

## Risk and Return: Thai Listed Finance and Security Companies Evidence

Napaporn Nilapornkul<sup>1</sup>, Jiraporn Yuttasri<sup>2</sup>, Teerawat Suaysom<sup>3</sup>

<sup>1</sup> Lecturer in Accounting and Finance department, the Faculty of Business Administration  
Rajamangala University of Technology Thanyaburi  
Pratumthani, Thailand  
napaporn\_n@rmutt.ac.th

<sup>2</sup> Graduate student in Business, Saïd Business School  
University of Oxford, United Kingdom  
Jiraporn.yuttasri@mba2015.sbs.oxfords.edu

<sup>3</sup> Undergraduate student in Accounting and Finance department, the Faculty of Business Administration  
Rajamangala University of Technology Thanyaburi  
Pratumthani, Thailand  
reak.teerawat@hotmail.com

**บทคัดย่อ**— งานวิจัยฉบับนี้ศึกษาผลกระทบของความเสี่ยงที่มีผลต่อผลตอบแทนของธุรกิจซึ่งความแตกต่างของงานวิจัยนี้กับงานวิจัยอื่นคือการศึกษาเปรียบเทียบระหว่างตัวแปรความเสี่ยงที่ใช้ข้อมูลทางบัญชี ซึ่งประกอบด้วย อัตราหนี้สินรวม อัตราหนี้สินต่อส่วนของผู้ถือหุ้น และ ภาระผูกพันทางการเงิน กับตัวแปรความเสี่ยงที่ใช้ข้อมูลตามกลไกตลาด ได้แก่ value at risk ณ ระดับความเชื่อมั่นที่ร้อยละ 95 นอกจากนี้ผลตอบแทนซึ่งเป็นตัวแปรตามมีการใช้ข้อมูลทางบัญชีซึ่งประกอบด้วย อัตราผลตอบแทนจากสินทรัพย์ และ อัตราผลตอบแทนจากส่วนของผู้ถือหุ้น และการใช้ข้อมูลตามกลไกตลาด ได้แก่อัตราส่วน Tobin's q (อัตราส่วนราคาตลาดของสินทรัพย์ต่อมูลค่าตามบัญชีของสินทรัพย์) ขอบเขตงานวิจัยนี้ศึกษาเฉพาะกลุ่มบริษัทเงินทุนและหลักทรัพย์ที่จดทะเบียนในตลาดหลักทรัพย์แห่งประเทศไทย โดยใช้ข้อมูลรายปีระหว่างปี 2553 – 2557 ยกเว้นข้อมูลราคาตลาดของหุ้นที่ใช้ข้อมูลรายวันเพื่อคำนวณ value at risk การวิเคราะห์ข้อมูลเป็นแบบ Panel data โดยใช้สมการถดถอยพหุคูณแบบ fixed effect models ผลการวิจัยพบว่า ตัวแปรความเสี่ยงที่ใช้ข้อมูลทางบัญชีและข้อมูลตามกลไกตลาดเป็นปัจจัยสำคัญที่สามารถอธิบายผลตอบแทนของธุรกิจ ยกเว้นตัวแปรภาระผูกพันทางการเงิน ตัวแปรความเสี่ยงที่ใช้ข้อมูลทาง

บัญชีมีความสัมพันธ์เชิงลบกับอัตราผลตอบแทนต่อสินทรัพย์ และอัตราผลตอบแทนต่อส่วนของผู้ถือหุ้น ขณะที่ตัวแปรความเสี่ยงที่ใช้ข้อมูลตามกลไกตลาดก็มีความสัมพันธ์เชิงลบต่ออัตราราคาตลาดของสินทรัพย์ต่อมูลค่าตามบัญชีของสินทรัพย์เช่นกัน เป็นที่น่าสังเกตว่าเมื่อพิจารณาจากค่า adjusted R<sup>2</sup> พบว่ากลุ่มตัวแปรความเสี่ยงมีความสามารถในการอธิบายผลตอบแทนของธุรกิจในรูปของอัตราผลตอบแทนต่อสินทรัพย์ได้มากที่สุด ตามด้วยอัตราผลตอบแทนต่อส่วนของผู้ถือหุ้น และ อัตราส่วนราคาตลาดของสินทรัพย์ต่อมูลค่าตามบัญชีของสินทรัพย์ ตามลำดับ ซึ่งผลที่ได้สะท้อนให้เห็นว่าผลตอบแทนที่ใช้ข้อมูลตามกลไกตลาดน่าจะได้รับผลกระทบจากปัจจัยความเสี่ยงทั้งภายในและภายนอกธุรกิจซึ่งความเสี่ยงเหล่านี้จะนำไปสู่ต้นทุนทางการเงินและต้นทุนการล้มละลายซึ่งย่อมส่งผลกระทบต่อการลดลงของผลตอบแทนของธุรกิจ

