

How the minimum wage change affect to the revenue of the
property development companies in Thailand?



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จุฬาลงกรณ์มหาวิทยาลัย
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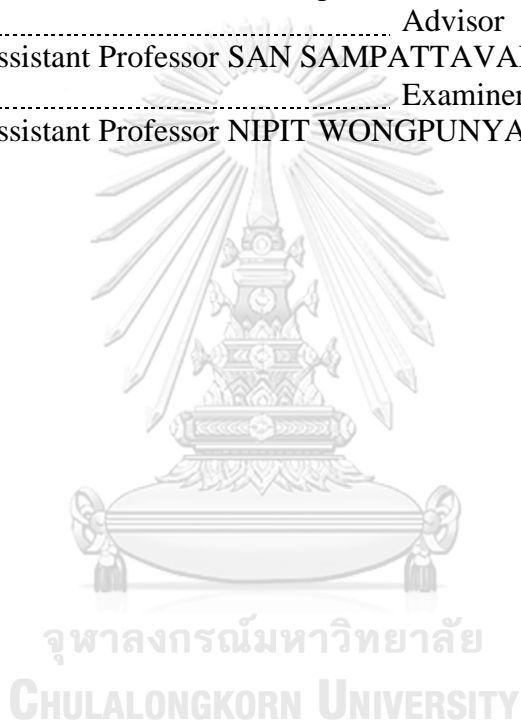
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This paper has a purpose to test the relationship between the minimum wage change and the revenue of property development companies that join the stock market in Thailand for more than 10 years. Moreover, this paper still has an investigation for proving the result of testing. This paper used the revenue property development companies which join the stock market in Thailand for more than 10 years which the data which be used from 2010 to 2019. The Thai annual average minimum wage information is gathered from the macroeconomic website from 2010 to 2019. The relationship between the minimum wage and the revenue of property development companies is tested by the panel regression model follow the study of Sufian and Kamarudin (2015). The result of this paper indicates that the minimum wage change has not affected or a relationship with the revenue of the property development companies in Thailand. Moreover, from proving the result, it shows that the revenue of property development companies was stable by the increase of renting revenue from the consumer expenditure increasing and the effect of the minimum wage is not efficient enough to affect the revenue. Furthermore, the companies in the real estate industry have the efficient skills for revenue & profit-making. Thus, the minimum wage change has not affected or a relationship with the revenue of the property development companies in Thailand. Due to limited time, the data is limited too. The scope of the data has only the property development companies. For improving, this study should collect all of the companies in the real estate industry for testing the industry which has more efficiency and scale. Moreover, the years of data is the limited scale because the companies which are joined the stock market of Thailand less than 10 years will be deducted for suitable with testing a panel regression.

Field of Study:	Business and Managerial Economics	Student's Signature
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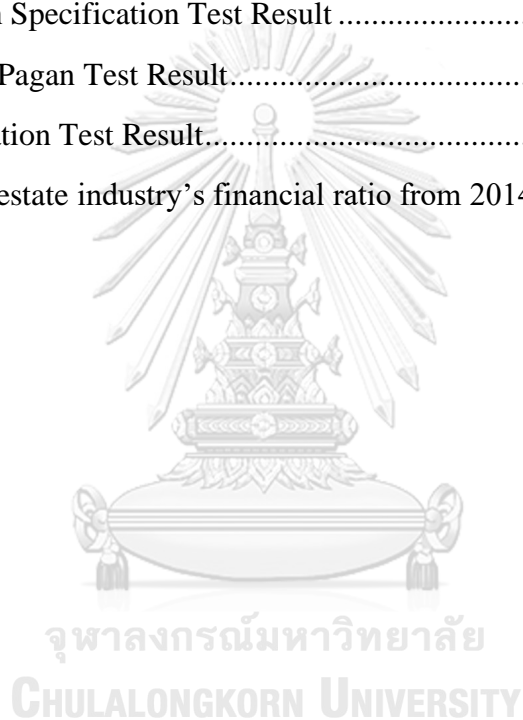
Siravit Srichomngam

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1. Introduction

In the 2020s, money is the most important thing for living during we are alive. If you have not enough money, you can't live in the residential. As the importance of residential, it is one of four basic needs that everyone must-have. On the other hand, money is a powerful factor too. Hence, these things should be changed in the same direction. Many people establish the firm for enhancing the amount of their money. Money can be changed to be everything that you need if it has enough but the most important thing that everybody needs to have is the residence. Someone rents the condominium, rented room, house, and others. When you are still alive the important thing that you need to use every day is the residence. Moreover, many people no need just rent the residence but they need to be the owner of the residence.

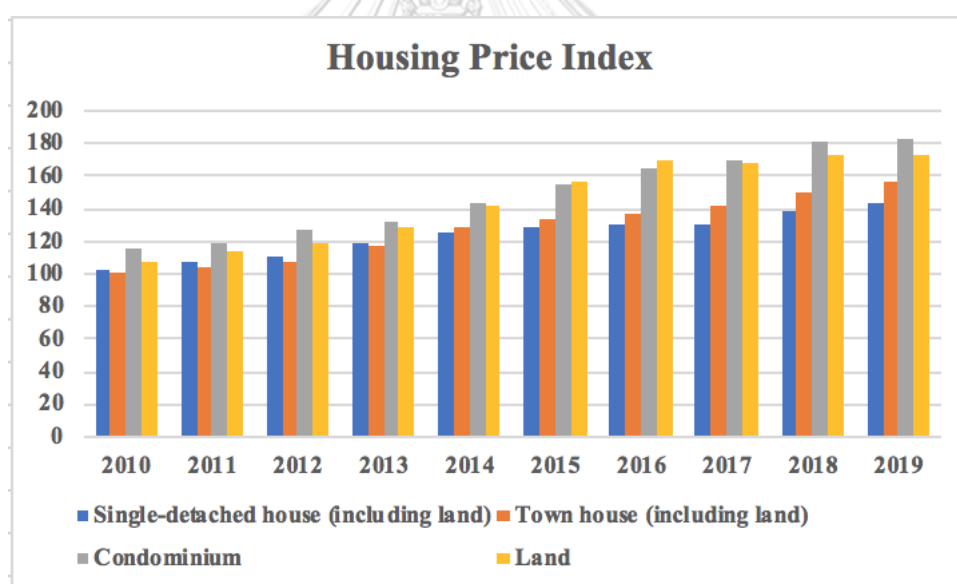


Figure 1: Thailand housing price index
Source: Bank of Thailand

As the most popular thinking in Thailand, Thai people need to have a house for their families or themselves. Thus, the property development companies are the business that important business for the living of Thai people who grow every year based on Figure 1. It shows that the housing price in Thailand is increasing every year. Thus, it indicates that the importance of property development companies for

the people in Thailand. Their products are many kinds such as a single house, condominium, townhouse, and other for people choosing. After people graduated from university, most of them need to find a job for a salary. Most Thai people live based on the salary that why the salary is a significant thing. When the inflation rate grew higher but the salary is still the same, it made many people can't live by based on the salary because it is not enough. Thai government can't remain quiet about this problem Therefore, the Thai government needs to announce the minimum legislation for appointing the stair for helping the people who are suffering from insufficient wage problems for the living.

As the minimum wage change in Thailand, it has an effect on the cost increase of the property development companies which affects to decrease in profit that is ordinary. On the other hand, how about the revenue of the property development companies? Is it affected by the minimum wage increase? The result of this paper will importantly help to clarify the association between the minimum wage and the revenue of the property development companies. This paper has purposed to contemplate the coefficient of the minimum wage increase to the revenue of property development companies that they have any relationship between them or not. Using the minimum wage and other variables to be the independent variables to find the relationship with the dependent variable which is the revenue of property development companies in Thailand.

