MACROECONOMIC DETERMINANTS OF MALAYSIAN HOUSING PRICE: Evidence from 2010Q1 – 2017Q3

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DECLARATION

We hereby declare that:

(1) This undergraduate FYP is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.
(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.
(3) Equal contribution has been made by each group member in completing the FYP.
(4) The word count of this research report is 17,074 words.

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LIST OF ABBREVIATIONS

ARCG	Autoregressive Condition Heteroscedasticity
BNM	Bank Negara Malaysia
BLUE	Best Linear Unbiased Estimator
CNLRM	Classical Normal Linear Regression Model
DV	Dependent Variable
ER	Exchange Rate
GDP	Gross Domestic Products
GST	Goods and Sales Tax
HPI	Housing Price Index
IV	Independent Variable
LR	Lending Rate
MHPI	Malaysian Housing Price Index
NAPIC	National Property Information Centre
OLS	Ordinary Least Square
Q1	Quarter 1
Q3	Quarter 3
RESET	Ramsey's Regression Specification Error Test
RPGT	Real Property Gain Tax
TOL	Tolerance
UR	Unemployment Rate
VIF	Variance Inflation Factor

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Preface

In Malaysia, price of housing has played an important role for the Malaysia economy. In this recent year, the housing price of Malaysia was stood at a high considerably level. Thus, this study tends to apply the macroeconomic variables to examine the housing price in Malaysia. The macroeconomic variables in this research include Gross Domestic Product (GDP), unemployment rate, lending rate, exchange rate and real property gain tax (RPGT).

This study is conducted based on the guideline that consists of 3 main section:

First section: Preliminary pages that include page of copyright, declaration, acknowledgement, table of contents, list of tables, list of figures, list of abbreviations, list of appendices, preface and abstract.

Second section: The body (content) of the research: Chapter 1: Research Overview Chapter 2: Literature Review Chapter 3: Methodology Chapter 4: Data Analysis Chapter 5: Discussion, Conclusion and Implications.

Third section: The end materials consist of references and appendices

The above criteria will be fulfilled in order to completes this research study. This study provides various types of information about hosing sector in Malaysia which will be useful for future researchers.

Abstract

The main purpose of this study is to measure the significant relationship between macroeconomic factors and movements of housing price in Malaysia from period year 2010 Quarter 1 to year 2017 Quarter 3, which consist of quarterly data of 31 observations. The continuous increase of housing price in Malaysia is becoming one of the hot issues discussed these days. This paper examines empirically whether the increasing trend of housing price in Malaysia is related to changes in Gross Domestic Product (GDP), Exchange Rate (ER), Lending Rate (LR), and Unemployment Rate (UR). Ordinary Least Square (OLS) method is applied in this study, with the purpose of capturing the effect of independent variables. The data of the variables in this study are obtained through the secondary sources. This paper is useful for the government, developers, investors and home buyers to know which factors is most affected the movement of property price investment decision. Thus, this paper can serve as a guide for the government in stabilizing the residential property price in Malaysia. The general results of the study obtained found that Exchange Rate (ER), Lending Rate (LR), and Real Property Gain Tax (RPGT) have the significant relationship in determining the Malaysian housing price index (MHPI), whereas the Gross Domestic Product (GDP) and Unemployment Rate (UR) have the insignificant relationship in determining the housing price index of Malaysia.

CHAPTER 1: INTRODUCTION

1.1 Research Background

Exploring the determinants of house prices from macroeconomic viewpoint in Malaysia from year 2010 quarter one until 2017 quarter four will be the main focus in this research. Exchange rate, lending rate, GDP growth rate, unemployment rate and real property gain tax were employed together with Malaysia house price index (MHPI). From the research we found that the price of houses affected the movement of economy in Malaysia. From the opinion and view of investors, speculators and governments, it is an important issue for them to make decision and also the wealth of citizens in Malaysia. Besides that, we also found that Malaysian are having difficulty in purchasing their dream houses due to the rise of house price. Therefore, the significant determinants of housing price should be identified in order to provide recommendation for stakeholders.

At the beginning of this chapter, the background of the study and each of the fundamental determinant that affects the housing price will be discussed thoroughly. The research question and objective will be listed out follow by the problem statement. In addition, the significance of study will be stated in the last of the chapter.

Housing is a necessities of life that can enhance the living quality. A shelter allows users to live in a comfort and protected environment. People working hard to achieve their key goal in life which is pursuing with their dream house. Before buying a house, many considerations will be taken by buyers in term of price, location, accessibility, facilities, however, house price is main considerations and affordability has become a crucial issue towards owning a house. According to Cindy (2013) and Nurul Azam(2013), the development of the public facilities close to the residential area may lead the increase in housing price in that area. Besides

that, house price may keep increasing due to property owner or broker offer higher price and high market demand.

