: the Australian experience." Review of Pacific basin financial markets and policies 14(02): 213-269.

Wuthisatian, R. (2021). "An examination of calendar anomalies: evidence from the Thai stock market." Journal of Economic Studies.

Appendix

Table A1. List of derivative warrant issued stocks

NO.	UNDERLYING	COMPANY NAME	DW CODE	1 st ISSUE DATE
1	PTT	PTT PUBLIC COMPANY LIMITED	PTT13CA	03-Jul-09
2	KBANK	KASIKORNBANK PUBLIC COMPANY LIMITED	KBAN13CA	25-Aug-09
3	BANPU	BANPU PUBLIC COMPANY LIMITED	BANP13CA	29-Mar-10
4	CPF	CHAROEN POKPHAND FOODS PUBLIC COMPANY LIMITED	CPF08CA	18-Jun-10
5	TTA	THORESEN THAI AGENCIES PUBLIC COMPANY LIMITED	TTA13CA	16-Aug-10
6	ADVANC	ADVANCED INFO SERVICE PUBLIC COMPANY LIMITED	ADVA13CA	16-Aug-10
7	IVL	INDORAMA VENTURES PUBLIC COMPANY LIMITED	IVL13CA	16-Aug-10
8	PS	PRUKSA REAL ESTATE PUBLIC COMPANY LIMITED	PS13CA	16-Aug-10
9	SCC	THE SIAM CEMENT PUBLIC COMPANY LIMITED	SCC13CA	16-Aug-10
10	TCAP	THANACHART CAPITAL PUBLIC COMPANY LIMITED	TCAP13CA	16-Aug-10
11	SCB	SCB X PUBLIC COMPANY LIMITED	SCB08CA	23-Sep-10
12	BBL	BANGKOK BANK PUBLIC COMPANY LIMITED	BBL42CA	02-Nov-10
13	KTB	KRUNG THAI BANK PUBLIC COMPANY LIMITED	KTB01CA	01-Nov-10
14	BAY	BANK OF AYUDHYA PUBLIC COMPANY LIMITED	BAY13CA	24-Nov-10
15	TOP	THAI OIL PUBLIC COMPANY LIMITED	TOP13CA	25-Nov-10
16	CPALL	CP ALL PUBLIC COMPANY LIMITED	CPAL13CA	19-Jan-11
17	LH	LAND AND HOUSES PUBLIC COMPANY LIMITED	LH13CA	02-Feb-11
18	DTAC	TOTAL ACCESS COMMUNICATION PUBLIC COMPANY LIMITED	DTAC08CA	07-Jan-11
19	TRUE	TRUE CORPORATION PUBLIC COMPANY LIMITED	TRUE18CA	11-Jan-11
20	STA	SRI TRANG AGRO-INDUSTRY PUBLIC COMPANY LIMITED	STA13CA	18-Jan-11
21	IRPC	INTERNATIONAL RESEARCH CORPORATION PUBLIC CO., LTD.	IRPC18CA	13-Jan-11
22	TTB	TMBTHANACHART BANK PUBLIC COMPANY LIMITED	TMB18CA	18-Jan-11
23	BTS	BTS GROUP HOLDINGS PUBLIC COMPANY LIMITED	BTS13CA	25-Jan-11
24	THAI	THAI AIRWAYS INTERNATIONAL PUBLIC COMPANY LIMITED	THAI01CA	03-Mar-11
25	ESSO	ESSO (THAILAND) PUBLIC COMPANY LIMITED	ESSO13CA	19-Apr-11
26	TISCO	TISCO FINANCIAL GROUP PUBLIC COMPANY LIMITED	TISC13CA	20-Apr-11
27	BEC	BEC WORLD PUBLIC COMPANY LIMITED	BEC42CA	11-May-11
28	MINT	MINOR INTERNATIONAL PUBLIC COMPANY LIMITED	MINT13CA	21-Jun-11
29	SSI	SAHAVIRIYA STEEL INDUSTRIES PUBLIC COMPANY LIMITED	SSI01CA	04-Jul-11
30	BCP	BANGCHAK CORPORATION PUBLIC COMPANY LIMITED	BCP18CA	18-Jul-11
31	AOT	AIRPORTS OF THAILAND PUBLIC COMPANY LIMITED	AOT42CA	20-Jul-11
32	CPN	CENTRAL PATTANA PUBLIC COMPANY LIMITED	CPN42CA	21-Jul-11
33	GLOW	GLOW ENERGY PUBLIC COMPANY LIMITED	GLOW13CA	04-Aug-11
34	EGCO	ELECTRICITY GENERATING PUBLIC COMPANY LIMITED	EGCO13CA	05-Aug-11
35	BLA	BANGKOK LIFE ASSURANCE PUBLIC COMPANY LIMITED	BLA13CA	04-Aug-11
36	BH	BUMRUNGRAD HOSPITAL PUBLIC COMPANY LIMITED	BH13CA	05-Sep-11
37	DELTA	DELTA ELECTRONICS (THAILAND) PUBLIC COMPANY LIMITED	DELT13CA	05-Sep-11
38	BIGC	BIG C SUPERCENTER PUBLIC COMPANY LIMITED	BIGC01CA	19-Sep-11

39	SPALI	SUPALAI PUBLIC COMPANY LIMITED	SPAL01CA	16-Jan-12
40	ROBINS	ROBINSON DEPARTMENT STORE PUBLIC COMPANY LIMITED	ROBI42CA	17-Jan-12
41	BJC	BERLI JUCKER PUBLIC COMPANY LIMITED	BJC42CA	17-Jan-12
42	DCC	DYNASTY CERAMIC PUBLIC COMPANY LIMITED	DCC13CA	14-Feb-12
43	INTUCH	INTOUCH HOLDINGS PUBLIC COMPANY LIMITED	INTU01CA	12-Jul-12
44	MAKRO	SIAM MAKRO PUBLIC COMPANY LIMITED	MAKR01CA	29-Aug-12
45	JAS	JASMINE INTERNATIONAL PUBLIC COMPANY LIMITED	JAS01CA	14-Jan-13
46	KKP	KIATNAKIN PHATRA BANK PUBLIC COMPANY LIMITED	KKP42CA	14-Jan-13
47	BDMS	BANGKOK DUSIT MEDICAL SERVICES PUBLIC COMPANY LIMITED	BDMS06CB	09-May-13
48	RATCH	RATCH GROUP PUBLIC COMPANY LIMITED	RATC07CA	27-May-13
49	TTW	TTW PUBLIC COMPANY LIMITED	TTW07CA	27-May-13
50	CK	CH. KARNCHANG PUBLIC COMPANY LIMITED	CK23C1401A	25-Jul-13
51	STEC	SINO THAI ENGINEERING AND CONSTRUCTION	STEC08C1401A	14-Aug-13
52	THCOM	THAICOM PUBLIC COMPANY LIMITED	THCO08C1401A	14-Aug-13
53	QH	QUALITY HOUSES PUBLIC COMPANY LIMITED	QH13C1403A	14-Aug-13
54	SIRI	SANSIRI PUBLIC COMPANY LIMITED	SIRI13C1403A	14-Aug-13
55	ITD	ITALIAN-THAI DEVELOPMENT PUBLIC COMPANY LIMITED	ITD07C1404A	21-Aug-13
56	MCOT	MCOT PUBLIC COMPANY LIMITED	MCOT07C1404A	21-Aug-13
57	AAV	ASIA AVIATION PUBLIC COMPANY LIMITED	AAV28C1403A	15-Aug-13
58	CENDEL	CENTRAL PLAZA HOTEL PUBLIC COMPANY LIMITED	CENT23C1404A	01-Nov-13
59	SAMART	SAMART CORPORATION PUBLIC COMPANY LIMITED	SAMA42C1406A	11-Nov-13
60	TTCL	TOYO-THAI CORPORATION PUBLIC COMPANY LIMITED	TTCL42C1406A	11-Nov-13
61	VGI	VGI PUBLIC COMPANY LIMITED	VGI42C1406A	11-Nov-13
62	LPN	L.P.N. DEVELOPMENT PUBLIC COMPANY LIMITED	LPN27C1405A	26-Nov-13
63	AMATA	AMATA CORPORATION PUBLIC COMPANY LIMITED	AMAT01C1407A	17-Jan-14
64	GFPT	GFPT PUBLIC COMPANY LIMITED	GFPT07C1410A	03-Feb-14
65	WHA	WHA CORPORATION PUBLIC COMPANY LIMITED	WHA13C1407A	12-Feb-14
66	MAJOR	MAJOR CINEPLEX GROUP PUBLIC COMPANY LIMITED	MAJO06C1504A	06-Mar-14
67	STPI	STP&I PUBLIC COMPANY LIMITED	STPI27C1503A	20-Mar-14
68	AP	AP (THAILAND) PUBLIC COMPANY LIMITED	AP01C1409A	24-Mar-14
69	S	SINGHA ESTATE PUBLIC COMPANY LIMITED	S5013C1409A	17-Apr-14
70	BCH	BANGKOK CHAIN HOSPITAL PUBLIC COMPANY LIMITED	BCH42C1410A	28-Apr-14
71	SPCG	SPCG PUBLIC COMPANY LIMITED	SPCG42C1410A	28-Apr-14
72	UV	UNIVENTURES PUBLIC COMPANY LIMITED	UV42C1410A	28-Apr-14
73	BMCL	BANGKOK METRO PUBLIC COMPANY LIMITED	BMCL13C1412A	02-Jun-14
74	SC	SC ASSET CORPORATION PUBLIC COMPANY LIMITED	SC13C1512A	03-Jul-14
75	M	MK RESTAURANT GROUP PUBLIC COMPANY LIMITED	M01C1412A	09-Jul-14
76	THRE	THAI REINSURANCE PUBLIC COMPANY LIMITED	THRE27C1502A	14-Jul-14
77	EARTH	ENERGY EARTH PUBLIC COMPANY LIMITED	EART13C1501A	01-Aug-14
78	NOK	NOK AIRLINES PUBLIC COMPANY LIMITED	NOK42C1502A	02-Sep-14
79	PSL	PRECIOUS SHIPPING PUBLIC COMPANY LIMITED	PSL42C1502A	02-Sep-14
80	SRICHA	SRIRACHA CONSTRUCTION PUBLIC COMPANY LIMITED	SRIC23C1505A	12-Sep-14
81	TU	THAI UNION GROUP PUBLIC COMPANY LIMITED	TU06C1511A	05-Nov-14
82	MC	MC GROUP PUBLIC COMPANY LIMITED	MC42C1506A	26-Nov-14