From the study of Bauer, Kluve, Schaffner, and Schmidt (2009), the public revenue will be decreased from corporate taxes because of the minimum wage change. This change leads to an increase in the wage of incumbent workers and high skill workers' demand. As the total labor income increased, it implies the increase in wage cost or the decrease in profit of the firm which will lead to the decrease of public revenue. Therefore, follow the panel regression model, I hypothesize that the minimum wage will lead to a decrease in the company revenue. This study data has the main idea on the property development companies only in the stock market of Thailand which joined more than 10 years.

2. Literature Review

From the study of Bauer, Kluve, Schaffner, and Schmidt (2009), the evidence shows the revenue was affected to decrease by the increases in the minimum wage. For testing the effect of the minimum wage on the revenue of the property development companies, the panel regression model will be used that refers to the study of (Sufian and Kamarudin, 2015). For setting up the strong model for testing the panel regression model, the independent variables will be picked up from the evidence that shows the relations of the independent variables to the revenue of property development companies. For the independent variables, the minimum wage is an important independent variable for solving the research question (Belser and Rani, 2011). Total assets are one of the independent variables that show the relationship between the size companies and revenue (Sufian and Habibullah, 2009). Sales and managing costs are one of the independent variables that show the company management performance. (Molyneux and Thornton, 1992) The last one is the business unit age of the property development companies that lead to an increase in revenue (Chen, 2009). The regression result of their studies identified that minimum wage and other determinants are significant determinants. It's meant the revenue of the property development companies has affected by minimum wages, total assets, sales and managing cost, and business unit age.

2.1 The dependent and independent variables

For the revenue, it has many studies that show the relationship of significant determinants with revenue. Each of the determinants that will be used for testing the panel regression model, they have a significant meaning for themselves. The determinants that have a relationship with the revenue of property development companies will be explained follow this. According to the study of Bauer, Kluve, Schaffner, and Schmidt (2009), the minimum wage is the determinant that has an opposite relationship with the revenue of the company. From this study that showing, the revenue after minimum wage changing will affect by the income tax and corporate

taxes which has two opposite effects. The revenue is increased after income taxes increased and decreased after corporate taxes increased. Because the effect of income taxes is softer than corporate taxes, the minimum wage will be led to a decrease following the corporate taxes increase. From the study of Sufian and Habibullah (2009), this study tries to test the commercial bank in Bangladesh's performance that has 37 banks from 1997 to 2004 by using the multivariate regression model. The company's total asset used to be the factor that shows the size of the company which the size of the company is related to the revenue efficiency of the company. If the company is large, the revenue efficiency will high too. If the revenue efficiency is high, the revenue will affect positively. According to the study of Chen (2009), this study tries to examine the satisfaction measure's revenue connotation of the multiple stakeholder, business unit age, and others by using the 20 quarters information of multi-stakeholder satisfaction by testing regression model. The result of this study the business unit age is the factor that increases the revenue. It means the experience of the company is the factor that affects in a positive way to revenue. More experience will be related to the efficiency of the company for operating and managing. As the study of Molyneux and Thornton (1992), this study tries to find the variables that related to bank performance in the European countries from 1986 to 1989. The expense of operating is the factor that shows the management quality of the company. From the minimum wage changing, it has straight related to the cost of sales and management. As the sales and management cost increased, the management quality will be referred to increase too but the cost increased may refer to a decrease in revenue too. It may affect the revenue in positive and negative ways. Thus, the result of the study shows a positive relationship between the minimum wage and the cost of sales and management.

2.2 Technical for regression model testing

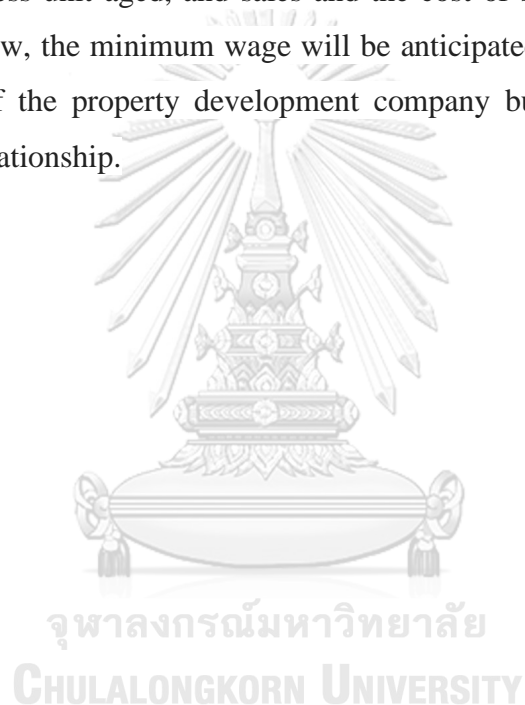
Based on the study of Sufian and Habibullah (2009), they used the panel regression model for testing the revenue efficiency of the bank industry in Bangladesh. This study can adapt the regression model for testing the effect of minimum wage changes on the revenue of the property development companies. This

study used the panel regression model for testing the all of banks or bank industry in Bangladesh, it is suitable for adapting the model to test the relationship of revenue, micro determinants, and minimum wage because the variable and testing way are quite suitable for this study. Moreover, the panel regression model will be tested by three different situations which are Pooled OLS, Fixed effects, and Random effects model follow the study of Akbar, Imdadullah, Ullah, and Aslam (2011) which the way to find the suitable way for choosing the model for determining the result of this study are F-test, Hausman specification test, and Breusch-Pagan Lagrange Multiplier test.

From the study of Gupta (2007), the revenue was set to be the dependent variable for testing the ratio of government revenue with other independent variables. Because of the efficient result after testing the revenue as a dependent variable, the revenue is used to be the dependent variable in this study to be the strong dependent variable for testing the model. For the significant independent variable that can represent the size of the company, the study of Sufian and Habibullah (2009) show that the total assets of the company are the factor that can be used to represent the size of the company. This factor will be used to represent how the minimum wage affects the revenue of companies that have a different size based on the total assets. As the study of the Chen (2009), for showing the experience and management quality of customers to the company for responding to the minimum wage changing, the business united age is the suitable factor to be used. Business unit age can show the experience of the company for responding and managing the problem which can relate to the increased revenue. From the study of Molyneux and Thornton (1992), the sales and management costs are the factor that can explain the management quality. If the cost is high, the quality will be increased too. As the minimum wage changes, the sale and management cost are the factor that have affected the revenue of the company certainly. Thus, the technical way for testing the result to answer the question of this study is panel regression analysis which will test in three ways which are pooled OLS, random, and fixed because the yearly and companies' data are suitable for this technic to test (Sufian and Habibullah, 2009). Moreover, the ways for choosing the suitable model are F-test, Hausman specification test, and Breusch-

Pagan Lagrange Multiplier test. The factors that will be used are minimum wage, total assets, business unit aged, and sales and the cost of sales and management.

Finally, this study has purposed to identify the association between revenue, minimum wage, and other determinants. The panel regression model is the model used to determine the effect of the minimum wage and microeconomic determinants on the revenue of the property development companies. The suitable factors determined to create a strong model for testing the regression are minimum wage, total assets, business unit aged, and sales and the cost of sales and management. As the literature review, the minimum wage will be anticipated to have a negative effect on the revenue of the property development company but other determinants will have a positive relationship.