Rising of housing price and low interest rate unable consumers to spend at high rates with low income. If housing have high price comparing to other localities, firms are difficult to sell and only fewer individuals can afford to their homeownership. Under tight housing market may lead to severe financial stress among households. For instance, they decide to stay at shelter that far from their workplace which lead to high travelling cost, time and fatigue. (Zainab, 2010)

This paper examines factors influencing the housing price and gives suggestions on strategies to solve this issue. In this paper, five macroeconomic variables have been chosen to provide a clear picture and better understanding on how to set up the housing price at the same time form a source for government to handling the housing affordability issue.

1.1.1 Housing Policy in Malaysia

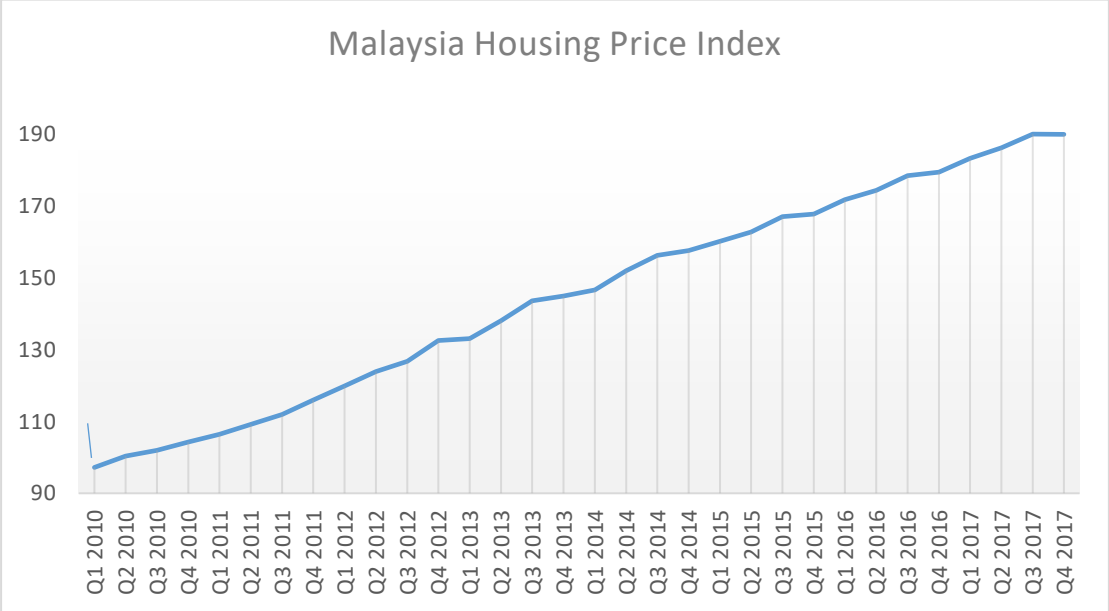
Since the early year of 1982, government of Malaysia had enforced a low-cost housing policy for private sector developers to increase housing affordability rate. Start from 1957, government set up Five-Year National Plan and also declared the provision of low priced housing in Malaysia. This policy highlighted to provide affordable houses to Malaysian, especially low-income family. The policy mainly aimed for ‘shelter for all’ policy rather than a ‘homeownership’ one as people who has no ability to own a house will prefer to rent shelter rather than involve themselves in long financial commitment of owning a house. Every country have their own social responsibility towards housing development for citizen. In Malaysia, the government distributed the responsibility to the federal and state government. State government is responsible for the resident authority and land housing problems. The operation of a housing policy, such as approval of land conversion, subdivision of a housing project, allocation of low-cost houses and levy on foreign ownership, therefore falls under the jurisdiction of the state government.

The state government is also related in housing provision through its state economic and development corporations (SEDCs) to fulfil the housing objectives outlined by the state. This policy enforced that project area beyond 5 acres have to assign at least 30% of houses as low cost units for balance socio-economy mix (Donald, 1989).

The government of Malaysia had publicised a policy that qualifying full loan for the purchaser who the first-time are buying a house. It also publicised a 50% reduction in stamp duty for houses at RM350, 000 or less, and imposing inventory of 65,000 unit new houses for market demand. Also, the new policy is applying taxation for monitoring client who buy numerous units for rent and flip over for large money (Bawa & Azriyati, 2010).