83	MEGA	MEGA LIFESCIENCES PUBLIC COMPANY LIMITED	MEGA42C1506A	26-Nov-14
84	KCE	KCE ELECTRONICS PUBLIC COMPANY LIMITED	KCE01C1506A	14-Jan-15
85	KTIS	KASET THAI INTERNATIONAL SUGAR CORPORATION	KTIS01C1506A	14-Jan-15
86	HANA	HANA MICROELECTRONICS PUBLIC COMPANY LIMITED	HANA42C1508A	28-Jan-15
87	SGP	SIAMGAS AND PETROCHEMICALS PUBLIC COMPANY LIMITED	SGP42C1508A	28-Jan-15
88	GUNKUL	GUNKUL ENGINEERING PUBLIC COMPANY LIMITED	GUNK01C1510A	21-Apr-15
89	ICHI	ICHITAN GROUP PUBLIC COMPANY LIMITED	ICHI01C1510A	21-Apr-15
90	KTC	KRUNGTHAI CARD PUBLIC COMPANY LIMITED	KTC01C1510A	21-Apr-15
91	SAWAD	SRISAWAD CORPORATION PUBLIC COMPANY LIMITED	SAWA01C1510A	29-Apr-15
92	BA	BANGKOK AIRWAYS PUBLIC COMPANY LIMITED	BA42C1603A	07-Jul-15
93	CBG	CARABAO GROUP PUBLIC COMPANY LIMITED	CBG42C1603A	07-Jul-15
94	CKP	CK POWER PUBLIC COMPANY LIMITED	CKP42C1603A	07-Jul-15
95	LHFG	LH FINANCIAL GROUP PUBLIC COMPANY LIMITED	LHBA42C1603A	07-Jul-15
96	SVI	SVI PUBLIC COMPANY LIMITED	SVI23C1607A	16-Jul-15
97	ANAN	ANANDA DEVELOPMENT PUBLIC COMPANY LIMITED	ANAN23C1604A	18-Sep-15
98	RS	RS PUBLIC COMPANY LIMITED	RS01C1602A	09-Oct-15
99	UNIQ	UNIQUE ENGINEERING AND CONSTRUCTION	UNIQ01C1602A	09-Oct-15
100	EPG	EASTERN POLYMER GROUP PUBLIC COMPANY LIMITED	EPG13C1606A	08-Jan-16
101	CHG	CHULARAT HOSPITAL PUBLIC COMPANY LIMITED	CHG01C1607A	12-Jan-16
102	PTG	PTG ENERGY PUBLIC COMPANY LIMITED	PTG01C1607A	12-Jan-16
103	TASCO	TIPCO ASPHALT PUBLIC COMPANY LIMITED	TASCO1C1607A	12-Jan-16
104	VNG	VANACHAI GROUP PUBLIC COMPANY LIMITED	VNG01C1607A	12-Jan-16
105	PLANET	PLANET COMMUNICATIONS ASIA PUBLIC COMPANY LIMITED	PLAN08C1608A	26-Jan-16
106	BEAUTY	BEAUTY COMMUNITY PUBLIC COMPANY LIMITED	BEAU01C1608A	01-Mar-16
107	SCN	SCAN INTER PUBLIC COMPANY LIMITED	SCN42C1610A	01-Mar-16
108	GL	GROUP LEASE PUBLIC COMPANY LIMITED	GL01C1609A	11-Apr-16
109	GPSC	GLOBAL POWER SYNERGY PUBLIC COMPANY LIMITED	GPSC01C1609A	11-Apr-16
110	WORK	WORKPOINT ENTERTAINMENT PUBLIC COMPANY LIMITED	WORK42C1701A	30-Jun-16
111	BEM	BANGKOK EXPRESSWAY AND METRO PUBLIC COMPANY LIMITED	BEM13C1701A	07-Jul-16
112	IFEC	INTER FAR EAST ENERGY CORPORATION	IFEC42C1702A	07-Jul-16
113	TVO	THAI VEGETABLE OIL PUBLIC COMPANY LIMITED	TVO42C1703A	03-Aug-16
114	ERW	THE ERAWAN GROUP PUBLIC COMPANY LIMITED	ERW42C1706A	23-Nov-16
115	SPRC	STAR PETROLEUM REFINING PUBLIC COMPANY LIMITED	SPRC42C1709A	09-Jan-17
116	TKN	TAOKAENOI FOOD & MARKETING PUBLIC COMPANY LIMITED	TKN42C1709A	09-Jan-17
117	VIBHA	VIBHAVADI MEDICAL CENTER PUBLIC COMPANY LIMITED	VIBH42C1709A	09-Jan-17
118	SUPER	SUPER ENERGY CORPORATION PUBLIC COMPANY LIMITED	SUPE08C1707A	11-Jan-17
119	MTC	MUANGTHAI CAPITAL PUBLIC COMPANY LIMITED	MTC06C1806A	28-Jun-17
120	EA	ENERGY ABSOLUTE PUBLIC COMPANY LIMITED	EA08C1801A	06-Jul-17
121	COM7	COM7 PUBLIC COMPANY LIMITED	COM713C1802A	07-Jul-17
122	PTL	POLYPLEX (THAILAND) PUBLIC COMPANY LIMITED	PTL01C1801A	13-Jul-17
123	MALEE	MALEE GROUP PUBLIC COMPANY LIMITED	MALE13C1804A	19-Oct-17
124	ORI	ORIGIN PROPERTY PUBLIC COMPANY LIMITED	ORI13C1806A	10-Jan-18
125	MONO	MONO NEXT PUBLIC COMPANY LIMITED	MONO24C1807A	30-Jan-18
126	GGC	GLOBAL GREEN CHEMICALS PUBLIC COMPANY LIMITED	GGC01C1810A	22-May-18

127	BGRIM	B. GRIMM POWER PUBLIC COMPANY LIMITED	BGRI13C1812A	04-Jul-18
128	TOA	TOA PAINT (THAILAND) PUBLIC COMPANY LIMITED	TOA13C1812A	05-Jul-18
129	PRM	PRIMA MARINE PUBLIC COMPANY LIMITED	PRM19C1902A	20-Aug-18
130	GULF	GULF ENERGY DEVELOPMENT PUBLIC COMPANY LIMITED	GULF13C1906A	04-Jan-19
131	AEONTS	AEON THANA SINSAP (THAILAND) PUBLIC COMPANY LIMITED	AEON01C1906A	09-Jan-19
132	GOLD	GOLDEN LAND PROPERTY DEVELOPMENT	GOLD19C1906A	10-Jan-19
133	MBK	MBK PUBLIC COMPANY LIMITED	MBK19C1906A	10-Jan-19
134	OSP	OSOTSPA PUBLIC COMPANY LIMITED	OSP41C1912A	02-Jul-19



Table A2. List of non-derivative warrant issued stocks

NO.	UNDERLYING	COMPANY NAME
1	FPT	FRASERS PROPERTY (THAILAND) PUBLIC COMPANY LIMITED
2	TRC	TRC CONSTRUCTION PUBLIC COMPANY LIMITED
3	ASP	ASIA PLUS GROUP HOLDINGS PUBLIC COMPANY LIMITED
4	DEMCO	DEMCO PUBLIC COMPANY LIMITED
5	LOXLEY	LOXLEY PUBLIC COMPANY LIMITED
6	SF	SIAM FUTURE DEVELOPMENT PUBLIC COMPANY LIMITED
7	JCK	JCK INTERNATIONAL PUBLIC COMPANY LIMITED
8	PF	PROPERTY PERFECT PUBLIC COMPANY LIMITED
9	U	U CITY PUBLIC COMPANY LIMITED
10	SAT	SOMBOON ADVANCE TECHNOLOGY PUBLIC COMPANY LIMITED
11	ROJNA	ROJANA INDUSTRIAL PARK PUBLIC COMPANY LIMITED
12	AJ	A.J. PLAST PUBLIC COMPANY LIMITED
13	KSL	KHON KAEN SUGAR INDUSTRY PUBLIC COMPANY LIMITED
14	RML	RAIMON LAND PUBLIC COMPANY LIMITED
15	GSTEEL	G STEEL PUBLIC COMPANY LIMITED
16	SDC	SAMART DIGITAL PUBLIC COMPANY LIMITED
17	LANNA	THE LANNA RESOURCES PUBLIC COMPANY LIMITED



Table B. Trading Volume results

No	Company	Panel A : Change in average volume		Panel B : Dummy variable regression			
				coefficient			
		Change	T-test	Constant	LnValue	Range	Dummy
1	PTT	1751001.9235	-0.4583	-0.4748	0.8821***	0.0075	-0.2625***
				0.2390	0.0000	0.8550	0.0000
2	KBANK	-4023301.8527	15.584***	-2.6054***	0.9077***	0.0495***	-0.2965***
				0.0000	0.0000	0.0030	0.0000
3	BANPU	-6705653.1686	8.4225***	-3.0277***	0.9674***	0.0589*	-0.1783***
				0.0000	0.0000	0.0550	0.0000
4	CPF	-13202280.8205	5.909***	0.1436	0.8611***	0.1059**	-0.4967***
				0.7500	0.0000	0.0210	0.0000
5	TTA	-2771316.9202	7.3486***	-1.9673***	0.9442***	0.0909***	0.035***
				0.0000	0.0000	0.0000	0.0000
6	ADVANC	669113.1286	-1.9202*	-3.1062***	0.9296***	0.0395***	-0.109***
				0.0000	0.0000	0.0040	0.0000
7	IVL	-17303880.0845	8.6796***	-1.7868***	0.948***	-0.1085***	-0.5443***
				0.0020	0.0000	0.0000	0.0000
8	PS	2251623.1519	-14.8926***	-1.2416**	0.914***	-0.1366**	-0.1743***
				0.0160	0.0000	0.0450	0.0000
9	SCC	382618.8517	-5.9851***	-5.2879***	0.9765***	0.0105***	-0.2367***
				0.0000	0.0000	0.0040	0.0000
10	TCAP	-10832705.9450	11.2451***	-2.7634***	0.976***	-0.0108	-0.389***
				0.0000	0.0000	0.6780	0.0000
11	SCB	-1162438.9336	2.8698***	-3.868***	0.9701***	-0.0056	-0.1679***
				0.0000	0.0000	0.3300	0.0000
12	BBL	593248.9080	-3.5715***	-2.9484***	0.8818***	0.0324***	-0.1137***
				0.0000	0.0000	0.0040	0.0000
13	KTB	-23585879.7252	7.3424***	-1.3736***	0.9365***	0.1309**	-0.1938***
				0.0000	0.0000	0.0110	0.0000
14	BAY	-10854312.7534	13.4578***	-2.5724***	0.9737***	-0.0599***	-0.1199***
				0.0000	0.0000	0.0090	0.0000
15	TOP	3938282.7553	-6.5711***	-2.1942***	0.9112***	0.0234*	-0.3707***
				0.0000	0.0000	0.0640	0.0000
16	CPALL	2292281.9251	-5.6557***	-2.4568***	0.97***	0.0464	-0.0283*
				0.0000	0.0000	0.1810	0.0670
17	LH	3222725.9907	-1.4565	-1.7657***	0.9803***	0.2649	0.1813***
				0.0000	0.0000	0.3340	0.0000
18	DTAC	-3187579.5042	4.2932***	-3.168***	0.9715***	-0.055***	-0.1095***
				0.0000	0.0000	0.0000	0.0000
19	TRUE	-187813325.2530	9.756***	-0.9613***	0.9909***	-0.4107***	-0.1752***