3. Conceptual Framework

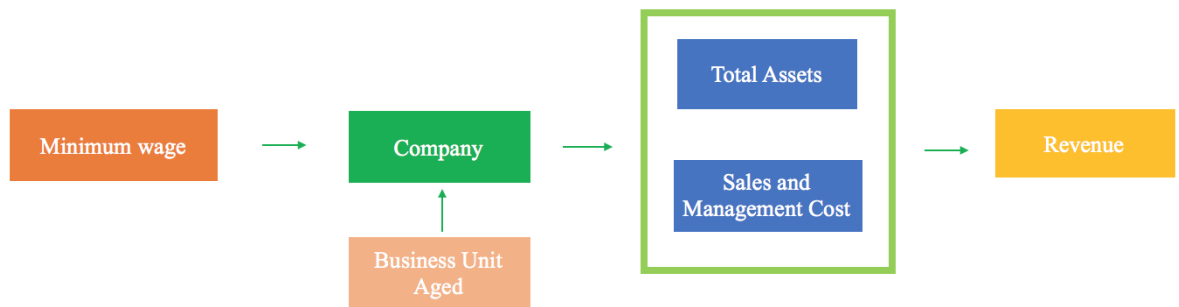


Figure 2: Conceptual Framework

This conceptual framework indicates the relationship between the minimum wage and the revenue of property development companies. After the minimum wage changes, it will be affected to increase the wage cost of the companies which leads to a decrease in the revenue of the companies because the corporate taxes increase more than the income taxes (Bauer, Kluve, Schaffner, and Schmidt, 2009). From the company that receives an effect from the minimum wage, the experience is important to manage for gaining a positive effect from it (Chen, C. X., 2009). The total assets or revenue efficiency of the company is the factor that indicates the effect way from the minimum wage change to revenue such as more total assets, the minimum wage effect will anticipate being positive because of the strength of based and management quality (Sufian and Habibullah, 2009). The minimum wage changes directly affected sales and management costs. As the sales and management costs increased, the management quality will be referred to increase too but the cost increased may refer to a decrease in revenue too. It may affect to the revenue in positive and negative ways.

4. Research Methodology

The method that will be used for finding the answer is the interrelationship research which will focus on finding the relationship and how the relationship they are. As the revenue efficiency model of Sufian and Kamarudin (2015), it used to adapt for testing the revenue of property development companies. The step of research doing will be separated into 2 steps which consist of data collection and regression analysis.

4.1 Data Collection

For the data, it will be collected from the annual report of property development companies which in the stock exchange of Thailand and macroeconomic website on the internet. The data which be collected will be the revenue of the company, minimum wage, GDP, inflation rate, import price, government expenditure, and consumer expenditure. For the details of the above variables, it will be explained follows this:

Data

The author plans to use the annual report of the property company and the minimum wage information from the specific websites from 2010 to 2019. The variable and measurement that I plan to be used are the following:

Variable type	Variable	Variable in Annual report and other websites.	Measurement
Dependent Variable	Revenue	Revenue of property development companies in Thailand.	Baht
Independent Variable	Minimum wage	Each year minimum wage of an employee in Thailand.	Baht
Independent Variable	Total Assets	Total Assets of property development companies in Thailand.	Baht
Independent Variable	Sales and Management Cost	Sales and Management cost of property development companies in Thailand.	Baht
Independent Variable	Business Unit Aged	Opened years of property development companies in Thailand.	Age
Control Variable	Year	Each year that the data will be used.	Year numbers

Table 1: Variable Table

Company

The property development companies joined the Stock market of Thailand more than 10 years which has 44 companies in the Stock Market of Thailand follow this:

SET Symbols	Name	SET Symbols	Name	SET Symbols	Name
A	REEYA PROPERTY PUBLIC COMPANY LIMITED	GREEN	GREEN RESOURCES PUBLIC COMPANY LIMITED	PRECHA	PREECHA GROUP PUBLIC COMPANY LIMITED
AMATA	AMATA CORPORATION PUBLIC COMPANY LIMITED	JCK	JCK INTERNATIONAL PUBLIC COMPANY LIMITED	PRIN	PRINSIRI PUBLIC COMPANY LIMITED
AP	AP (THAILAND) PUBLIC COMPANY LIMITED	KC	K.C. PROPERTY PUBLIC COMPANY LIMITED	QH	QUALITY HOUSES PUBLIC COMPANY LIMITED
AQ	AQ ESTATE PUBLIC COMPANY LIMITED	KWG	KING WAI GROUP (THAILAND) PUBLIC COMPANY LIMITED	RML	RAIMON LAND PUBLIC COMPANY LIMITED
BLAND	BANGKOK LAND PUBLIC COMPANY LIMITED	LALIN	LALIN PROPERTY PUBLIC COMPANY LIMITED	ROJNA	ROJANA INDUSTRIAL PARK PUBLIC COMPANY LIMITED
BROCK	BAAN ROCK GARDEN PUBLIC COMPANY LIMITED	LPN	L.P.N. DEVELOPMENT PUBLIC COMPANY LIMITED	S	SINGHA ESTATE PUBLIC COMPANY LIMITED
CGD	COUNTRY GROUP DEVELOPMENT PUBLIC COMPANY LIMITED	MBK	MBK PUBLIC COMPANY LIMITED	SAMCO	SAMMAKORN PUBLIC COMPANY LIMITED
CI	CHARN ISSARA DEVELOPMENT PUBLIC COMPANY LIMITED	MJD	MAJOR DEVELOPMENT PUBLIC COMPANY LIMITED	SC	SC ASSET CORPORATION PUBLIC COMPANY LIMITED
CPN	CENTRAL PATTANA PUBLIC COMPANY LIMITED	MK	M.K. REAL ESTATE DEVELOPMENT PUBLIC COMPANY LIMITED	SENA	SENADEVELOPMENT PUBLIC COMPANY LIMITED
ESTAR	EASTERN STAR REAL ESTATE PUBLIC COMPANY LIMITED	NCH	N. C. HOUSING PUBLIC COMPANY LIMITED	SF	SIAM FUTURE DEVELOPMENT PUBLIC COMPANY LIMITED
EVER	EVERLAND PUBLIC COMPANY LIMITED	NNCL	NAVANAKORN PUBLIC COMPANY LIMITED	SIRI	SANSIRI PUBLIC COMPANY LIMITED
FPT	FRASERS PROPERTY (THAILAND) PUBLIC COMPANY LIMITED	NOBLE	NOBLE DEVELOPMENT PUBLIC COMPANY LIMITED	SPALI	SUPALAI PUBLIC COMPANY LIMITED
GLAND	GRAND CANAL LAND PUBLIC COMPANY LIMITED	NUSA	NUSASIRI PUBLIC COMPANY LIMITED	U	U CITY PUBLIC COMPANY LIMITED
GOLD	GOLDEN LAND PROPERTY DEVELOPMENT PUBLIC COMPANY LIMITED	PF	PROPERTY PERFECT PUBLIC COMPANY LIMITED	UV	UNIVENTURES PUBLIC COMPANY LIMITED
				WIN	WYNCOAST INDUSTRIAL PARK PUBLIC COMPANY LIMITED

Table 2: List of the property development companies

Variable type	Minimum	Maximum	Mean	SD
Revenue (Million THB)	18.85	41922.62	6519.91	8583.24
Minimum wage (THB)	206	325	288.2	39.78
Total assets (Million THB)	303.72	169933.03	21642.18	25307.57
Sales and Management Cost (Million THB)	16.46	6838.81	1119.99	1374.55
Business Unit Aged (Year)	1	31	17.91	6.28