**คำสำคัญ:** ความเสี่ยง ผลตอบแทน เกณฑ์ทางบัญชี เกณฑ์ทางการตลาด

**Abstract**— This research has attempted to examine the impact of risk variables on a firm's return. The major distinction of this study with the prior research is to compare the influence explanatory risk variables, which are developed into two aspects: accounting basis; including debt ratio, debt to equity ratio and degree of financial leverage, and marketing basis; including value at

risk at 95% confidence level. The dependent variables were also conducted in both aspects: accounting basis; including return on assets and return on equity, and marketing basis, including Tobin's q ratio (market to book ratio). The research scope focused on Thai finance and security companies listed on the Stock Exchange of Thailand (SET). Data were collected in annual basis during 2010 – 2014, except daily market price for calculating market-based risk variable as value at risk at 95% confidence level. Panel data analysis was employed in term of the fixed effect models for all multiple regression models. The findings revealed that explanatory risk variables rely on both accounting basis and marketing basis played a key role to explain a firm's return, except degree of financial leverage. Interestingly, accounting-based risk variables were negatively related to firm's return as return on assets and return on equity, whereas marketing-based risk variables provided a negative sign only for market to book ratio. Obviously, based on adjusted R<sup>2</sup> risk variables provided the most explanatory power on return on assets, followed by return on equity and market to book ratio respectively. This might be reflected that market-based dependent variable as market to book ratio might be impacted from internal and external risk factors. These risks might lead to financial cost and bankruptcy cost, resulting to decline in firm's return.

Keywords: risk; return; accounting basis; marketing basis and value at risk

### Introduction

The 1997 Asian Financial Crisis (AFC) or Tom Yum Goong crisis was originated in Thailand. The two major causes of the 1997 AFC were Thai financial liberalization policy without risk hedging and the floating Thai baht announcement. These phenomena brought about a significant devaluation of Thai baht and finally led to huge non-performing loans (NPLs) among Thai financial institutions [1]. At that period, a plenty of financial institutions especially finance companies were collapsed, resulting in recession in Thailand. Then, the crisis subsequently spread to other Asian countries, including Indonesia, Malaysia and South Korea, and finally to Asian region. Thereafter, in 2008 the global financial crisis (GFC), or the hamburger crisis, erupted in the United States. The major cause of the GFC was a lax monetary policy, contributing to excessive leverage and maturity transformations by U.S. banks [2]. Similar to the 1997 AFC, the 2008 GFC then spread to the European Union (EU) and some Asian countries. Due to a huge financial disaster from financial crises, scholars in many countries have recognized in risk and return prospects and concern about the appropriation of financial information. Thus, many scholars have tried to study about risk prospects and risk assessment to contribute to improve financial tools for a better risk prevention.

This stimulates researcher to conduct this study to response research question, which is what distinction between the accounting-based risk variables and market-based risk variables influencing on firm's return are. In addition, finance and security sector was selected due to being a high risk business by nature. As a result, this research endeavored to compare the impacts of a firm's risk on its return based on accounting basis and marketing basis of Thai finance and security companies listed on the Stock Exchange of Thailand (SET) during 2010 – 2014. A major distinction of this research is the inclusion of the market-based risk variable, called Value at Risk (VaR).

The organization of the rest of the paper is as follows: Section II deals with the literature review and the finance and security company sectors in Thailand. Section III is concerned with data and methodology, including the data, dependent variables and explanatory variables. Section IV discusses empirical model used and the research findings, and finally the discussions and conclusion are provided in Section V.