				0.0000	0.0000	0.0000	0.0000
20	STA	-4244721.3096	5.6222***	-2.3684***	0.957***	-0.088***	-0.066***
				0.0000	0.0000	0.0000	0.0050
21	IRPC	15363977.3266	-1.9293*	-0.5095**	0.9514***	-0.2999***	-0.1919***
				0.0130	0.0000	0.0010	0.0000
22	TTB	-258129462.9715	7.395***	0.2827**	0.9469***	0.4198**	0.0294***
				0.0100	0.0000	0.0130	0.0000
23	BTS	-36406472.3747	15.4305***	-0.7807***	0.9526***	0.3426**	0.0816***
				0.0000	0.0000	0.0160	0.0000
24	THAI	2241864.8514	-11.8018***	-2.8564***	0.9524***	-0.0166	0.2605***
				0.0000	0.0000	0.3010	0.0000
25	ESSO	10368214.5936	-10.0468***	-0.7916***	0.9286***	-0.0063	-0.2479***
				0.0000	0.0000	0.8970	0.0000
26	TISCO	-1868990.3459	15.1842***	-2.3818***	0.9321***	0.0013	-0.0436**
				0.0000	0.0000	0.9640	0.0330
27	BEC	-796950.8245	4.3323***	-1.8928***	0.9086***	0.0114	-0.1658***
				0.0000	0.0000	0.6680	0.0000
28	MINT	2483151.2788	-6.5071***	-0.9876***	0.9255***	0.2669***	-0.0047
				0.0000	0.0000	0.0040	0.8090
29	SSI	-396852.2054	1.7109*	-1.3774***	0.8667***	0.1238***	0.4***
				0.0000	0.0000	0.0010	0.0000
30	BCP	978786.6348	-1.7689*	1.8673***	0.7306***	0.3472***	-0.0018
				0.0010	0.0000	0.0000	0.9650
31	AOT	35540670.3608	-14.4106***	-0.198	0.9378***	0.4287***	-0.1552***
				0.3230	0.0000	0.0020	0.0000
32	CPN	3748917.3188	-12.6413***	-0.4556*	0.8702***	0.1709***	-0.1672***
				0.0780	0.0000	0.0000	0.0000
33	GLOW	-350403.4449	7.2887***	-3.1092***	0.9545***	0.0293*	-0.1645***
				0.0000	0.0000	0.0740	0.0000
34	EGCO	67586.1116	-3.7518***	-1.0571	0.7873***	0.0884**	0.1432**
				0.1610	0.0000	0.0220	0.0110
35	BLA	723616.0451	-4.9243***	-1.923***	0.9148***	0.0525**	-0.1638***
				0.0000	0.0000	0.0220	0.0000
36	BH	152647.0596	-4.3756***	0.7489	0.7258***	0.197***	-0.055
				0.2290	0.0000	0.0000	0.3770
37	DELTA	-627603.0785	13.8624***	-2.5447***	0.9579***	0.04	0.2204***
				0.0000	0.0000	0.2120	0.0000
38	BIGC	46053.0157	-0.7723	-3.1439***	0.9121***	0.0077	-0.0791***
				0.0000	0.0000	0.1790	0.0000
39	SPALI	-2557161.6278	6.7884***	-2.516***	0.9931***	0.1133**	-0.1594***
				0.0000	0.0000	0.0400	0.0000
40	ROBINS	232449.3290	-10.0927***	-2.1038***	0.9121***	0.0083	-0.2631***
				0.0000	0.0000	0.5530	0.0000
41	BJC	1669545.7375	-7.6207***	0.1205	0.8091***	0.0942*	-0.2412***

				0.7960	0.0000	0.0820	0.0000
42	DCC	102834.0180	-0.2231	-0.4664*	0.9472***	0.7291**	-0.0141
				0.0500	0.0000	0.0130	0.4890
43	INTUCH	1392380.9214	-3.691***	-3.6451***	0.9811***	0.002	-0.1488***
				0.0000	0.0000	0.8420	0.0000
44	MAKRO	1963829.7956	-3.6483***	-2.0081***	0.9525***	-0.0252	-0.1622***
				0.0000	0.0000	0.3480	0.0000
45	JAS	649300.2552	-0.1265	-1.3828***	0.9972***	-0.5819***	-0.3707***
				0.0000	0.0000	0.0000	0.0000
46	KKP	1565719.5826	-17.9914***	-0.9538**	0.8389***	0.0435**	-0.2039***
				0.0270	0.0000	0.0140	0.0000
47	BDMS	2911241.6269	-4.053***	-2.6949***	1.0041***	-0.1178**	-0.0336*
				0.0000	0.0000	0.0400	0.0780
48	RATCH	-223347.8664	5.349***	-2.5532***	0.9111***	0.016	0.1299***
				0.0000	0.0000	0.3760	0.0000
49	TTW	-1288680.4378	6.4353***	-2.5097***	1.0114***	-0.1361***	0.0227***
				0.0000	0.0000	0.0000	0.0060
50	CK	2562433.4430	-0.8873	-2.7346***	0.9785***	0.0183	0.1586***
				0.0000	0.0000	0.3460	0.0000
51	STEC	741814.5848	-1.3219	-2.7353***	0.9795***	-0.0351	0.1418***
				0.0000	0.0000	0.2330	0.0000
52	THCOM	-5100783.9229	18.6889***	-2.7444***	0.9572***	0.0256***	-0.0865***
				0.0000	0.0000	0.0030	0.0000
53	QH	-82964910.1255	19.0025***	0.3506	0.9221***	0.5007**	0.1735***
				0.2920	0.0000	0.0150	0.0000
54	SIRI	-77104848.2439	6.9065***	0.6565*	0.908***	0.1321	0.3913***
				0.0750	0.0000	0.5920	0.0000
55	ITD	-26391601.3018	6.2333***	1.9956***	0.804***	0.2533***	0.1934***
				0.0000	0.0000	0.0010	0.0000
56	MCOT	-305171.8622	11.9803***	-3.5051***	0.9855***	-0.0328***	0.3159***
				0.0000	0.0000	0.0010	0.0000
57	AAV	-15201950.4346	13.02***	-0.062	0.9054***	0.1886*	0.1543***
				0.8420	0.0000	0.0510	0.0000
58	CENDEL	1056925.2635	-8.6267***	-2.0898***	0.9115***	0.0771***	0.1637***
				0.0000	0.0000	0.0090	0.0000
59	SAMART	140281.7458	-0.5507	-2.7024***	0.9869***	-0.0306	0.1613***
				0.0000	0.0000	0.2410	0.0000
60	TTCL	-389340.2668	5.6826***	-2.7251***	0.9532***	0.0306**	-0.0564***
				0.0000	0.0000	0.0340	0.0090
61	VGI	20506864.8947	-9.6273***	0.3955	0.8778***	0.4871**	0.1516***
				0.3580	0.0000	0.0170	0.0000
62	LPN	2815037.4820	-14.7141***	-2.0202***	0.9322***	0.1461***	0.3676***
				0.0000	0.0000	0.0020	0.0000
63	AMATA	285817.7218	-1.7209*	-2.0301***	0.9566***	0.0757*	0.1043***

				0.0000	0.0000	0.0880	0.0000
64	GFPT	134394.4935	-0.3527	-1.6544***	0.9628***	-0.1422***	-0.2597***
				0.0000	0.0000	0.0060	0.0000
65	WHA	9526306.9515	-2.2538**	-1.84***	1.0414***	0.2459	0.0694***
				0.0000	0.0000	0.2910	0.0020
66	MAJOR	117930.4668	-1.6331	-2.0352***	0.9461***	0.085	-0.0216
				0.0000	0.0000	0.1500	0.3610
67	STPI	1052009.2361	-8.8538***	-1.6885***	0.9289***	0.2329***	-0.0704***
				0.0000	0.0000	0.0000	0.0030
68	AP	8504608.1320	-14.7638***	-0.2579	0.9296***	-0.0276	-0.1466***
				0.2450	0.0000	0.8540	0.0000
69	S	11726858.8975	-11.0732***	-0.4484**	1.0023***	-0.8241***	-0.8717***
				0.0350	0.0000	0.0000	0.0000
70	BCH	4679363.6147	-26.1859***	-0.5921***	0.9245***	0.0533	-0.2422***
				0.0000	0.0000	0.5120	0.0000
71	SPCG	4307715.3094	-17.2444***	-2.7073***	0.9847***	0.016	-0.2577***
				0.0000	0.0000	0.4580	0.0000
72	UV	11377383.8110	-9.144***	1.1655***	0.8048***	0.7146***	-0.0155
				0.0050	0.0000	0.0000	0.7120
73	BMCL	225250957.9868	-17.1009***	0.4833*	0.9772***	-0.6643	-0.5067***
				0.0540	0.0000	0.3360	0.0000
74	SC	4352601.1861	-8.9233***	-0.7998***	0.9826***	0.2777***	-0.1491***
				0.0000	0.0000	0.0010	0.0000
75	M	-509668.4024	15.1854***	-4.0251***	1.0021***	-0.0226**	-0.1045***
				0.0000	0.0000	0.0490	0.0000
76	THRE	-1173626.8718	3.0597***	-0.7141***	0.9726***	0.1006	-0.1014***
				0.0000	0.0000	0.5130	0.0000
77	EARTH	8296744.6332	-12.2542***	-0.9308***	0.9489***	0.2285*	0.0358*
				0.0000	0.0000	0.0750	0.0590
78	NOK	4562217.4591	-4.487***	-0.2864	0.8982***	0.6745***	0.1392***
				0.4710	0.0000	0.0000	0.0000
79	PSL	283077.1964	-3.3085***	-2.6535***	0.9823***	-0.0303	0.2642***
				0.0000	0.0000	0.6400	0.0000
80	SRICHA	-9927.8829	0.3117	-0.4825	0.8032***	0.2564***	0.0272
				0.3110	0.0000	0.0000	0.5130
81	TU	6635064.1615	-7.9935***	0.0059	0.8448***	0.2077***	-0.257***
				0.9900	0.0000	0.0070	0.0000
82	MC	-395796.4140	4.2988***	-1.014***	0.883***	0.2447***	0.2213***
				0.0060	0.0000	0.0070	0.0000
83	MEGA	-323512.9998	4.6037***	-1.8661***	0.9285***	0.1108	0.1504***
				0.0000	0.0000	0.1130	0.0000
84	KCE	520583.2205	-4.1486***	-2.7406***	0.9854***	0.0423*	-0.2813***
				0.0000	0.0000	0.0690	0.0000
85	KTIS	-9362380.3661	8.5029***	3.8741***	0.623***	1.2812***	-0.3749***