Table 3: Summary Statistic Table

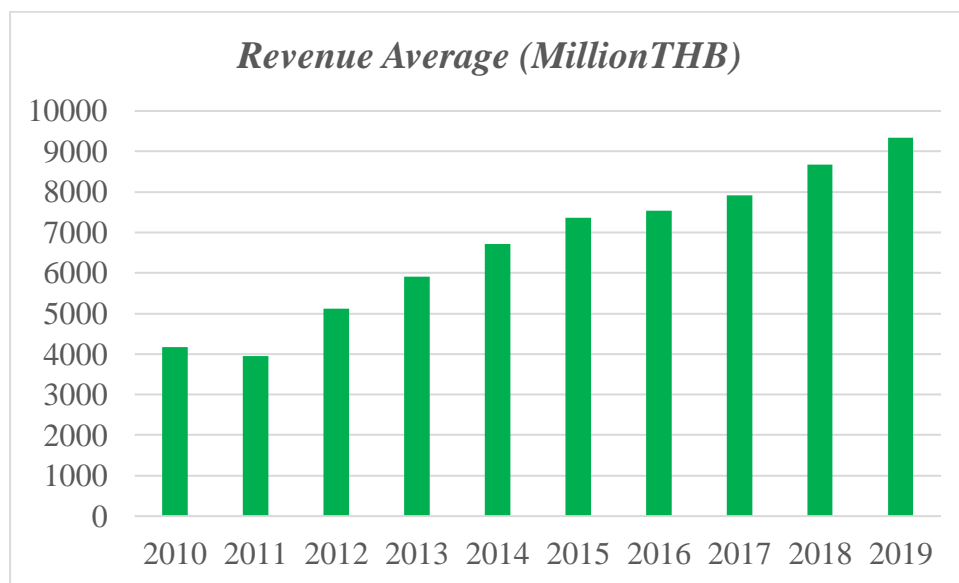


Figure 3: Revenue Average Trend Graph

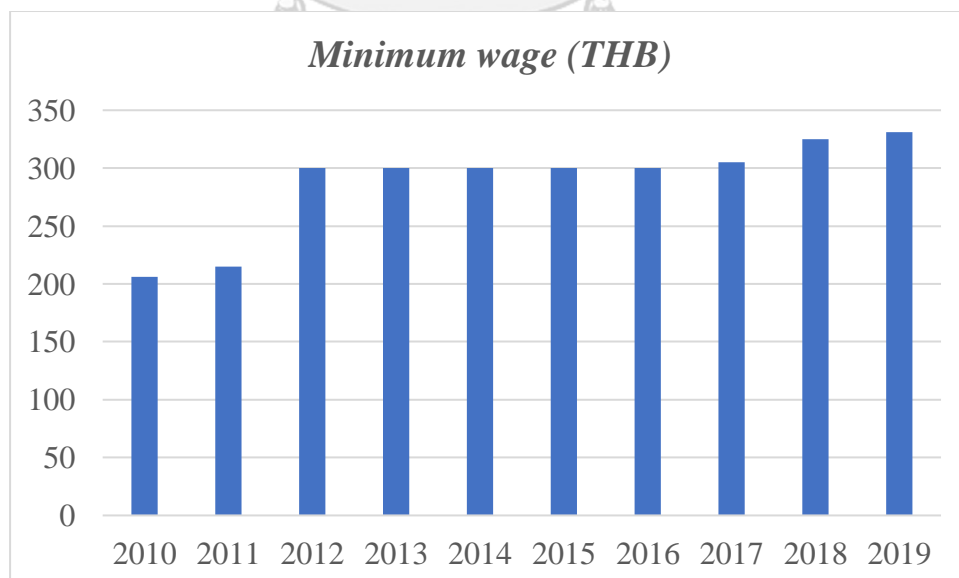


Figure 4: Minimum Wage Trend Graph

Source: Tradingeconomics

From Table 3, it shows the variable which is used to test in the regression analysis model. It indicates the independent variables which are minimum, maximum, mean, and standard deviation of 44 property development companies that joined the stock market of Thailand for more than 10 years from 2010 to 2019.

According to Figure 2 and Figure 3, the trend of these graphs is clearly shown in the same direction of the trend. It grows together which these things are the interesting thing that suitable for proving. Figure 2 is showing the trend of an average of revenue and Figure 3 that shows the trend of a minimum wage, it has an interesting point in these graphs that the revenue of the company has the same trend when the time is passed by 10 years. It makes the point of this research happen that the revenue of the property companies and minimum wage have a relationship between them or not.

4.2 Regression analysis

This step will use the collected data put in the panel regression model for testing the relationship and effect of the macroeconomic determinants on the revenue of the property development companies in the stock market of Thailand. The models that were picked up for using are Pooled OLS model, Fixed effect model, and Random effect model. Moreover, for suitable model choosing, the F-test, Hausman specific model test, and Breusch-Pagan Lagrange Multiplier test will be used for choosing between those Pooled OLS model, Fixed effect model, and Random effect model (Akbar, Imdadullah, Ullah, and Aslam, 2011).

Model

According to the objective of the study that needs to recognize the property company's revenue was influenced by macroeconomic determinants. To test the association between the revenue and determinant variables, the model for testing is the panel regression model following: (Sufian and Kamarudin, 2015)

$$Y_{cy} = \beta x_{cy} + \varepsilon_{cy} \quad c = 1, 2, \dots, N ; y = 1, 2, \dots, N$$

where

Y_{cy} is the changing revenue of property company c at time y

x_{cy} is the explanatory variables' matrix

β is the coefficients vector

ε_{cy} is a random error term

c is the property company c observation

y is the year y observation

N is a number of the data set observations

Pooled OLS model

This model will be using while the assumption is the constant coefficients through time and individual. For estimate the Pooled OLS regression model, the revenue will be used as the dependent variable following:

$$LRVE_{cy} = \beta_{0y} + (\beta_1 MINW_y + \beta_2 AST_{cy} + \beta_3 SAM_{cy} + \beta_4 BUA_{cy} + \beta_5 YEAR_DUM_y) + v_{cy}$$

Where c substitutes the company and y substitute the year time period.

Fixed effect model

As the individuality of each company is taken for estimating the Fixed regression model, the model will be changed to follow this:

$$RVE_{cy} = \beta_{0y} + (\beta_1 MINW_y + \beta_2 AST_{cy} + \beta_3 SAM_{cy} + \beta_4 BUA_{cy} + \alpha_5 YEAR_DUM_y) + \mu_{cy}$$

Where c substitutes the company and y substitute the year time period.

Random effect model

For the random effect model, the outcome variable is presumed to be random. For estimate the random effect regression model, the model could be changed to follow this:

$$LRVE_{cy} = \beta_{0y} + (\beta_1 MINW_y + \beta_2 AST_{cy} + \beta_3 SAM_{cy} + \beta_4 BUA_{cy} + \beta_5 YEAR_DUM_y) + w_{cy}$$

Where c substitutes the company and y substitute the year time period.

Where

RVE is the revenue of property development company c at time y.

MINW is the minimum wage in Thailand at time *y*

AST is total assets of property development company *c* in at time *y*

SAM is the sales and management cost of property development company *c* at time *y*

BUA is business unit aged of property development company *c* at time *y*

YEAR_DUM is the dummy of year which are:

YEAR_DUM2010 is the year dummy which 1 is the revenue of year 2010 and 0 is otherwise.

YEAR_DUM2011 is the year dummy which 1 is the revenue of year 2011 and 0 is otherwise.

YEAR_DUM2012 is the year dummy which 1 is the revenue of year 2012 and 0 is otherwise.