### I. LITERATURE REVIEW

Traditionally, proxies of firm's return have been used based on accounting basis, including profit margin, the returns on total assets (ROA) and the return on equity (ROE) as employed by many researchers such as Capraru and Ihnatov (2014) [3] and Pertria, Capraru and Ihnatov (2015) [4]. Because of financial crises, many researchers have concerned in current firm's value leading to study in a firm's market-based return. Proxy variables based on marketing basis have been used in many studies; however, a popular one is market-to-book ratio (*Mtb*) called Tobin's q (the ratio of market value of total assets over the book value of total assets). This variable has been used by many researchers, such as Fan et al (2012) [5], Gurcharan (2010) [6] and Wanzenried (2006) [7].

In regard to firm's risk, several other studies employed proxy risk variables based on accounting basis such as debt ratio, debt to equity ratio, time interest earned ratio and impaired loans. Similarly, market-based risk variables might be used by many researchers such as Powell (2007) [8]. Additionally, the relationship between risk and return has been studied by many researchers. The famous finance scholars as Fama and French stated the positive relationship between risk and return (1992) [9], implying that firms with higher risk might gain higher return. Thereafter several later papers examined the association of risk with return in various aspects. For example, Malkiel and Saha (2005) studied of hedge funds and concluded that the riskier hedge funds have, the lower return they gain [10]. Ganzach (2000) investigated the association of risk with expected return of familiar assets and unfamiliar assets. The risk and return for unfamiliar assets were judged by global preference, whilst for familiar assets were judged under the financial markets condition [11].

*Thai Finance and Securities Sectors*

Because of the influence of the 1997 AFC, the Thai financial landscape has significantly changed, especially banking sector and finance and securities sectors. At that period, a number of finance companies dropped from 91 to 2 companies due to a huge of overseas loans and a massive of non-performing loans [12]. Thereafter, the finance and security sector have been improved continuously by the collaboration of the Bank of Thailand (BOT) and the Ministry of Finance (MOS) to closely supervise and to restore the country’s financial soundness and stability. By 2014, a number of finance companies and security companies listed on the SET increased to 31 companies which total assets were approximately 299 million baht [13].

II. DATA AND METHODOLOGY

1. Data

This research employed panel data. The data were of Thai finance and security companies listed on the Stock Exchange of Thailand (SET) during 2010 – 2014. The data were of annual basis, except for the stock prices which were of daily data to calculate VaR as a market-based risk variable. Delist and new list companies were excluded because of unavailable data. As a result, the samples of this study consisted of 25 out of 31 Thai listed finance and security companies whose combined assets were 97.03% of the total assets of the entire finance and security sector in 2014 [13] (approximately 290 million bath).

2. Dependent Variable

In regards to firm’s return, this study used two dependent variable groups: (1) bases on accounting basis as Return on Asset (ROA) and Return on Equity (ROE) and (2) based on marketing basis as market to book value (MTB) or called Tobin’Q. Each dependent variable was measured as shown in Table 1.

Table 1: The mnemonic and definition of the dependent variables

Variables	Mnemonic	Definition
<b>Accounting Basis</b>		
1. Debt ratio	<i>DB</i>	Total debts / total assets
2. Debt to equity ratio	<i>DE</i>	Total debts / total equity
3. Degree of Financial Leverage	<i>DFL</i>	Earnings before interest and tax / earnings before tax
<b>Marketing Basis</b>		
1. Value at Risk	<i>VaR</i>	Market-based risk variable rely on the z-score of the normal distribution at 95% the confidence level
<b>Control Variable</b>		
1. GDP growth rate	<i>GPR</i>	Annual percentage growth rate of GDP at market prices based on constant local currency [16]

3. Explanatory variable

Similarly, the explanatory variables in this research were focused on risk variables including two variable groups: (1) the accounting-based risk variable group and (2) the market-based risk variable group.

After financial crises, the market-based risk measurement tools are typically deployed for financial stability for the forward-looking nature [14]. In this research, the Value at Risk (*VaR*) was used as a proxy of market-based risk. *VaR* calculation is shown as following.