				0.0000	0.0000	0.0000	0.0000
86	HANA	174148.5837	-1.2186	-2.3124***	0.9126***	0.0371*	0.0611**
				0.0000	0.0000	0.0830	0.0330
87	SGP	330427.7364	-1.1174	-0.1666	0.9024***	0.5377***	-0.0502**
				0.5840	0.0000	0.0010	0.0310
88	GUNKUL	-16836964.8944	11.6867***	-1.7412***	1.0271***	-0.4416***	0.0311*
				0.0000	0.0000	0.0010	0.0560
89	ICHI	-3236528.6468	10.9957***	-1.8552***	0.9278***	0.1393***	0.0708***
				0.0000	0.0000	0.0000	0.0020
90	KTC	-7138232.7107	19.053***	-2.8706***	1.0529***	-0.4056***	-0.1865***
				0.0000	0.0000	0.0000	0.0000
91	SAWAD	-10015836.2011	14.1529***	-3.0861***	0.9941***	-0.0645*	-0.2153***
				0.0000	0.0000	0.0780	0.0000
92	BA	-820921.3376	5.2859***	-1.6226***	0.9154***	0.2699***	-0.0756***
				0.0000	0.0000	0.0000	0.0010
93	CBG	-2257434.0010	17.2044***	-4.1007***	1.0245***	-0.0172	0.0361***
				0.0000	0.0000	0.2390	0.0060
94	CKP	-6428031.0443	11.9572***	-0.7247***	0.9746***	0.0715	0.1876***
				0.0000	0.0000	0.6060	0.0000
95	LHFG	-11815405.4096	7.3837***	-0.0101	0.9644***	0.5041**	0.0769***
				0.9010	0.0000	0.0170	0.0000
96	SVI	-9369183.6030	5.0157***	-1.1245***	0.9756***	0.0204	-0.0403***
				0.0000	0.0000	0.8240	0.0000
97	ANAN	2246523.4263	-5.8686***	-1.0007***	0.985***	0.2095**	-0.122***
				0.0000	0.0000	0.0260	0.0000
98	RS	-1864398.4405	5.9657***	1.9003***	0.7345***	0.7246***	0.1165**
				0.0020	0.0000	0.0000	0.0340
99	UNIQ	-748536.3352	2.6862***	-2.3958***	0.9732***	0.0144	-0.1264***
				0.0000	0.0000	0.7850	0.0000
100	EPG	788954.2258	-0.3671	-1.0648***	0.9343***	-0.0246	-0.285***
				0.0000	0.0000	0.4470	0.0000
101	CHG	215300.9028	-0.1086	-0.56***	0.9833***	0.3326	-0.1505***
				0.0020	0.0000	0.1170	0.0000
102	PTG	-1943956.9728	4.5933***	-1.114***	0.906***	0.2523***	-0.0568***
				0.0000	0.0000	0.0000	0.0000
103	TASCO	4038550.5945	-4.1215***	-4.1027***	1.0369***	-0.1023***	0.1843***
				0.0000	0.0000	0.0000	0.0000
104	VNG	-4129322.9194	10.9996***	-1.7905***	0.9506***	-0.0259	0.0569*
				0.0000	0.0000	0.7330	0.0570
105	PLANET	-514309.2283	2.4879**	-0.6998***	0.9642***	0.4988***	0.0991***
				0.0000	0.0000	0.0000	0.0000
106	BEAUTY	-1667609.7061	2.6628***	0.3758	0.8876***	-0.1046	-0.1768***
				0.2230	0.0000	0.2340	0.0000
107	SCN	-7074129.3073	5.7911***	-0.4007***	0.9041***	0.1619***	0.0642***

				0.0010	0.0000	0.0010	0.0000
108	GL	-5423823.1297	7.8516***	-2.5617***	0.9801***	-0.037	-0.5179***
				0.0000	0.0000	0.1180	0.0000
109	GPSC	3024421.8273	-9.0136***	-2.9362***	0.9956***	-0.0666***	-0.3091***
				0.0000	0.0000	0.0050	0.0000
110	WORK	1595633.1481	-13.7837***	-3.4915***	0.9898***	0.0164**	0.031**
				0.0000	0.0000	0.0470	0.0110
111	BEM	85990817.5480	-12.7326***	-0.1157	0.9144***	0.4004***	-0.2157***
				0.6590	0.0000	0.0000	0.0000
112	IFEC	8851030.7080	-5.5428***	-1.6084***	0.9844***	-0.0521	0.262***
				0.0000	0.0000	0.7400	0.0000
113	TVO	-461263.8122	8.8538***	-3.5515***	1.0177***	-0.1213***	-0.1869***
				0.0000	0.0000	0.0000	0.0000
114	ERW	-2616495.0666	4.6348***	0.0289	0.9336***	0.3859	-0.0047
				0.9060	0.0000	0.3050	0.8130
115	SPRC	-9734939.1310	8.2454***	-1.6553***	0.9548***	0.0855	-0.1057***
				0.0000	0.0000	0.1260	0.0000
116	TKN	-2206533.3151	2.1334**	-2.8796***	0.9812***	0.0334	-0.0227
				0.0000	0.0000	0.3450	0.3830
117	VIBHA	-11743682.1169	7.2454***	-0.6863***	0.9762***	0.7035***	-0.024***
				0.0000	0.0000	0.0000	0.0000
118	SUPER	-44505430.2081	2.2516**	1.0419***	0.9167***	2.0561***	0.0333
				0.0000	0.0000	0.0000	0.1040
119	MTC	-78988.3165	0.1558	-3.0369***	0.9767***	0.0455***	-0.1249***
				0.0000	0.0000	0.0010	0.0000
120	EA	3269515.9357	-5.1442***	-2.6264***	0.9629***	-0.0405*	-0.2753***
				0.0000	0.0000	0.0740	0.0000
121	COM7	14991587.7700	-14.9318***	-0.7845***	0.9486***	-0.0614	-0.1507***
				0.0000	0.0000	0.5360	0.0000
122	PTL	-7220643.3256	13.9505***	-1.4954***	0.9304***	0.1801***	0.0592***
				0.0000	0.0000	0.0000	0.0010
123	MALEE	715755.4082	-4.9422***	-4.2124***	1.0303***	-0.038*	0.138***
				0.0000	0.0000	0.0870	0.0000
124	ORI	-2319852.2308	6.4962***	-1.9927***	0.9719***	-0.0256	-0.0728***
				0.0000	0.0000	0.5320	0.0000
125	MONO	-3802530.1111	1.828*	0.4119	0.8937***	0.7321*	0.084**
				0.3460	0.0000	0.0540	0.0140
126	GGC	1370432.3552	-3.9919***	-2.0098***	0.959***	0.0989***	0.2495***
				0.0000	0.0000	0.0010	0.0000
127	BGRIM	-6991292.1843	12.9816***	-3.1532***	0.9957***	-0.0446**	-0.0083
				0.0000	0.0000	0.0140	0.4570
128	TOA	-2521702.1417	12.799***	-3.5756***	0.9953***	0.0173	0.0166
				0.0000	0.0000	0.4190	0.4030
129	PRM	1699927.2714	-4.812***	0.019	0.8646***	0.7958***	0.1067***

				0.9560	0.0000	0.0000	0.0030
130	GULF	-8316221.9626	4.4773***	-1.9811***	0.9642***	-0.0159	-0.211***
				0.0000	0.0000	0.7040	0.0000
131	AEONTS	-93362.7463	2.894***	-4.4979***	0.9584***	0.0008	0.0232**
				0.0000	0.0000	0.7990	0.0390
132	GOLD	-82013.8829	0.8229	-1.9811***	0.9829***	0.2374***	0.1476***
				0.0000	0.0000	0.0010	0.0000
133	MBK	-194818.1204	2.1618**	-2.6569***	0.9689***	0.0519	0.1368***
				0.0000	0.0000	0.1700	0.0000
134	OSP	1051792.2583	-2.58**	-1.7902***	0.9164***	0.0064	-0.2042***
				0.0000	0.0000	0.6780	0.0000

*Note : This table present the results of t-test (panel A) and regression analysis from equation (2) (panel B). The numerical values in the table indicate the estimated coefficients of the variables and the numerical values contain in the below column indicate p-value. ***,** and * indicates significant level at 1%, 5% and 10% respectively.*