YEAR_DUM2013 is the year dummy which 1 is the revenue of year 2013 and 0 is otherwise.

YEAR_DUM2014 is the year dummy which 1 is the revenue of year 2014 and 0 is otherwise.

YEAR_DUM2015 is the year dummy which 1 is the revenue of year 2015 and 0 is otherwise.

YEAR_DUM2016 is the year dummy which 1 is the revenue of year 2016 and 0 is otherwise.

YEAR_DUM2017 is the year dummy which 1 is the revenue of year 2017 and 0 is otherwise.

YEAR_DUM2018 is the year dummy which 1 is the revenue of year 2018 and 0 is otherwise.

$YEAR_DUM2019$ is the year dummy which 1 is the revenue of year 2019 and 0 is otherwise.

v_{cy} is experimental error variance and unobserved individual specific effect.

μ_{cy} is experimental error variance.

w_{cy} is time series components and time cross-sectional error.

α_c is entity-specific intercepts that capture heterogeneities across entities.

β_c are parameters.



Specified Model Testing

Fixed Effects Hypothesis Test

For checking the model between the fixed effect model and Pooled OLS model, the f-test will be the suitable one that follows the study of Akbar, Imdadullah, Ullah, and Aslam (2011). The pooled OLS model is used to be based on the test. This significant test will test for the difference of R^2 for checking the improvement of the model. If the R square has improvement the fixed model will be the suitable model for testing that the pooled OLS model.

$$F_{groupseffects} = \frac{(R_{fix}^2 - R_{pooled}^2)/(N - 1)}{(1 - R_{LSDV}^2)/(NT - N - k)}$$

Where

T is the amount of all observations.

N is the group's amount.

k is the model regressor's number.

If the p-value that will be found from F-test is significant, the fixed model will be a suitable model for choosing. If the p-value is not significant, the pooled OLS model is preferred.

Hausman Specification Test

For specifying the model between the fixed effect model and random effect model, the Hausman specification test is the suitable specified model testing for choosing between fixed and random effect model (Hausman, 1978).

Hypothesis H_0 : Random effect models is consistent.

H_a : Fixed effects model is consistent.

If the p-value of the Hausman specification test is more than 0.05, the null hypothesis will not be rejected. The random effects model is consistent and efficient. On the other hand, if the p-value is lower than 0.05, the null hypothesis will be rejected. Fixed effects model is preferred (Consistent)

Breusch-Pagan Lagrange Multiplier (LM) Test

For checking the random effect alternative in the pooled OLS model, the Breusch-Pagan Lagrange multiplier test will be used (Waldman, 1983). The hypothesis for investigating the result is the following:

Hypothesis $H_0: \sigma_T = 0$

$H_0: \sigma_T \neq 0$

If the p-value of the Breusch-Pagan Lagrange multiplier test is more than 0.05, the null hypothesis will not be rejected. The pool OLS model has not a random effect. On the other hand, if the p-value is lower than 0.05, the pool OLS model has a random effect in the model.

5. Empirical Finding

Macroeconomic Determinants

Minimum wage (MINW)

Note: From the study of Bauer, Kluve, Schaffner, and Schmidt (2009), this factor will have a negative relationship on the revenue. The result of revenue after minimum wage changing will affect by the income tax and corporate taxes which has two opposite effects. The revenue is increased after income taxes increased. Moreover, it will be decreased after corporates taxes increased. Because the effect of income taxes is softer than corporate taxes, the minimum wage will be led to a decrease following the corporate taxes increase. Thus, this minimum wage factor will have a negative relationship with the revenue.

Microeconomic Determinants

Total Assets (AST)

Note: Representative of the property development companies size. AST was adapted from the LNTA of the Sufian and Habibullah (2009) study. As the size of companies larger, the efficiency of revenue will be increased too. If the revenue efficiency is high, the revenue will trend to affect in a positive way although other factors have a negative effect by not larger.

Sales and Management Cost (SAM)

Note: Representative of quality of management. SAM was adapted from the NIETA of Molyneux and Thornton (1992) study. From this study, the cost of sales and management that need to pay to the employee in the company can be the factor that shows the management quality of the company which this factor affects the relationship in positive and negative relationships follow the related factors.

Business Unit Aged (BUA)

Note: Representative of the company experience. As the study of Chen (2009), the business unit aged of the company will have a positive effect on the revenue. As increasing in the business unit aged, the experience for managing the company will be increased too. Thus, the business unit aged may have a positive effect on the revenue of the company.



6. Result and Discussions.

The result of the regression model will be used to summarize the effect of the independent variable which are the macroeconomics determinants to the dependent variable that are the revenue of the property development companies which in the stock market of Thailand

Result

	Pooled OLS	Fixed	Random
	Revenue	Revenue	Revenue
Minimum wage (THB)	-27.906	-17.481	-21.57
	[1.71]	[0.48]	[2.02]*
Total Assets (Size of company)	0.151	0.065	0.082
	[16.52]**	[6.03]**	[8.01]**
Sales and Management Expense	3.456	3.771	3.782
	[20.82]**	[18.97]**	[20.13]**
Business Unit Aged	55.17	110.58	113.849
	[2.23]	[0.26]	[1.77]
year= 2010	-1,009.75	-692.738	-807.614
	[0.55]	[0.57]	[0.77]
year= 2011	-1,715.04	-1,454.69	-1,563.63
	[1.01]	[1.19]	[1.61]
year= 2012	906.78	360.333	558.234
	[1.67]	[0.20]	[1.37]
year= 2013	628.053	197.727	346.114
	[1.16]	[0.14]	[0.94]
year= 2014	854.893	576.497	678.248
	[1.59]	[0.58]	[2.01]*
year= 2015	258.17	207.706	238.498
	[0.48]	[0.35]	[0.76]
Constant	6,435.23	4,026.52	4,742.14
	[1.26]	[1.11]	[1.60]
Observations	440	440	440
R-squared	0.69	0.79	
Number of ID		44	44
Absolute value of t statistics in brackets			
* significant at 5%; ** significant at 1%			

Table 4: Panel Regression Model Result

From table 4 on the Pooled OLS column, the result shows that it has total assets and sales and management expenses which are statistically significant. Moreover, they have a positive relationship with the revenue of the property development companies. The one million baht of total assets of property development company increases will lead to an increase in the revenue of property development by 0.151 million baht and one million baht of sales and management expenses of property development company increase will lead to an increase in revenue of property development by 3.456 million baht. For the minimum wage, business unit age, and year, they are not statistically significant which means they have not a relationship with the revenue of the property development companies.

For the fixed effect model column, the result shows that it has total assets and sales and management expenses which are statistically significant. Moreover, they have a positive relationship with the revenue of the property development companies. The one million baht of total assets of property development company increases will lead to an increase in the revenue of property development by 0.065 million baht and one million baht of sales and management expenses of property development company increase will lead to an increase in revenue of property development by 3.771 million baht. For the minimum wage, business unit age, and year, they are not statistically significant which means they have not a relationship with the revenue of the property development companies.

For the random effect model column, the result shows that it has a minimum wage, total assets, and sales and management expenses which are statistically significant. Moreover, total assets and sales and management expenses have a positive relationship with the revenue of the property development companies. The one million baht of total assets of property development company increases will lead to an increase in the revenue of property development by 0.082 million baht and one million baht of sales and management expense of property development company increase will leads to an increase in revenue of property development by 3.782 million baht. On the other hand, minimum wage has a negative relationship with the revenue of the property development companies. Furthermore, the one baht of

minimum wage increases will lead to a decrease in the revenue of property development by 21.57 million baht. For the business unit age and year, they are not statistically significant which means they have not a relationship with the revenue of the property development companies.