**VaR calculation**

*VaR* has been widely used as a market risk assessment tool and has also been suggested in Basel Accord (International banking regulations issued by the Basel committee on banking supervision). There are three methods to calculate *VaR*: the variance-covariance method, the historical method, and the Monte Carlo simulation method [15]. These days, the RiskMetrics model, developed and introduced by J.P Morgan, is the most popular method. This research employed the variance-covariance method, starting with calculating daily equity returns by using the natural logarithm of the ratio of current price ( $P_t$ ) to the previous price ( $P_{t-1}$ ).

$$r_t = \ln \left( \frac{P_t}{P_{t-1}} \right)$$

The Variance-covariance method assumes a normal distribution for asset returns. Calculating VaR requires the measurement of the standard deviation of the relevant assets. The z-score of the normal distribution is obtained based on the confidence level [15]. For this study, the 95% confidence level or the worst 5% of the distribution the z-score is -1.645 was employed. Then, VaR can be calculated as below:

$$VaR = z\text{-score} \times (\sigma_x)$$

Furthermore, this study employed Gross Domestic Product growth rate or GDP growth rate (*GPR*) as a control variable. Each explanatory variable was measured as shown in Table 2.

Table 2: The mnemonics and definitions of explanatory variables

Variables	Mnemonic	Definition equation
<b>Accounting Basis</b>		
1. Return on Assets	<i>ROA</i>	Earnings after tax / total assets
2. Return on Equity	<i>ROE</i>	Earnings after tax / total equity
<b>Marketing Basis</b>		
3. Market to book value	<i>MTB</i>	Market value of total assets / book value of total assets

III. EMPIRICAL MODELS AND FINDINGS

Prior to conducting multiple regressions, data multicollinearity was analyzed by using the Pearson correlation and Variance Inflation Factor (VIF). The results showed in Table 3 below.

The results in Table 3 showed that no explanatory variables provided VIFs above 10.0, whereas *DB* and *DE* had high correlation (0.82), which was above 0.80. As a result, they would be included separately in empirical models as shown in Model 1 and Model 2 below.

Table 3: Multicollinearity and VIF

VIF	Correlation								
	<i>ROA</i>	<i>ROE</i>	<i>MTB</i>	<i>DB</i>	<i>DE</i>	<i>DFL</i>	<i>VaR</i>	<i>GPR</i>	
	<i>ROA</i>	1.00							
	<i>ROE</i>	0.73	1.00						
	<i>MTB</i>	0.11	0.08	1.00					
3.2	<i>DB</i>	-0.20	0.27	-0.13	1.00				
3.3	<i>DE</i>	-0.27	0.17	-0.14	<b>0.82</b>	1.00			
1.1	<i>DFL</i>	-0.16	0.02	-0.09	0.27	0.31	1.00		
1.0	<i>VaR</i>	0.18	0.27	-0.10	0.22	0.16	0.02	1.00	
1.0	<i>GPR</i>	-0.03	0.01	0.09	0.01	0.01	0.09	0.07	1.00

In this research, panel data regression was employed, by considering both fixed effects (FE) and random effects (RE) models. The FE model was developed to take account with heterogeneity effect. While, the RE models assumes a random variable uncorrelated with independent variables. Then the Hausman (HS) test was used in order to selecting the appropriate model between the FE model and the RE model. The null hypothesis of the HS test is that there are no considerable difference between the FE and the RE. As a result, if the null hypothesis is rejected, the RE is rejected [17].

This current research has proceeded to study the influence of risk variables on return as follows:

$$Y_{i,t} = \beta_0 + \beta_1 DE_{i,t} + \beta_2 DFL_{i,t} + \beta_3 VaR_{i,t} + \beta_4 GPR_{i,t} + C_i + C_t + \varepsilon_{i,t} \dots (M1)$$

$$Y_{i,t} = \beta_0 + \beta_1 DB_{i,t} + \beta_2 DFL_{i,t} + \beta_3 VaR_{i,t} + \beta_4 GPR_{i,t} + C_i + C_t + \varepsilon_{i,t} \dots (M2)$$

Where  $Y_{i,t}$  is *ROA* or *ROE* or *MTB*, which separately employed in each model respectively.  $i$  and  $t$  denote company  $i$  and year  $t$ , respectively.  $\varepsilon_{i,t}$  is the random error term for individual  $i$  in year  $t$ .