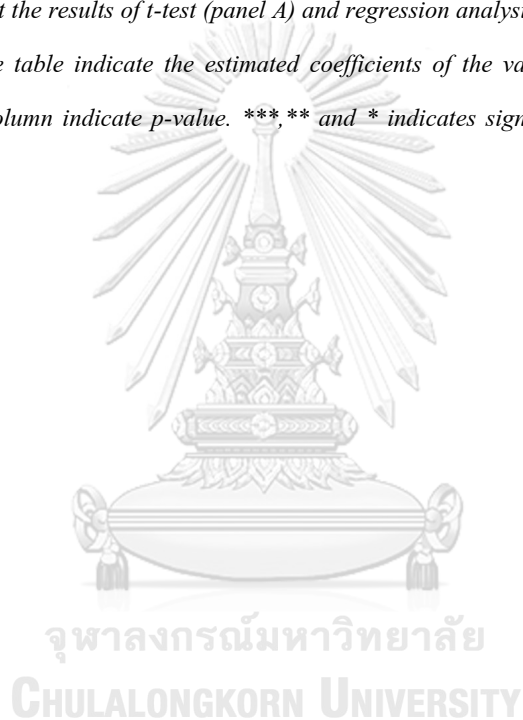


Table C. Volatility results

No	Company	Panel A : Change in standard deviation				Panel B : Dummy variable regression			
						coefficient			
		Pre SD	Post SD	Change	F-test	P-value			
						Constant	ARCH	GARCH	Dummy
1	PTT	0.0258	0.0216	-0.0041	1.4162**	0.000301	-0.076188	0.615166*	-0.000088
						0.192900	0.125200	0.061200	0.296400
2	KBANK	0.0266	0.0189	-0.0077	1.9722***	0.000235*	0.21675**	0.517123**	-0.000154*
						0.078600	0.042400	0.021200	0.064000
3	BANPU	0.021	0.0189	-0.0022	1.243	0.000008	-0.029425***	1.017613***	-1e-05***
						0.153700	0.008800	0.000000	0.004300
4	CPF	0.0255	0.02	-0.0056	1.6337***	0.00064*	0.110779	-0.067762	-0.000265
						0.056000	0.282100	0.884800	0.123700
5	TTA	0.0173	0.0145	-0.0028	1.4295**	0.000077	0.066265	0.653858*	-0.000018
						0.387800	0.430600	0.088200	0.481800
6	ADVANC	0.021	0.0174	-0.0037	1.4678**	0.000106***	0.634836***	0.213123*	6.5e-05*
						0.001700	0.007400	0.095100	0.064400
7	IVL	0.0361	0.0415	0.0054	1.3222*	0.000053	0.111376**	0.836657***	0.000068
						0.189600	0.016700	0.000000	0.132900
8	PS	0.0273	0.0214	-0.006	1.6363***	0.000136	0.118138*	0.733612***	-0.000076
						0.124000	0.086700	0.000000	0.144700
9	SCC	0.0214	0.0194	-0.0021	1.2249	0.000044	0.162731**	0.745681***	-0.000005
						0.184400	0.026500	0.000000	0.785300
10	TCAP	0.0282	0.0199	-0.0083	2.0032***	0.000617**	0.170942	0.036316	-0.0003**
						0.027400	0.130700	0.924800	0.044000
11	SCB	0.017	0.019	0.002	1.252	1.7e-05**	0.018531	0.886777***	0.000017
						0.049700	0.605300	0.000000	0.124500
12	BBL	0.0144	0.0193	0.0049	1.8048***	0.000044	-0.057025	0.840395***	0.000042
						0.253000	0.135600	0.000000	0.296300
13	KTB	0.0199	0.0219	0.0021	1.2197	0.00034***	0.340496***	-0.076995	0.000009
						0.000600	0.009000	0.693900	0.914800
14	BAY	0.0169	0.0208	0.0038	1.504**	0.000033	0.033287	0.852042***	0.000018
						0.496200	0.458600	0.000000	0.528500
15	TOP	0.0227	0.0217	-0.001	1.0945	1.5e-05***	-0.037149***	1.024677***	-1.6e-05***
						0.000200	0.000000	0.000000	0.000000
16	CPALL	0.0227	0.0208	-0.0018	1.1855	7.4e-05**	0.002006	0.806279***	0.000004
						0.014900	0.957500	0.000000	0.769500
17	LH	0.0215	0.0252	0.0037	1.3773*	0.000117	0.073976	0.66526*	0.000063
						0.443300	0.426000	0.086900	0.329200
18	DTAC	0.0221	0.0208	-0.0012	1.122	4e-06*	0.042715**	0.954194***	-1e-06***
						0.080300	0.010700	0.000000	0.000000
19	TRUE	0.055	0.0286	-0.0265	3.7113***	0.000547	0.051317	0.774828***	-0.000418

						0.205400	0.273400	0.000000	0.200100
20	STA	0.0354	0.0302	-0.0052	1.3743*	6.1e-05***	-0.054733***	1.019109***	-4e-05***
						0.000000	0.000000	0.000000	0.000000
21	IRPC	0.0277	0.0255	-0.0023	1.185	9e-06***	-0.022972***	1.027318***	-2e-05***
						0.000200	0.000000	0.000000	0.000500
22	TTB	0.023	0.0189	-0.0041	1.4762**	0.000002	-0.044426***	1.020152***	0.000001
						0.803000	0.003100	0.000000	0.794100
23	BTS	0.0182	0.0167	-0.0014	1.1765	0.000164	0.077482	0.466958	-0.000054
						0.310300	0.492100	0.375400	0.359400
24	THAI	0.0325	0.0239	-0.0086	1.8506***	0.000193	0.063204	0.760744***	-0.000105
						0.267600	0.267800	0.000100	0.291900
25	ESSO	0.0296	0.0316	0.002	1.1387	0.000166	0.091445	0.723616***	0.000025
						0.301100	0.332800	0.003700	0.663400
26	TISCO	0.0197	0.0181	-0.0016	1.1896	0.000253***	-0.070356***	0.562327***	-8.8e-05***
						0.000000	0.000000	0.000000	0.000000
27	BEC	0.0206	0.0266	0.006	1.6697***	1.5e-05**	-0.071278***	1.035307***	1.5e-05**
						0.049100	0.000200	0.000000	0.013000
28	MINT	0.0184	0.026	0.0076	1.9993***	0.000012	-0.089158***	1.03068***	3.2e-05***
						0.119900	0.000000	0.000000	0.000000
29	SSI	0.0179	0.0286	0.0107	2.5527***	2.6e-05*	0.143955**	0.801498***	0.000009
						0.070700	0.013100	0.000000	0.512400
30	BCP	0.019	0.0281	0.0091	2.1964***	0.000041	0.259186**	0.601444***	9.3e-05*
						0.167000	0.016200	0.000000	0.095300
31	AOT	0.0177	0.0283	0.0106	2.5482***	5.2e-05**	0.443016***	0.552469***	-0.000004
						0.018800	0.000000	0.000000	0.864100
32	CPN	0.019	0.0276	0.0086	2.1028***	0.000179*	-0.073736	0.5799**	0.000186*
						0.078000	0.137200	0.019600	0.050200
33	GLOW	0.0166	0.0268	0.0103	2.6226***	0.000016	0.067795*	0.883035***	0.000019
						0.129900	0.082200	0.000000	0.311400
34	EGCO	0.0099	0.0118	0.0019	1.4101**	0.0001***	0.181355*	-0.196119	3.6e-05**
						0.000200	0.082500	0.283100	0.040300
35	BLA	0.0242	0.0282	0.0039	1.3508*	0.000404***	0.370414***	0.052550	0.000050
						0.000200	0.001100	0.686500	0.568900
36	BH	0.0174	0.0261	0.0087	2.2406***	0.000070	0.05304*	0.714596***	0.000075
						0.168800	0.059200	0.000000	0.101300
37	DELTA	0.0193	0.0189	-0.0004	1.0467	0.000118**	0.160593***	0.514743**	0.000008
						0.042000	0.006800	0.011200	0.804200
38	BIGC	0.0196	0.0289	0.0093	2.1813***	2.9e-05**	0.09363**	0.863659***	0.000000
						0.017000	0.011500	0.000000	0.978700
39	SPALI	0.0278	0.0151	-0.0127	3.3962***	0.000326***	0.106356**	0.518563***	-0.000299***
						0.000000	0.010000	0.000000	0.000000
40	ROBINS	0.0289	0.0217	-0.0072	1.7776***	0.000090	0.116664	0.788808***	-0.000049
						0.301700	0.116400	0.000000	0.337700
41	BJC	0.0215	0.0222	0.0007	1.069	0.000178	0.091330	0.500562	0.000029

						0.269800	0.198200	0.208700	0.463600
42	DCC	0.0159	0.0181	0.0022	1.2982*	8e-06***	-0.104616***	1.027686***	2.1e-05***
						0.000000	0.000000	0.000000	0.000000
43	INTUCH	0.0169	0.0138	-0.0031	1.4976**	0.000118**	0.215495**	0.370559*	-0.000041
						0.041900	0.040200	0.092500	0.188900
44	MAKRO	0.0238	0.0179	-0.0059	1.7646***	0.000123	0.093110	0.686373***	-0.000053
						0.289500	0.245000	0.007000	0.329300
45	JAS	0.0218	0.0294	0.0075	1.8087***	0.000045	0.112699**	0.8062***	0.000038
						0.102200	0.040700	0.000000	0.258800
46	KKP	0.0169	0.025	0.0081	2.1963***	0.000187	0.209459*	0.131623	0.000215
						0.121200	0.058500	0.773700	0.132600
47	BDMS	0.0204	0.0271	0.0068	1.7726***	1.8e-05***	-0.060883***	1.033599***	0.000003
						0.000100	0.000000	0.000000	0.652200
48	RATCH	0.0164	0.0137	-0.0027	1.4371**	0.000121*	0.115097	0.368238	-0.000028
						0.057300	0.120900	0.181400	0.290400
49	TTW	0.017	0.0194	0.0024	1.3028*	0.000052	0.035603	0.78287**	0.000015
						0.550900	0.348800	0.010700	0.503900
50	CK	0.0427	0.0319	-0.0108	1.7922***	6e-05***	-0.047931***	1.022818***	-5.1e-05***
						0.003800	0.000200	0.000000	0.000000
51	STEC	0.0448	0.0357	-0.0091	1.5757**	0.001432	-0.049363	0.338644	-0.000546
						0.596400	0.513900	0.797400	0.602900
52	THCOM	0.0328	0.0235	-0.0093	1.9452***	0.000087	-0.006303	0.924385***	-0.000051
						0.265400	0.833300	0.000000	0.278300
53	QH	0.0403	0.0277	-0.0127	2.1247***	0.001280	0.120795	0.047414	-0.000626
						0.175500	0.164100	0.937300	0.228700
54	SIRI	0.0373	0.0269	-0.0104	1.9257***	0.000146	0.241513***	0.683656***	-0.000079
						0.102800	0.001500	0.000000	0.210900
55	ITD	0.0513	0.0375	-0.0138	1.872***	0.002765*	-0.067689	0.003905	-0.001270
						0.079600	0.307800	0.994600	0.115200
56	MCOT	0.0229	0.0223	-0.0005	1.0476	0.0001*	0.161459**	0.670917***	-0.000045
						0.051700	0.029000	0.000000	0.179700
57	AAV	0.0331	0.0275	-0.0056	1.4496**	8.2e-05*	0.196715***	0.727761***	-0.000012
						0.073300	0.001900	0.000000	0.724500
58	CENDEL	0.0372	0.0295	-0.0077	1.5857**	0.001766*	0.071472	-0.404055	-0.000597
						0.085600	0.298600	0.545800	0.229000
59	SAMART	0.0366	0.0253	-0.0113	2.0903***	0.000304	0.035164	0.724436**	-0.000151
						0.462000	0.568600	0.039500	0.460200
60	TTCL	0.0434	0.0242	-0.0192	3.2158***	0.000193**	0.058515	0.780672***	-0.000104
						0.037400	0.190600	0.000000	0.100200
61	VGI	0.0324	0.0289	-0.0035	1.2551	0.00053**	0.276839***	0.277252	-0.000187
						0.013500	0.003900	0.203800	0.138400
62	LPN	0.029	0.0249	-0.0041	1.3593*	0.000176	0.027860	0.748255**	-0.000038
						0.526700	0.615100	0.047100	0.591500
63	AMATA	0.0237	0.0196	-0.0041	1.4675**	0.000443*	0.128543*	0.064404	-0.000126