Hausman Specification Test

Coefficients				
	(b) Fixed	(B) Random	(b-B) Difference	Sqrt(diag(V_b-V_B)) S.E.
Minimum wage	-17.48145	-21.56988	4.088429	34.65544
Total assets	.0650783	.0819965	-.0169182	.0033971
Sales and management cost	3.770753	3.781878	-0.111247	.0648446
Business unit aged	110.5799	113.8494	-3.269517	418.3977
Year 2010	-692.7379	-807.6139	114.876	617.4901
Year 2011	-1454.688	-1563.633	108.9454	734.1501
Year 2012	360.3332	558.2336	-197.9003	1768.788
Year 2013	197.7267	346.1142	-148.3875	1350.058
Year 2014	576.4973	678.2484	-101.7511	931.7183
Year 2015	207.7059	238.4979	-30.79203	512.0344
b = consistent under Ho and Ha; obtain from xtreg				
B = inconsistent under Ha; efficient under Ho; obtain from xtreg				
Test: Ho: Difference in coefficients not systematic				
Chi2(8) = (b-B)'((V_b-V_B)^(-1))(b-B)				
= 37.63				
Prob>chi2 = 0.0000				
(V b-V B is not positive definite)				

Table 5: Hausman Specification Test Result

For choosing between fixed effect model and random effect model, the Hausman Specification test is used for testing.

Hypothesis H₀: Random effect models is consistent.

H_a: Fixed effects model is consistent.

As a result, from table 5, the p-value of the Hausman Test is lower than 0.05 meaning that the null hypothesis that the random model is appropriated model has been rejected. The alternative hypothesis is a suitable hypothesis for this test. Moreover, the result still shows that the random effect model and fixed model has not the same coefficient estimated follow the p-value that is too small. It can conclude that the fixed model is appropriate than the random effect model for this study.

Breusch-Pagan Test

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
H₀: Constant variance	
Variable : Minimum wage, Total assets, Sales and management expense, Business unit aged, Year 2010, Year 2011, Year 2012, Year 2013, Year 2014, and Year 2015	
Chi2(10) = 578.97	
Prob > chi2 = 0.000	

Table 6: Breusch-Pagan Test Result

For choosing between pooled OLS model and random effect model, the Breusch-Pagan Specification test is used for testing.

Hypothesis H₀: $\sigma_T = 0$

H_a: $\sigma_T \neq 0$

As a result, from table 6, the p-value of the Breusch-Pagan Test is lower than 0.05 meaning that the null hypothesis that the pooled OLS model has constant variance been rejected. Thus, it can be concluded that the pooled OLS model has a random effect on the model. It means the random effect model is more suitable than the pooled OLS model.

F-test

$$\begin{aligned}
 F_{groupseffects} &= \frac{(0.79 - 0.69)/(44 - 1)}{(1 - 0.79)/(440 - 44 - 2)} \\
 &= \frac{0.0023256}{0.000532995} \\
 &= 4.363
 \end{aligned}$$

$$p - value = > 0.0001$$

As a result of the F-test, the p-value of F-Test is lower than 0.05. It means the null hypothesis has been rejected. It can conclude that the fixed effect model is more appropriate than the pooled OLS model.

Specification Test

Test	p-value	Model Tested	Model Selected
Hausman	>0.0001	Fixed and Random	Fixed
Breusch-Pagen	>0.0001	OLS and Random	Random
F-test	>0.0001	OLS and Fixed	Fixed

Table 7: Specification Test Result

Follow the specification test result, all of the specification tests show the p-value of them are lower than 0.0001 for all test. First, the Hausman test shows that the fixed model is appropriate. Second, the Breusch-Pagen shows that the Random model is appropriate. Last, the F-test shows that the Fixed model is appropriate. Hence, the selected model will be the fixed effect model follow the majority result of the specification test.

From table 4 on the fixed effect model column, the result shows that it has total assets and sales and management expenses which are statistically significant. Moreover, they have a positive relationship with the revenue of the property

development companies. The one million baht of total assets of property development company increases will lead to an increase in the revenue of property development by 0.065 million baht and one million baht of sales and management expenses of property development company increase will lead to an increase in revenue of property development by 3.771 million baht. For the minimum wage, business unit age, and year, they are not statistically significant.

Follow this result, the minimum wage has no significant relationship with the revenue of the property development companies which is opposed with the result of founded research paper of Bauer, Kluve, Schaffner, and Schmidt (2009) that told the minimum wage has a negative effect with the revenue of the companies. Moreover, they have total assets and sales and management expenses which has result in the same ways based on the research paper of Sufian and Habibullah (2009) and Molyneux P and Thornton (1992). Moreover, they told the total assets and sales and management expenses may have a positive effect on the revenue of the property development companies. For the business unit aged, the literature review told they have a positive relationship but the result has not shown the significant relationship between them. Thus, the result of the model may have other reasons why the minimum wage has no negative relationship with the revenue of the property development companies. More research papers will be used to prove it.

7. Proving the result

As the regression model that Hausman test recommends a suitable model for the result is fix model, the fixed regression model recommends that the minimum wage has no significant relationship with the revenue of property development companies in Thailand. It is not matching with the study of Bauer, Kluve, Schaffner, and Schmidt (2009) that show the revenue has an opposite relationship with the revenue. Thus, the result will be proved to follow this:

From the result, the proving ways will be separated into 2 methods which are proving the revenue and proving the cost of property development companies.

1. The revenue of the property development companies.

As the study of Yamagishi (2020), housing renting will be led to an increase follow the minimum wage that increases. As 10 percent of the minimum wage is increased, the housing rent will have a positive relationship to increase with around 2 percent. When the minimum wage is increased, the wage of employees is increasing too that will relate to the study of Lathapipat and Poggi (2016) which shows the minimum wage affect to raise the benefit of workers in Thailand around 15 to 45 percent. House renting is increased because of an increase in consumer expenditure as their wage that increased. Moreover, as the study of Cahuc and Michel (1996), the minimum wage is affected to increase the proportion of skilled workers and increase the capital accumulation of them. It will lead to an increase in housing rent too. Furthermore, the minimum wage increase can result in preventing low skill workers from falling in their job by increasing the effectiveness of their labor skilled follow the study of Lee and Saez (2012). Therefore, the minimum wage will lead to an increase and stability in the revenue of property development companies. Example of renting revenue, Leasehold is an agreement for occupying in real estate such as Triple Y Residence of Golden land Property Development Public Company Limited which located nearby MRT Samyan station. This is one of the property development companies' revenue collecting ways that increase because of the minimum wage.

Thus, the revenue of the property development is stabled by the minimum wage that conforms to the result of the fixed panel regression model.

2. The cost of property development companies

From the study of Jardim and Van (2019), the minimum wage will affect the labor cost of the company which increasing following an increase of minimum wage but it has not large effect enough to affect the product's price from testing by the business outcome in Washington. The total revenue will equal to the price of goods multiplied by the number of goods that sold follow the study of Suri, Budhiraja, and Rajput (2006). When the price has not affected by the minimum wage, the total revenue will be not affected too. Thus, the change in the labor cost by the minimum wage has not affected the revenue of the property development companies.

As mentioned above, the revenue of the property development companies has not affected by the minimum wage. After the minimum wage is increased, the wage of the employee in the business will be increased too but the impact of cost increasing is not larger enough to affect the companies to increase the price of the product to stable the profit. Moreover, the business still has a profit form the minimum wage. Because the wage of employees is increased, the rate for residential renting also increasing and stabilizing too. The employee has more consumer expenditure related to the wage that increased. It has a positive effect on the property development companies' revenue too

Moreover, the financial ratio analysis is another way for proving the result of this study.