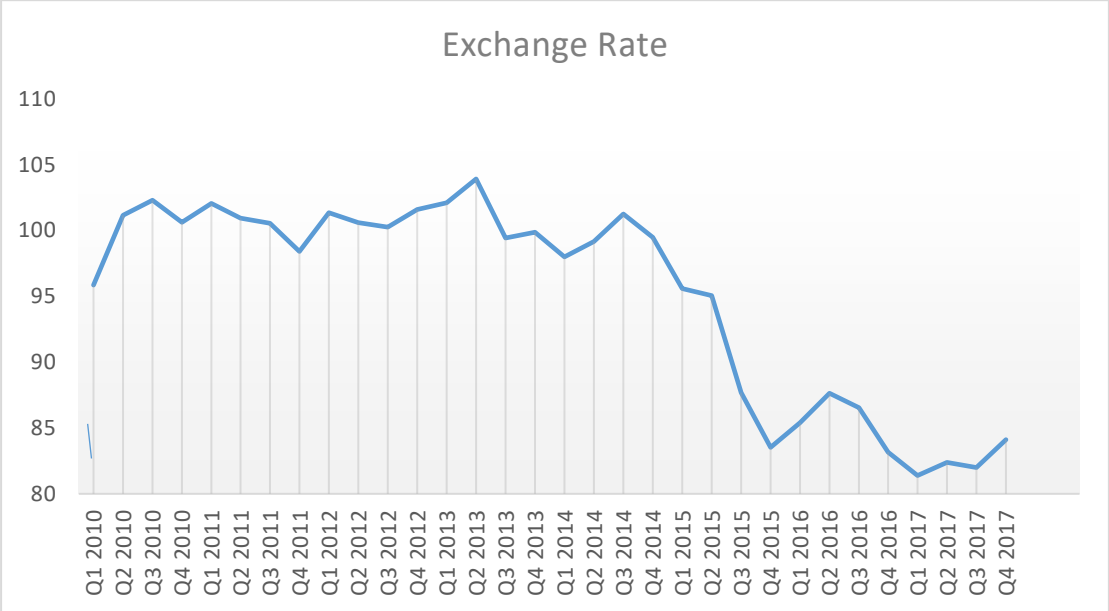
1.1.2 Macroeconomics Factor Affect House Price Index

1.1.2.1 Movement of Malaysian Housing Price



Graph 1.1 Malaysian Housing Price Index Changes from year 2010 Q1 to 2017 Q3 (2000=100)

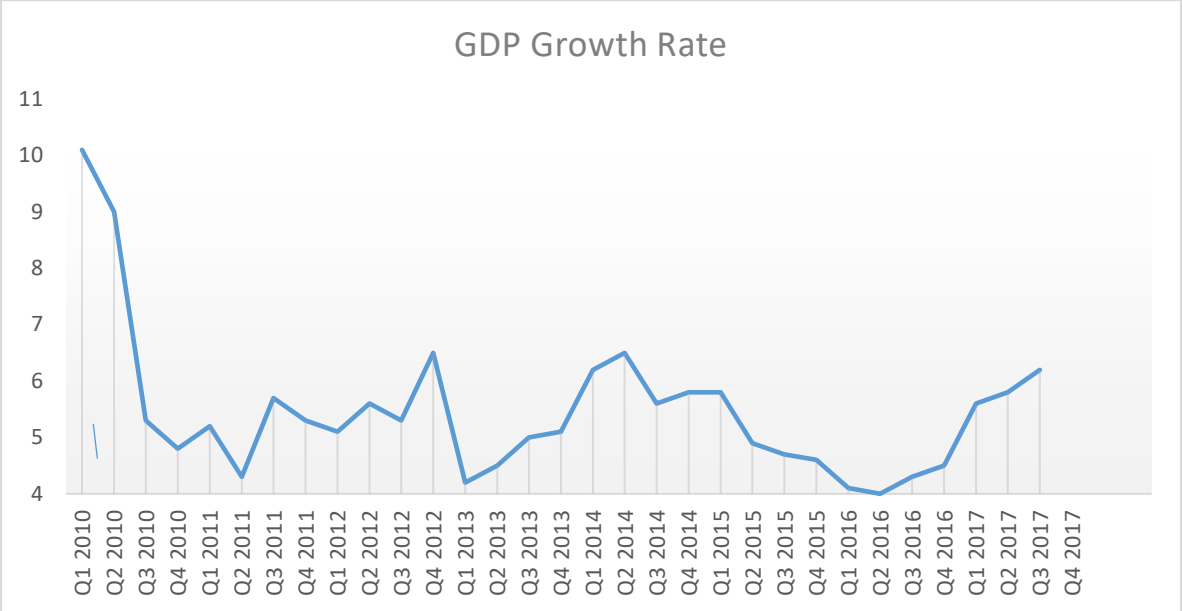
1.1.2.2 Exchange rate in Malaysia



Graph 1.2 Exchange rate index of MYR/USD from year 2010 Q1 to 2017 Q3 (2000=100)