						0.066200	0.087800	0.889100	0.159900
64	GFPT	0.0224	0.0176	-0.0048	1.6179***	3.9e-05*	0.165075*	0.747329***	0.000002
						0.095500	0.052500	0.000000	0.902400
65	WHA	0.0374	0.0227	-0.0146	2.7022***	9.6e-05**	0.139398***	0.773052***	-0.000022
						0.021900	0.000600	0.000000	0.373300
66	MAJOR	0.0163	0.013	-0.0033	1.5735**	0.00036***	0.146602***	-0.198208**	-0.000225***
						0.000000	0.000600	0.025400	0.000000
67	STPI	0.0216	0.0166	-0.005	1.6895***	0.000145	0.017854	0.660793	-0.000057
						0.669400	0.710700	0.392100	0.672800
68	AP	0.0191	0.023	0.0039	1.4474**	2.5e-05***	-0.113787***	1.02643***	2.4e-05***
						0.000800	0.000000	0.000000	0.000000
69	S	0.0384	0.0517	0.0133	1.8156***	0.000625***	0.586173***	-0.117318***	0.001692***
						0.000000	0.000000	0.000000	0.000000
70	BCH	0.0186	0.019	0.0003	1.0367	1e-05**	-0.059773***	1.031146***	0.000002
						0.036800	0.000600	0.000000	0.576500
71	SPCG	0.0177	0.0242	0.0065	1.8699***	0.000061	0.034573	0.76796***	0.000060
						0.372900	0.488900	0.003400	0.400900
72	UV	0.0326	0.0266	-0.006	1.5004**	0.001607***	0.073373	-0.648808*	-0.000468*
						0.000100	0.110500	0.062600	0.076900
73	BMCL	0.0162	0.0284	0.0123	3.0903***	6.8e-05***	0.410552***	0.226337	0.000405***
						0.006200	0.000200	0.127900	0.002200
74	SC	0.017	0.0153	-0.0018	1.2431	0.000084	0.133614	0.58209*	-0.000023
						0.274400	0.174700	0.073200	0.428400
75	M	0.0149	0.0113	-0.0036	1.7361***	1.2e-05***	-0.072404***	1.027097***	-7e-06***
						0.000000	0.000000	0.000000	0.000000
76	THRE	0.0215	0.015	-0.0065	2.0448***	0.000228***	0.101969***	0.533146***	-0.000197***
						0.000000	0.003200	0.000000	0.000000
77	EARTH	0.0189	0.0234	0.0046	1.5435**	0.000085	-0.014176	0.787005***	0.000036
						0.331800	0.632500	0.000500	0.285600
78	NOK	0.0131	0.029	0.0159	4.9184***	-2e-06*	-0.03357***	1.042398***	1e-05***
						0.086400	0.000000	0.000000	0.000000
79	PSL	0.0231	0.0235	0.0004	1.035	1.1e-05*	-0.046345***	1.007919***	1.4e-05***
						0.063400	0.000100	0.000000	0.000000
80	SRICHA	0.0149	0.0149	0.0000	1.0048	0.000070	0.062912	0.624203	0.000000
						0.525800	0.405000	0.237700	0.983500
81	TU	0.0121	0.0189	0.0067	2.4145***	0.000090	0.027172	0.310656	0.000140
						0.658300	0.694300	0.837300	0.652800
82	MC	0.0169	0.022	0.0051	1.6892***	8.3e-05**	0.185412**	0.546133***	0.000044
						0.043100	0.040400	0.002200	0.121100
83	MEGA	0.0146	0.0221	0.0074	2.2743***	0.000003	-0.04772***	1.035816***	9e-06***
						0.230900	0.000000	0.000000	0.000200
84	KCE	0.0211	0.0228	0.0017	1.1729	0.000015	0.106584**	0.877559***	-0.000013
						0.236300	0.040000	0.000000	0.147400
85	KTIS	0.0167	0.016	-0.0008	1.0966	0.000063	0.029905	0.724342***	-0.000003

						0.314500	0.546000	0.006400	0.833500
86	HANA	0.0225	0.0253	0.0028	1.2611	0.000051	0.017998	0.885601***	0.000011
						0.599800	0.532400	0.000000	0.635300
87	SGP	0.0266	0.0289	0.0023	1.1793	0.000568***	0.30712***	-0.152702	0.000219*
						0.000300	0.002500	0.525700	0.082100
88	GUNKUL	0.029	0.0288	-0.0002	1.0129	4.1e-05***	-0.076992***	1.024717***	0.000000
						0.000000	0.000000	0.000000	0.990000
89	ICHI	0.019	0.0193	0.0003	1.0344	0.000048	0.053571	0.81205***	0.000004
						0.120300	0.249700	0.000000	0.722100
90	KTC	0.0258	0.0233	-0.0024	1.2189	0.000124	0.124557*	0.695556***	-0.000033
						0.114600	0.082300	0.000000	0.370800
91	SAWAD	0.0298	0.0189	-0.0109	2.4755***	0.001058**	0.187138	-0.342424	-0.000634**
						0.010200	0.103000	0.348100	0.032100
92	BA	0.0124	0.0159	0.0035	1.6476***	0.000033	0.093005**	0.736278***	0.000003
						0.198300	0.031700	0.000000	0.709400
93	CBG	0.0207	0.0172	-0.0035	1.443**	0.000092	0.109974	0.665034***	-0.000021
						0.276800	0.211900	0.009900	0.515000
94	CKP	0.0145	0.0159	0.0015	1.2145	0.000025	0.036598	0.841224***	0.000008
						0.360000	0.434300	0.000000	0.504000
95	LHFG	0.016	0.0154	-0.0005	1.068	0.000024	0.080384*	0.841543***	-0.000007
						0.235000	0.081800	0.000000	0.222700
96	SVI	0.0186	0.0222	0.0036	1.4205**	0.000301**	0.201533	-0.074076	0.000136
						0.035400	0.104900	0.856600	0.154300
97	ANAN	0.0211	0.0209	-0.0003	1.0248	0.000439	0.150000	0.600000	0.000000
						0.698800	0.626500	0.525300	1.000000
98	RS	0.0343	0.0222	-0.0121	2.3887***	0.00151***	0.092634	-0.424322	-0.000876***
						0.001000	0.345500	0.314700	0.001200
99	UNIQ	0.0207	0.028	0.0072	1.8196***	3e-05*	0.164132**	0.809942***	-0.000007
						0.081700	0.023600	0.000000	0.596800
100	EPG	0.0293	0.0246	-0.0047	1.4149**	0.000030	0.08907*	0.870968***	0.000000
						0.208900	0.071900	0.000000	0.987900
101	CHG	0.0218	0.027	0.0052	1.5338**	3.7e-05*	0.045109*	0.874875***	0.000013
						0.054100	0.080400	0.000000	0.385400
102	PTG	0.0233	0.0175	-0.0058	1.7706***	0.000063	0.089187	0.78082***	-0.000023
						0.239900	0.195600	0.000000	0.314500
103	TASCO	0.0317	0.0359	0.0042	1.2808	0.000502***	0.479836***	0.113664	-0.000006
						0.008700	0.000200	0.535300	0.965700
104	VNG	0.027	0.021	-0.006	1.6557***	6.4e-05***	-0.125146***	1.023954***	-2.4e-05***
						0.000000	0.000000	0.000000	0.000000
105	PLANET	0.0298	0.0188	-0.0109	2.4953***	3e-05***	0.194316***	0.810249***	-2.5e-05***
						0.006100	0.000000	0.000000	0.004100
106	BEAUTY	0.0244	0.0256	0.0012	1.0994	0.000307	-0.020075	0.510495	0.000020
						0.801600	0.733000	0.799300	0.851300
107	SCN	0.0385	0.0221	-0.0164	3.0234***	7.9e-05**	0.049286	0.864269***	-4.5e-05*

						0.020100	0.102100	0.000000	0.055700
108	GL	0.0359	0.0373	0.0014	1.0809	0.000077	0.148534**	0.777921***	9.1e-05**
						0.215100	0.015900	0.000000	0.044500
109	GPSC	0.016	0.0208	0.0048	1.6826***	0.000106**	-0.082001***	0.625593***	0.000108**
						0.018700	0.004800	0.000400	0.010600
110	WORK	0.0249	0.033	0.0081	1.7616***	0.000375***	0.785066***	-0.034867	-0.000035
						0.000000	0.000000	0.461300	0.635700
111	BEM	0.018	0.0246	0.0066	1.8715***	0.000055	-0.026243	0.852314***	0.000057
						0.509600	0.433900	0.000500	0.478300
112	IFEC	0.0235	0.0308	0.0072	1.7087***	0.000185**	0.24057**	0.484522**	0.000031
						0.026600	0.017000	0.011200	0.513400
113	TVO	0.0189	0.0191	0.0002	1.0247	0.000128	0.109981	0.539765	-0.000004
						0.317200	0.208400	0.195100	0.891800
114	ERW	0.0192	0.0117	-0.0075	2.7021***	0.000125	0.171175	0.512839*	-0.000084
						0.142400	0.119400	0.087300	0.138200
115	SPRC	0.0267	0.0157	-0.0109	2.8737***	0.000077	0.062071	0.815369***	-0.000045
						0.210500	0.166900	0.000000	0.207400
116	TKN	0.0318	0.0251	-0.0067	1.6073***	0.000184	0.033897	0.77576***	-0.000058
						0.440600	0.530700	0.005100	0.477600
117	VIBHA	0.0182	0.0127	-0.0055	2.0562***	4.4e-05*	0.294561***	0.55575***	0.000001
						0.066000	0.003100	0.000000	0.971200
118	SUPER	0.0356	0.0225	-0.013	2.4919***	0.000101***	0.396293***	0.56454***	0.000015
						0.000200	0.000000	0.000000	0.641400
119	MTC	0.0224	0.0168	-0.0056	1.786***	0.000088	0.062000	0.754405***	-0.000037
						0.347300	0.219200	0.000600	0.353500
120	EA	0.0203	0.0183	-0.002	1.2363	0.000110	-0.057153*	0.779135***	-0.000022
						0.103700	0.066000	0.000000	0.274500
121	COM7	0.0222	0.0213	-0.0009	1.0866	0.000251	0.092213	0.398709	-0.000018
						0.382400	0.291300	0.530100	0.735900
122	PTL	0.0233	0.0167	-0.0066	1.9519***	0.000453***	0.164344**	-0.109712	-0.000169**
						0.001100	0.048000	0.711500	0.026900
123	MALEE	0.0292	0.0308	0.0017	1.1174	0.001094***	0.135903**	-0.582705**	0.000326
						0.000000	0.010000	0.023600	0.203700
124	ORI	0.0252	0.0289	0.0037	1.3165*	0.000058	0.152225***	0.78068***	-0.000011
						0.115000	0.002200	0.000000	0.657900
125	MONO	0.0245	0.0283	0.0038	1.3349*	2.6e-05*	-0.099189***	1.026134***	3.3e-05***
						0.080700	0.000000	0.000000	0.000000
126	GGC	0.0188	0.034	0.0152	3.2647***	0.000322***	0.825691***	-0.059303	0.000141*
						0.000000	0.000000	0.414200	0.070500
127	BGRIM	0.0253	0.0152	-0.0101	2.7662***	0.000269	0.128958	0.457685	-0.000173
						0.236900	0.332800	0.288700	0.239200
128	TOA	0.021	0.0151	-0.0059	1.9279***	0.000141	-0.055763	0.728997*	-0.000069
						0.457900	0.140800	0.077600	0.465600
129	PRM	0.0219	0.0288	0.0068	1.7217***	0.000013	-0.064923***	1.035082***	1.8e-05*