According to the study of Hsieh and Wang, (2001), the financial ratio shows the financial health and potential of companies. Thus, if we use it to analyze the ratio of all companies in the industry, it can result in the industry ratio analysis. For financial ratio analysis, it divides into five groups which consist of solvency ratios, liquidity ratios, profitability ratios, activity ratios, and price ratios. If we used it to analyze the real estate industry, we maybe know the interesting fact that why the

minimum wage has not affected or related to the revenue of the property development companies. Follow this is the graph of the financial ratio of the real estate industry until 2014 to 2019 from the specific website.

Financial ratio	Year					
	2019	2018	2017	2016	2015	2014
Solvency Ratios						
Debt ratio	0.55	0.57	0.56	0.64	0.63	0.7
Debt-to-equity ratio	0.69	0.39	0.3	0.4	0.4	0.14
Interest coverage ratio	1.22	1.1	1.29	0.79	0.3	0.59
Liquidity Ratios						
Current ratio	1.18	1.04	1.26	0.8	1.08	1.23
Quick ratio	0.92	1.06	0.64	0.41	0.62	0.85
Cash Ratio	0.68	0.48	0.45	0.24	0.83	0.64
Profitability Ratios						
Profit margin	3.1%	2.1%	7%	3.8%	3.8%	2.6%
ROE (Return on Equity)	-1.9%	-3.7%	-2.1%	-7.9%	-26.5%	-60.6%
ROA (Return on Asset)	1.6%	0.2%	1.7%	0.3%	0.2%	0.2%
Gross margin	51.6%	43.1%	49.3%	70%	61%	54.8%
Operating margin	18.2%	16.3%	12.3%	13.6%	6.6%	9.8%
Activity Ratios						
Asset turnover (days)	815	3091	2717	2697	2571	1933
Receivable turnover (days)	13	34	38	12	20	18
Inventory turnover (days)	9	16	10	24	27	34
Price Ratios						
Dividend Payout Ratio	0.32	0.44	0.7	0.14	0.65	1.68

Table 8: The real estate industry's financial ratio from 2014 to 2019

From the study of Gour and Gupta (2012), Solvency Ratios is the ratio that can be used to determine the ability of the company to repay the long-term debt and interest of the debt. This ratio affects the financial performance of the company. Solvency Ratios consist of the debt ratio, debt to equity ratio, and interest coverage ratio.

The debt ratio is the ratio that shows the ratio of debts and assets of the company. It means if the debt ratio is high, the risk of the company to bankrupt is high too. From the debt ratio of 2019, it shows the debt of real estate industry is lower than the total asset. Moreover, from the debt ratio row, the trend of debt ratio is lower

in every year. Thus, it shows the strong growth of the total asset of the real estate industry which means the companies in this industry has a trend to low risk for bankruptcy.

The debt-to-equity ratio is the ratio that can measure the incurring debt risk of the company. It means if the debt-to-equity is high, the risk of the company to bankrupt is high too but it has other factors to determine such as business type. From the debt-to-equity ratio of 2019, it shows the debt of the real estate industry is lower than the equity. Moreover, from the debt-to-equity row, the trend of the debt-to-equity ratio is higher in every year. It means the companies in the real estate industry are more incurring the debt every year but not more than the equity. It can explain by the real estate company requires a lot of money for investing in every time. Thus, the increase of the debt-to-equity ratio is a good signal for improving the industry.

The interest coverage ratio is the ratio that can measure the interest-paying ability. If this ratio lower than one, it means the company has not enough income for paying the interest. From the interest coverage ratio of 2019, it shows that the interest coverage ratio of real estate companies is higher than one. Moreover, from the interest coverage ratio row, the trend of this ratio is higher in every year. It shows the company in the real estate industry has an efficient ability for paying the interest and trend to stronger while the time is past.

Thus, for the solvency ratio, the solvency ratio of the real estate industry can define that the real estate companies in this industry have a low risk for bankruptcy, an efficient ability for paying the interest, and a trend to improve their ability continuously. It can analyze that the real estate industry has a strong base and an efficient ability to repay the debt for improving.

From the study of Kluger and Stephan (1997), Liquidity Ratios determine the ability of the company for repaying their short-term debt or checking their business liquidity. The liquidity ratio consists of the current ratio, quick ratio, and cash ratio.

The current ratio is the ratio that can be used to measure the ability of the company for repaying their short-term debt. It compares the current asset and current liabilities. The current ratio should more than one which means the company has good liquidity. If the current ratio is lower than one, it means the company may have a risk for lacking their liquidity. From the current ratio of 2019, it shows that the current ratio has value more than one. Moreover, from the current ratio row, it shows that the only one year which the current ratio is lower than one. It means the companies in the real estate industry have good liquidity and the ability for paying their short-term debt.

The quick ratio is the ratio that can be used to measure the ability of the company for repaying their short-term debt. It compares the liquid current assets and total current liabilities. The current ratio should more than one. If the current ratio has lower than one, it means the companies have a risk of lacking their liquidity in the short term and needs to find other asset sources in case of lacking money for repayment. From the quick ratio of 2019, it shows than the quick ratio has a value lower than one. Moreover, from the quick ratio row, it shows that it has the only one year that has value more than one. It means the companies in the real estate industry have not an efficient ability to repay their debt in the short term. On the other hand, an investment in the real estate industry has a large amount of money which is not strange that the quick ratio of this industry is lower than one.

The cash ratio is the ratio that can be used to measure the liquidity of the company which based on caution. It compares the current asset which deducted the inventory and the current liability of the company. The number of cash ratios should higher than one because it means the company asset is more than the current liabilities. From the cash ratio 2019, it shows that the value of this ratio is lower than one. Moreover, from the cash ratio row, it shows that all of the cash ratios of the real estate industry are lower than one. Based on the real estate industry, it is normal that the companies in the real estate industry have low liquidity because the amount for investing in one time is so high.

Hence, for the liquidity ratio, the liquidity ratio of the real estate industry can define that the real estate companies in this industry have the average efficient ability to repay the debt and low liquidity because the business type that requires a large amount of money for investing.

From the study of Hanafi and Halim (2009), Profitability Ratios are the ratio that can be used to measure the ability of the company for generating the capital stock and return on assets. If the ratio is high, the profit-making ability of companies will be high too. Profitability ratios consist of profit margin, return on equity, return on asset, gross margin, and operating margin.

Profit margin is the ratio that can be used to measure the profit-making ability of the company. It compares the net profit before tax with the total sales of the company. If the result is positive or more value, it defines as the company can make a high profit while compared with the total sales. Moreover, it can define the ability for managing the expense of the company too. From the profit margin 2019, it shows that the profit margin is positive. It means that the company in the real estate industry has an efficient ability to make a profit.

Return on equity is the ratio that can be used to measure the profit-making ability of the company. It compares the net profit with the equity of the company. If the return on equity is high, it means the profit-making ability is high too. From the return on equity 2019, the return on equity of the real estate industry is negative. It means the equity that this industry used is higher than the profit but it means that this industry has an inefficient profit-making ability. From the return on equity row, it shows the trend of return on equity that is improving continuously from -60.6% to -1.9% in five years which is fantastic. It means the real estate industry have an efficient profit-making ability and has a trend to grow to be positive in the nearest future.

Return on asset is the ratio that can be used to measure the profit-making ability from the asset of the company or what is the efficiency of the company that

using the asset for making the profit. It compares the net profit and total assets of the company. If the return on asset is high, the profit-making ability is high too. From the return on asset 2019, it shows the positive result which means the companies in the real estate industry have the efficient profit-making ability.