1. Descriptive statistics

Table 4 summarizes the descriptive statistics of the dependent and independent variables of the sampled data during 2010 – 2014 as below.

Table 4: Descriptive statistics of the dependent and explanatory variables

Variable	<i>ROA</i>		<i>ROE</i>		<i>MTB</i>	
	M 1	M 2	M 1	M 2	M 1	M 2
Constant	0.07***	0.07***	0.14***	0.12***	2.04***	2.31***
<i>DB</i>		-0.05**		-0.02		-1.83***
<i>DE</i>	-0.01***		-0.02***		-0.34***	
<i>DFL</i>	0.00	0.00	0.01	0.00	-0.19**	-0.18**
<i>VaR</i>	0.18***	0.20***	0.47***	0.51***	-5.74**	-5.02**
<i>Gpr</i>	-0.00	-0.00	-0.00	-0.00	0.06	0.06
AdjustedR <sup>2</sup>	0.640	0.637	0.445	0.437	0.422	0.425
F-statistic	8.87***	8.79***	4.55***	4.44***	4.23***	4.27***
Observations	125	125	125	125	125	125

In Table 4, *ROA* of sampled companies in finance and security sector is quite low, whilst *ROE* provided approximately twofold of *ROA*. The mean of *MTB* was 1.5, implying that market value of total assets higher than book value of total assets approximately 1.5 times. Generally, the finance firms and security firms obtained funds from debt financing more than equity financing by business nature, reflecting from the mean of debt ratio (0.5069) and the mean of debt to equity ratio (1.9975). The negative sign of *VaR* reflected the opportunity of firm’s loss, which stands for market risk. Obviously, the high standard deviation of *GPR* might be due to the impact of severe flooding in Thailand in 2011.

2. Regression results

As stated in empirical models, the FE and RE models were employed and then selected appropriated models by using the Hausman test. The results of HS test significantly rejected the null hypothesis for the regression models of *ROA* and *ROE*. Therefore, the fixed effects (FE) model might be used. Conversely, the HS test accepted the null hypothesis for the regression models of *MTB*, meaning that the FE model and RE model were both able to be used. However, this study employed the FE model for all regression models rely on comparison purpose.

The multiple regression results showed the explanatory power of independent variables with regard to the Thai listed finance and security firms’ return in Table 5 as below.

Table 5: Multiple regression results

Variable	Mean	Median	Std. Dev.
Dependent variable:			
<i>ROA</i>	0.0415	0.0315	0.0438
<i>ROE</i>	0.0987	0.0982	0.0949
<i>MTB</i>	1.5002	1.0217	1.6990
Explanatory variables:			
Accounting Basis			
<i>DB</i>	0.5069	0.5667	0.2647
<i>DE</i>	1.9975	1.3083	2.2017
<i>DFL</i>	1.6241	1.2180	1.5712
Marketing Basis			
<i>VaR</i>	-0.0354	-0.0285	0.0214
Control Variable			
<i>GPR</i>	3.8673	2.8094	2.9956

In regard to firms' return based on accounting basis as *ROA*, the results of Model 1 reported that the debt to equity ratio was negatively related to the Thai finance and security firms' *ROA* at the 1% significance level, whereas value at risk at 95% confidence level provided a significant positive influence to the firms' *ROA* at the 1% significance level. The adjusted  $R^2$  of Model 1 was 0.640. The other model, Model 2, the results showed that value at risk at 95% confidence level had a significant impact on the firms' *ROA* at the 1% significance level, whereas debt ratio was negatively associated with the firms' *ROA* at the 5% significance level. The adjusted  $R^2$  of this model was 0.637.