						0.177700	0.006400	0.000000	0.060800
130	GULF	0.0166	0.0137	-0.0029	1.4616**	0.000114	0.117234	0.433171	-0.000024
						0.297000	0.146500	0.339400	0.438800
131	AEONTS	0.0194	0.0176	-0.0018	1.2124	0.000043	0.122347*	0.777415***	-0.000014
						0.103400	0.068900	0.000000	0.256100
132	GOLD	0.0204	0.0112	-0.0092	3.3179***	5.9e-05***	0.176796***	0.747277***	-5.7e-05***
						0.002200	0.002600	0.000000	0.002400
133	MBK	0.0171	0.0159	-0.0012	1.1553	1.4e-05***	-0.067942***	1.032489***	-7e-06***
						0.000000	0.000000	0.000000	0.000000
134	OSP	0.0172	0.0216	0.0044	1.5766**	0.000064	0.043343	0.747956***	0.000031
						0.415800	0.497400	0.008600	0.437300

*Note : This table present the results of f-test (panel A) and GARCH (1,1) model from equation (6) (panel B). The numerical values in the table indicate the estimated coefficients of the variables and the numerical values contain in the below column indicate p-value. ***,** and * indicates significant level at 1%, 5% and 10% respectively.*

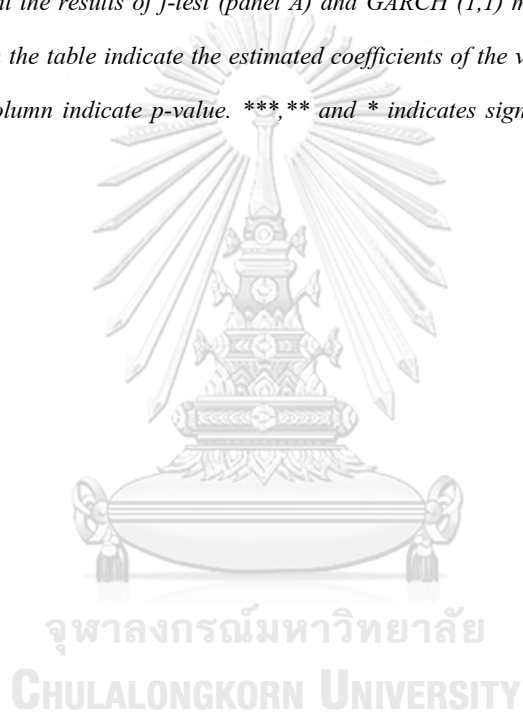


Table D. Systematic Risk Beta results

No	Company	Panel A : Dummy variable regression			
		Coefficient			
		P-value			
		Constant	Rm	Rm*Dummy	Dummy
1	PTT	-0.0004	1.4651***	-0.1687*	-0.0017
		0.7200	0.0000	0.0790	0.2420
2	KBANK	-0.0002	1.2378***	-0.1359	0.0006
		0.9140	0.0000	0.3310	0.7770
3	BANPU	0.0022	0.9021***	0.2475	-0.0037*
		0.1540	0.0000	0.1610	0.0890
4	CPF	0.0039**	1.2246***	-0.3483	-0.0042
		0.0370	0.0000	0.1760	0.1140
5	TTA	-0.0014	0.8804***	-0.2716	-0.0014
		0.2970	0.0000	0.1070	0.4400
6	ADVANC	0.0003	0.9467***	-0.0374	-0.0026
		0.8560	0.0000	0.8570	0.2500
7	IVL	0.0022	1.8526***	0.0574	0.0029
		0.4920	0.0000	0.8920	0.5290
8	PS	0.0011	1.1049***	-0.5503*	-0.0048
		0.6030	0.0000	0.0550	0.1280
9	SCC	-0.0011	1.3145***	0.1555	0.0014
		0.4060	0.0000	0.3470	0.4450
10	TCAP	0.0014	1.4724***	-0.2618	-0.0017
		0.4350	0.0000	0.2660	0.5150
11	SCB	-0.0013	1.291***	-0.0938	0.0013
		0.2780	0.0000	0.5530	0.4480
12	BBL	-0.0009	1.2706***	0.0105	0.0016
		0.4970	0.0000	0.9570	0.3830
13	KTB	-0.0006	1.544***	-0.1325	0.001
		0.7270	0.0000	0.6090	0.6610
14	BAY	-0.0014	1.3892***	-0.0933	0.0019
		0.3430	0.0000	0.6720	0.3540
15	TOP	0.0011	1.4919***	-0.1491	0.0003
		0.5530	0.0000	0.5910	0.9130
16	CPALL	-0.0005	0.8298***	0.3048	0.0019
		0.8130	0.0000	0.2660	0.4970
17	LH	-0.0012	0.8165***	0.281	0.0018
		0.5640	0.0000	0.3130	0.5490
18	DTAC	-0.001	0.6309***	0.1206	0.0043

		0.6220	0.0070	0.6830	0.1410
19	TRUE	0.0011	0.8906*	0.4274	-0.0023
		0.8080	0.0570	0.4800	0.7020
20	STA	0.0051*	1.4225***	0.0294	-0.0083*
		0.0970	0.0000	0.9460	0.0510
21	IRPC	0.0023	1.4544***	0.238	-0.0031
		0.2860	0.0000	0.4360	0.3000
22	TTB	-0.0011	0.9679***	-0.069	-0.0001
		0.5550	0.0000	0.7980	0.9600
23	BTS	-0.0022	0.98***	-0.1475	0.0009
		0.1500	0.0000	0.4770	0.6740
24	THAI	-0.0001	1.2668***	-0.1897	-0.0041
		0.9810	0.0000	0.5750	0.2610
25	ESSO	0.0045*	1.3352***	0.3047	-0.0039
		0.0770	0.0000	0.3340	0.2800
26	TISCO	-0.0007	0.9642***	-0.1027	0.0014
		0.6590	0.0000	0.6060	0.5420
27	BEC	0.0011	0.6397***	0.3424	0.0003
		0.5850	0.0010	0.1460	0.9140
28	MINT	0.0000	0.8524***	0.1715	0.0003
		0.9880	0.0000	0.3470	0.9150
29	SSI	-0.0014	0.6327***	0.5338**	-0.0034
		0.4560	0.0010	0.0110	0.1820
30	BCP	0.0008	0.7822***	0.5189***	-0.0013
		0.6550	0.0000	0.0040	0.5880
31	AOT	0.0018	0.8978***	0.1115	-0.0012
		0.3550	0.0000	0.5890	0.6440
32	CPN	0.0024	0.4438**	0.4852**	-0.0007
		0.2530	0.0220	0.0320	0.8220
33	GLOW	0.003	0.4555**	0.3942*	-0.002
		0.1330	0.0140	0.0680	0.4770
34	EGCO	-0.0009	0.3541***	-0.0211	0.0015
		0.3910	0.0000	0.8450	0.2840
35	BLA	0.0048**	1.0434***	-0.0706	-0.0061*
		0.0330	0.0000	0.7720	0.0540
36	BH	0.0004	0.6688***	0.2182	0.0011
		0.8270	0.0000	0.2630	0.6810
37	DELTA	-0.0028*	0.9085***	-0.2022	0.0029
		0.0780	0.0000	0.2040	0.1830
38	BIGC	0.0041**	0.8187***	0.3645*	-0.0052*
		0.0370	0.0000	0.0690	0.0620
39	SPALI	0.0002	1.0269***	-0.2447	0.0001
		0.8920	0.0000	0.2430	0.9780
40	ROBINS	0.0012	1.0821***	-0.0667	0.0016

		0.5790	0.0000	0.7850	0.5910
41	BJC	0.0028	0.3528***	0.5522**	-0.0015
		0.1740	0.0050	0.0220	0.6160
42	DCC	0.0005	0.5183***	-0.0618	-0.0017
		0.7540	0.0000	0.7350	0.4420
43	INTUCH	0.0022*	1.0917***	0.2728	-0.0033*
		0.0730	0.0000	0.2270	0.0500
44	MAKRO	0.0001	1.2588***	-0.4849	0.0004
		0.9410	0.0000	0.2070	0.8830
45	JAS	0.0037	1.0355**	0.4721	-0.0011
		0.1170	0.0100	0.2880	0.7300
46	KKP	0.0015	0.6608**	0.69*	-0.0006
		0.4370	0.0410	0.0550	0.8210
47	BDMS	0.0025	0.8718***	0.3049	-0.0035
		0.1890	0.0000	0.1940	0.2000
48	RATCH	-0.0009	0.5121***	-0.0972	0.0004
		0.5050	0.0010	0.5700	0.8260
49	TTW	0.0008	0.5835***	0.0546	-0.0006
		0.6090	0.0010	0.7840	0.8100
50	CK	-0.0004	2.1401***	-0.3864	0
		0.8620	0.0000	0.1310	0.9980
51	STEC	-0.0008	2.1041***	-0.2635	-0.0014
		0.7870	0.0000	0.3330	0.7180
52	THCOM	0.0019	1.3143***	-0.3156	0.0001
		0.3960	0.0000	0.1510	0.9840
53	QH	-0.0015	2.0342***	-0.5732***	0.0014
		0.4920	0.0000	0.0080	0.6560
54	SIRI	-0.0038*	1.9273***	-0.4216**	0.0014
		0.0600	0.0000	0.0300	0.6200
55	ITD	-0.0012	2.2533***	-0.1159	0.0007
		0.7010	0.0000	0.6970	0.8720
56	MCOT	-0.0024	0.3777***	0.5575***	0.0002
		0.2500	0.0040	0.0050	0.9550
57	AAV	-0.0011	1.3712***	-0.1566	-0.0012
		0.6310	0.0000	0.4950	0.7170
58	CENTEL	0.0023	1.3155***	0.3444	-0.0038
		0.4010	0.0000	0.2520	0.3280
59	SAMART	-0.002	1.7847***	-0.2979	0.0025
		0.3700	0.0000	0.2710	0.4400
60	TTCL	0.0000	1.4337***	-0.3897	0.0004
		0.9990	0.0000	0.2880	0.9250
61	VGI	0.0004	1.4434***	-0.0314	-0.0007
		0.8750	0.0000	0.9150	0.8440
62	LPN	-0.0021	1.0273***	-0.0033	0.0017