Gross margin is the ratio that can be used to measure the operating efficiency of the company. It compares the gross profit with sales. If the gross margin is high, it means the company has an efficient operating skill for managing the assets. If it low, it means they can't control it efficiently. From the gross margin 2019, it shows that the gross margin is more than 50% which is quite high. It means that the companies in the real estate industry has an efficient operating skill for managing their assets.

Operation margin is the ratio that can be used to measure the operating efficiency of the company. It compares the operating profit with the sales of the company. If the operating margin is high, it means the company has an efficient operating skill for managing the assets in the overall image. If it is low, it means they can't control it efficiently. From the operating margin 2019, it shows that the operating margin is positive. Moreover, from the operating margin row, it shows the trend of operating margin to improve continuously. It means the companies in the real estate industry has an efficient operating skill for managing their assets.

Thus, for the profitability ratio, the profitability ratio of the real estate industry can define that the real estate companies in this industry have an efficient profit-making and operating ability.

From the study of Satryo, Rokhmania, and Diptyana (2017), Activity Ratios are the ratio that can be used to measure the ability of companies to maximize their revenue from the resources. It consists of asset turnover, receivable turnover, and inventory turnover.

Asset turnover (days) is the ratio that can be used to measure the ability for making the revenue from the asset of the company because it told the number of days

that will be used for taking the sales revenue equal to the asset of the company. It compares the net sales and average total assets of the company. From the asset turnover 2019, it shows that the real estate industry companies used only 815 days to equal the sales revenue and the asset of the company while the previous year is 3091 days. It means that the efficient ability for making revenue of the companies in the real estate industry efficiently grows from the last year rapidly.

Receivable turnover (days) is the ratio that can be used to measure the ability for debt collecting of the company. It measures the days that the company needs to use to collect its receivables. If it is high, it means the debt collecting ability of that company is high. If it low, it means the company may have a chance to lacking its liquidity. It compares the net credit sales and the average account receivable of the company. From the receivable turnover 2019, it shows than the days that the company used for collecting their debt is very low. It means the companies in the real estate industry have a high ability for debt collecting.

Inventory turnover (days) is the ratio that can be used to measure the ability of the company for managing the inventory of them. It shows the number of days which will be used for turning inventory to sales. If it is high, it means the inventory managing ability is high. From the inventory turnover 2019, it shows only 9 days. Moreover, from the inventory turnover row, it shows the trend of inventory turnover to improve continuously. It means the companies in the real estate industry have a high ability for inventory managing.

Hence, for the activity ratio, the activity ratio of the real estate industry can define that the real estate companies in this industry have the efficiency ability for making revenue, debt collecting, and inventory managing.

From the study of Gill, Biger, and Tibrewala (2010), Price Ratios which consist if the dividend payout ratio. The dividend payout ratio is the ratio which can be used to measure the paying dividend ability of the company. It compares the dividend per share and earning per share. If the dividend payout ratio is high, it means

the dividend which shareholders received is high too. From the dividend payout ratio 2019, it indicates that the dividend payout ratio is 0.32 which in medium level for funding. It means that the companies in the real estate industry have an average level for paying dividends. It has other factors may affect such as expanding the business which can decrease the dividend-paying.

Above all, the companies in the real estate industry have strong abilities in many ways. Firstly, the companies have a low risk for bankruptcy, an efficient ability for paying the interest, and a trend to improve their ability continuously while analyzing based on the solvency ratios. Secondly, the companies have an efficient profit-making and operating ability based on the profitability ratios. Thirdly, the companies have the efficient skills for making revenue, debt collecting, and inventory managing based on the activity ratios. Lastly, the companies have a trend to grow continuously based on the price ratios.

In conclusion, the reason why the minimum wage has not a relationship or affected the revenue of property companies follow this. The companies have the efficient skills for making revenue and profit which can manage the effect of minimum wage efficiently. Moreover, the companies have the operating and managing ability which can control the factors which may be affected by the minimum wage changing to avoid the effect efficiently. Furthermore, the companies have debt collecting and paying a debt which eases for managing the debt efficiently which the minimum wage has an effect on the debt by the inflation. (Sufian and Kamarudin, 2015) If the debt is controlled efficiently the effect will be deducted. Thus, the property development companies have not affected or a relationship with the minimum wage changing.

8. Conclusion and Recommendation

Conclusion

This study has an objective to study the relationship between the minimum wage changing and the revenue of the property development companies in Thailand which join the stock market of Thailand for more than 10 years. For the data collecting, the data of each company has been collected from the annual report of each company from the year 2010 to 2019 and the specific website for collecting the annual minimum wage data from 2010 to 2019. From the literature review, it shows that the minimum wage may have an opposite relationship with the revenue of the companies follow the study of Bauer, Kluve, Schaffner, and Schmidt (2009). Thus, this study will test the relationship of the minimum wage changing and the revenue of property development companies in Thailand by the panel regression model which will separate into three models which are pool OLS model, fixed-effect model, and random effect model. Moreover, to choose a suitable model for getting a suitable result, the specification tests are necessary things. They consist of the Hausman test, Breusch pagan test, and F-test. (Akbar, Imdadullah, Ullah, and Aslam, 2011). From the specification model testing, the suitable model is the fixed effect model follow the majority result from the specification model testing.

Follow the testing result of the fixed-effect model, the minimum wage has no significant relationship with the revenue of the property development companies which the result is opposite with the found literature review. After finding the reasons why the result of this study is not in the same way with the literature review, the two main reasons are found. Firstly, the minimum wage changing will affect the wage of employees in Thailand. It will increase the consumer expenditure of employees which can relate to an increasing in the renting rate of the house. Property development will receive more revenue from the housing rent and other properties which can be the factor that stable the level of revenue. (Cahuc and Michel, 1996; Lee and Saez, 2012; Yamagishi, 2020). Secondly, the minimum wage changing has an effect to increase the labor cost of the company but the effect has not efficient enough to make the company decide to change its product price to stable its profit. Thus, when the price

did not change following the cost increases, the revenue will not be changed too. (Suri, Budhiraja, and Rajput, 2006; Jardim and Van, 2019)

In conclusion, the revenue of the property development companies has not any affected or relationship with the minimum wage following the result of testing. The main reasons are the revenue was stable by the increase of renting revenue from the consumer expenditure increasing of employees in Thailand. Moreover, the effect of the minimum wage is not efficient enough to affect the revenue of the property development companies in Thailand. Furthermore, the companies in the real estate industry have the efficient skills for revenue & profit-making. Thus, the revenue of the property development companies has not any affected or relationship with the minimum wage.



Recommendation

Although the revenue of the property development companies in Thailand has not affected by the minimum wage changes, it is the result based on all property development companies and the real estate industry. Different companies may have different revenue channels which means it may have some property development companies that will have been affected by the minimum wage changing. For example, Thailand has many housing rents or other types for renting which not only one company is the owner in the market. This market has a competition for snatching customers such as more luxury with cheaper prices or locations near BTS station which has more convenience for customers. If the companies have not a suitable quality strategy, their customer may change a location for renting which means the renting revenue of them is decreased. Thus, property development companies should not be confided in any situation. They should try to improve themselves for competing with other competitors. Moreover, it may have any factors that affect the revenue too. Although the minimum wage has not affected the revenue, it may have other factors that affect the revenue of the company too. Therefore, the recommendation of this paper is preparing for every situation is the necessary thing that every companies should be considered and improve strategy to vie with other competitors.



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