Then for *ROE*, the results of Model 1 reported the same as those of *ROA* which the debt to equity ratio provided a significant negative relation and value at risk at 95% confidence level provided a significant positive relation to the Thai finance and security firms' *ROE* at the 1% significance level. The adjusted  $R^2$  of Model 1 was 0.445. Surprisingly, the results of Model 2 showed that only market-based risk variable as value at risk at 95% confidence level played a key role on the firm's *ROE*, which was positively related to *ROE* at the 1% significance level. The adjusted  $R^2$  of this model was 0.437.

Finally the market-based return as market to book value (*MTB*), it is interesting that for Model 1 entire risk variables played a key role on firm's return. Debt to equity ratio, degree of financial leverage and value at risk at 95% confidence level was negatively related to the Thai finance and security firms' *MTB* at the 1% significance level for debt to equity ratio, and at the 5% significance level for degree of financial leverage and value at risk at 95% confidence level respectively. The adjusted  $R^2$  of Model 1 was 0.422. Additionally, the results of Model 2 reported the same as those results of Model 1. The adjusted  $R^2$  of this model was 0.425.

#### IV. DISCUSSIONS AND CONCLUSIONS

Based on multicollinearity analysis, the findings showed that entire accounting-base risk variables as debt ratio, debt to equity ratio and degree of financial leverage provided a negative relationship with *ROA* and *MTB*. This evidence reflected that a firm with higher financial risk might gain lower return. This might be due to having a high financial costs, including interest and bankruptcy costs. Conversely, those accounting-base risk variables had a positive sign rely on *ROE*, reflecting that a firm with higher financial risk might gain higher *ROE*. This evidence supports capital asset pricing model (CAPM), which stated that investing in riskier assets might gain higher return to cover a risk premium [9]. In regard to market-base variables as *VaR*, it was positively related to *ROA* and *ROE*; on the contrary, it was negatively associated with *MTB*. The negative sign rely on *MTB* reflected that a firm with higher *VaR*, or market risk might gain lower return due to losing customers' trust.

Table 5 showed that the F-test shows a 1% significance level for each regression model. This study provided four noteworthy results as discussed below.

Firstly, explanatory variables provided the highest explanatory power to *ROA* (adjusted  $R^2$  was approximately 0.640), followed by to *ROE* (adjusted  $R^2$  was approximately 0.445) and to *MTB* (adjusted  $R^2$  was approximately 0.425) respectively. It was more likely that firm's return in term of *ROA* might be able to be explained by risk variables. Whilst, the rest models provided somewhat lower adjusted  $R^2$ , implying that the models needed more explanatory variables to explain *ROE* and *MTB*.

Next, the results of Model 1 and Model 2 provided similar explanatory power for each dependent variable, reflecting from the similar magnitude of adjusted  $R^2$ . Interestingly, debt ratio played a key role to explain a firm's return in term of *ROA*, but not for *ROE*. This might be because the definition of debt ratio and *ROA* both included total assets, whereas *ROE* included total equity.

Thirdly, it is obvious that entire risk variables both accounting-basis (*DB*, *DE* and *DFL*) and marketing-basis (*VaR*) were significant factors influencing on *MTB*. This implies that market to book ratio might depend on market value of assets rely on both internal factors such as earnings and internal risks, and external factors such as financial market condition and government policy, whereas *DFL* is less likely to explain *ROA* and *ROE*.

Lastly, a control variable as *GPR* is less significant influence on entire a firm's return as *ROA*, *ROE* and *MTB*.

In conclusion, this research has investigated the impact of risk variables on firm's return of Thai listed finance and security companies. This study also compared between proxy variables based on accounting basis and marketing basis. The findings revealed that accounting-based risk variable and marketing-based variables played

a significant role to explain market-based firm's return as *MTB*. For *DFL*, it was less explanatory power on *ROA* and *ROE*. As a result, for risk variables both accounting basis and marketing basis were major determinants on a firm's return as *ROA*, *ROE* and *MTB*. Noteworthy, the limitation of this study is to include financial risk as *DE*, *DE* and *DFL*, and market risk as *VaR*. Thus for future research should include more proxy variables for the others risk types such as credit risk, operational risk and purchasing power risk. In addition, other industries such as property section, commercial section and construction sector should be examined in the future.

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