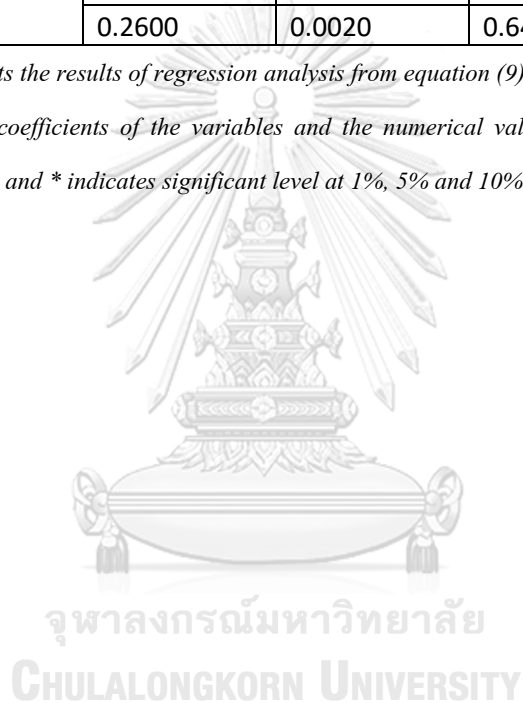
		0.3790	0.0000	0.9910	0.6240
63	AMATA	-0.002	0.9921***	0.8182***	0.0024
		0.2380	0.0000	0.0030	0.3300
64	GFPT	0.0049**	0.4659***	0.1107	-0.006**
		0.0140	0.0020	0.7350	0.0320
65	WHA	-0.0018	1.1301***	0.5611	0.0007
		0.5360	0.0000	0.2620	0.8700
66	MAJOR	0.0002	0.6984***	-0.2618	0.0001
		0.8630	0.0000	0.2850	0.9620
67	STPI	0.0014	1.0636***	0.2363	-0.0035
		0.4120	0.0000	0.4330	0.1410
68	AP	0.0002	1.1542***	0.9159***	0.0006
		0.9210	0.0000	0.0030	0.8180
69	S	0.0082*	0.5725	1.0429	0.0013
		0.0740	0.2020	0.2330	0.8450
70	BCH	0.0018	0.6183***	0.6148*	0.0002
		0.3230	0.0010	0.0750	0.9250
71	SPCG	0.0004	1.0652***	0.4811	-0.0001
		0.8170	0.0000	0.1920	0.9770
72	UV	0.0005	1.9295***	-0.454	0.0012
		0.8620	0.0000	0.3700	0.7450
73	BMCL	0.0008	0.3291	1.9264***	0.0029
		0.7260	0.2180	0.0000	0.3370
74	SC	-0.0002	1.2646***	-0.0228	0
		0.8780	0.0000	0.9450	0.9930
75	M	0.0016	0.6495***	-0.1326	-0.0026
		0.2390	0.0010	0.6590	0.1550
76	THRE	0.0000	0.6463**	0.5948	-0.0007
		0.9900	0.0220	0.1560	0.7820
77	EARTH	-0.0014	0.8934***	0.3727	-0.0008
		0.4950	0.0060	0.3780	0.7780
78	NOK	-0.0029	1.0251***	-0.8582*	0.0027
		0.2010	0.0050	0.0610	0.3950
79	PSL	-0.0012	0.8016**	0.3502	-0.0053*
		0.6040	0.0280	0.4430	0.0930
80	SRICHA	-0.0009	0.3233	0.6167**	0.0001
		0.5320	0.1630	0.0330	0.9750
81	TU	0.001	0.1478	0.4525	0.0000
		0.5390	0.5850	0.1670	0.9870
82	MC	-0.0018	0.9964***	0.2167	0.0016
		0.3150	0.0020	0.5630	0.5310
83	MEGA	-0.0032*	0.7636**	-0.5038	0.0042
		0.0910	0.0200	0.1970	0.1150
84	KCE	-0.0003	1.0126***	0.1558	0.0037

		0.8710	0.0000	0.6900	0.2040
85	KTIS	0.0000	0.4829**	0.3692	-0.0015
		0.9880	0.0230	0.2130	0.5020
86	HANA	0.0006	0.2635	-0.0762	-0.0004
		0.8090	0.3800	0.8670	0.9030
87	SGP	-0.0035	1.5256***	-0.3022	0.0052
		0.1790	0.0000	0.5370	0.1570
88	GUNKUL	0.0042	1.1822***	0.3995	-0.005
		0.1130	0.0000	0.3330	0.1750
89	ICHI	0.0005	0.9932***	0.0494	-0.0017
		0.7850	0.0000	0.8530	0.4720
90	KTC	0.0049**	1.127***	-0.0596	-0.0039
		0.0310	0.0000	0.8680	0.2280
91	SAWAD	0.0075***	1.1004***	0.0332	-0.0072**
		0.0010	0.0000	0.9270	0.0290
92	BA	0.0008	0.2214	0.555**	0.0004
		0.5670	0.2450	0.0200	0.8510
93	CBG	0.0034*	0.8011***	-0.2326	-0.0047*
		0.0640	0.0020	0.4740	0.0730
94	CKP	-0.0004	0.9888***	0.2623	-0.0005
		0.7060	0.0000	0.2100	0.7490
95	LHFG	0.0003	1.0145***	0.1212	-0.0007
		0.8260	0.0000	0.5940	0.7070
96	SVI	0.0003	0.9115***	0.047	0.0019
		0.8670	0.0010	0.8880	0.4720
97	ANAN	0.0000	1.0492***	-0.0552	0.0014
		0.9920	0.0000	0.8450	0.5990
98	RS	-0.0009	1.666***	-0.7247*	0.0007
		0.7250	0.0000	0.0600	0.8430
99	UNIQ	0.0051**	1.0755***	0.0998	-0.0072**
		0.0230	0.0000	0.7620	0.0240
100	EPG	0.0054**	0.7815***	-0.5332	-0.0059
		0.0440	0.0020	0.1870	0.1220
101	CHG	0.0045*	0.7581***	0.251	-0.0047
		0.0550	0.0010	0.4860	0.1560
102	PTG	0.0007	1.3928***	-0.6957**	0.0031
		0.6860	0.0000	0.0100	0.2110
103	TASCO	0.0072**	1.6124***	-1.3398***	-0.0111**
		0.0270	0.0000	0.0070	0.0160
104	VNG	0.0026	1.3873***	-0.8539**	-0.0033
		0.2380	0.0000	0.0110	0.2900
105	PLANET	-0.0003	1.0904***	-0.7444*	-0.0012
		0.8990	0.0000	0.0630	0.7230
106	BEAUTY	0.0019	0.7479***	-0.082	0.003

		0.4420	0.0040	0.8450	0.3810
107	SCN	-0.001	2.0893***	-1.1873**	0.0018
		0.7130	0.0000	0.0140	0.6430
108	GL	0.0023	1.39***	0.4201	0.0031
		0.5060	0.0000	0.4510	0.5170
109	GPSC	0.0008	0.8456***	0.1386	0.0016
		0.6230	0.0000	0.6160	0.5130
110	WORK	0.0000	0.4158	1.613***	-0.0005
		0.9960	0.2170	0.0000	0.8990
111	BEM	0.0023	0.5166**	1.0478***	-0.0013
		0.2260	0.0360	0.0010	0.6220
112	IFEC	0.0001	0.3077	1.7163***	-0.004
		0.9760	0.3230	0.0000	0.2370
113	TVO	0.0028	0.2784	0.3298	-0.0004
		0.1400	0.2810	0.3060	0.8790
114	ERW	0.0000	1.1418***	-0.5531	0.0002
		0.9970	0.0000	0.1070	0.9100
115	SPRC	0.0023	1.376***	-0.1724	-0.0008
		0.2440	0.0000	0.7580	0.7590
116	TKN	0.002	2.0858***	-0.0004	-0.0039
		0.4160	0.0000	1.0000	0.2580
117	VIBHA	-0.0003	1.3468***	-0.5685	-0.0002
		0.8110	0.0000	0.1160	0.8930
118	SUPER	-0.0016	2.6384***	-1.6597**	0.0019
		0.4900	0.0000	0.0160	0.5720
119	MTC	0.0023	2.2765***	-0.9855	-0.0026
		0.2140	0.0000	0.1480	0.3290
120	EA	0.0037**	2.4214***	-1.0505	-0.0017
		0.0410	0.0000	0.1140	0.5080
121	COM7	-0.0002	2.5769***	-0.78	0.0026
		0.9290	0.0000	0.2960	0.3620
122	PTL	-0.001	1.528**	-0.0937	-0.0008
		0.6130	0.0110	0.8980	0.7730
123	MALEE	-0.0031	1.9573**	-2.2633**	-0.0021
		0.3210	0.0180	0.0230	0.6280
124	ORI	0.0018	1.9626***	0.3702	-0.0006
		0.4700	0.0000	0.5640	0.8630
125	MONO	0.0016	1.6191***	-0.2366	-0.0062*
		0.5500	0.0030	0.7130	0.0890
126	GGC	-0.0026	1.3267***	0.2878	0.0016
		0.3170	0.0010	0.5740	0.6600
127	BGRIM	-0.0001	1.8933***	-0.7283**	0.0011
		0.9640	0.0000	0.0260	0.6500
128	TOA	0.0033*	1.2079***	-0.674**	-0.0035

		0.0570	0.0000	0.0360	0.1490
129	PRM	-0.0016	1.4167***	0.5995	0.0006
		0.4610	0.0000	0.1210	0.8330
130	GULF	0.0031**	1.1434***	0.1952	-0.0013
		0.0180	0.0000	0.5070	0.4690
131	AEONTS	0.0018	0.839***	0.4617	-0.0006
		0.3140	0.0000	0.2540	0.8170
132	GOLD	-0.0035**	1.342***	-0.8994***	0.0057***
		0.0160	0.0000	0.0080	0.0060
133	MBK	-0.0016	0.7423***	0.5285	0.0022
		0.2960	0.0000	0.1420	0.3050
134	OSP	0.0021	1.1067***	0.2053	0.001
		0.2600	0.0020	0.6480	0.7030

*Note : This table presents the results of regression analysis from equation (9). The numerical values in the table indicate the estimated coefficients of the variables and the numerical values contain in the below column indicate p-value. ***, ** and * indicates significant level at 1%, 5% and 10% respectively.*



VITA

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