In year 2010, its shows an appreciation of Ringgit Malaysia have reached a peak at 102.32. It then keep fluctuating between index of 102.06 to 100.26 from year 2011 to 2012. After 2012, the currency of Malaysia increased gradually to 103.93 and dropped to 99.44 after its peak. In year 2015, it suffer a serious depreciation from 95.61 to 83.54. It is consider as difficult period to most of the households, businessman and government today. This is because they have to spend more for the imported goods and services yet save less, but prices of goods are beyond what they normally or previously could afford, and they are forced to lower down living standard as living cost increased. According to Stephy (2016), the economy growth in Malaysia is slow due to the depreciation in ringgit Malaysia lead to the cost of living increases. When home currency is weak, it has increased the foreigners started to invest in our home country and increase the demand of house, hence pushed up housing price by the foreign buyers. Investment on property market from foreign investor may increase when a country's exchange rate begins to depreciate, foreign investors are able to change more currency in that country (Abelson, 2005). Foreign investors who have the affordability to purchase houses are due to their strong currency.

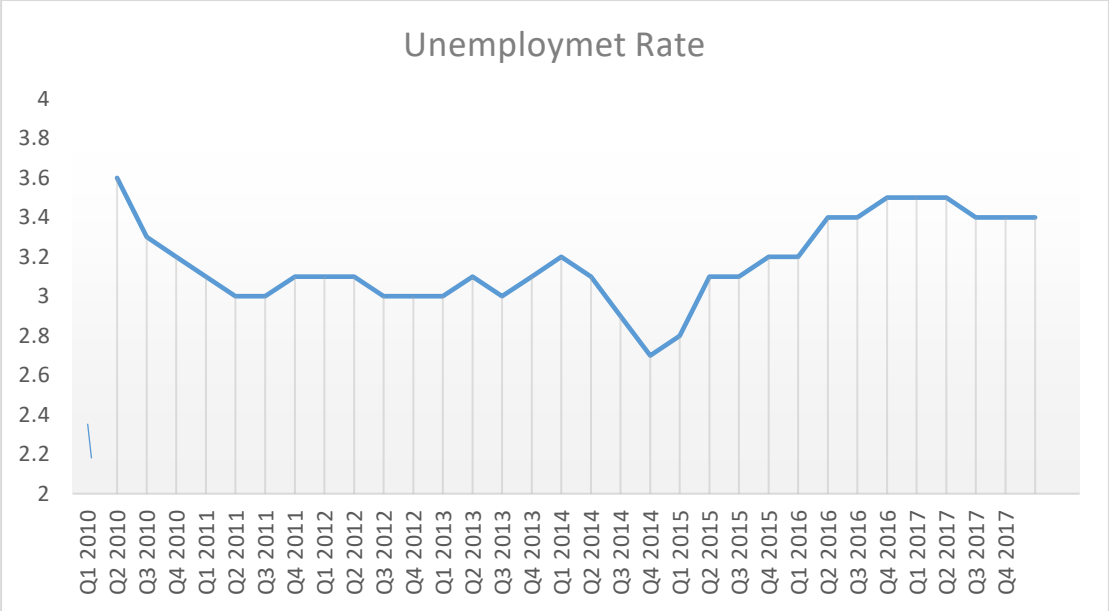
1.1.2.3 GDP Growth Rate



Graph 1.3 Malaysian GDP growth rate in % from year 2010 Q1 to 2017 Q3

The graph above showed that GDP growth rate in reached its peak at 10.1% in first quarter year 2010. This is the highest GDP rate among 7 years due to expansionary monetary policy has been used as a tool to cushion the financial system against share market collapse and capital outflows (Athukorala, 2010). However, the growth fell sharply to 5.3% due to the falls in global demand and world economic downturn. It then GDP growth keep fluctuating between 5% to 6.5% during the period of year 2011 to 2012. In year 2013, growth rate dropped to 4.5% and then bounced back to 6.5% from year 2013 to 2014. However, it then continuously fell among year 2014 to year 2016 until the lowest percentage which is 4% in 2016 quarter two. In quarter three of year 2016, the economy of Malaysia began to grow and recovered back to 6.2% in 2017. In short, GDP often have the correspondence with the housing to indicate the growth of economy. According to Ong (2013), the overall GDP growth is a significant factor to affect house price in Malaysia.

1.1.2.4 Unemployment Rate

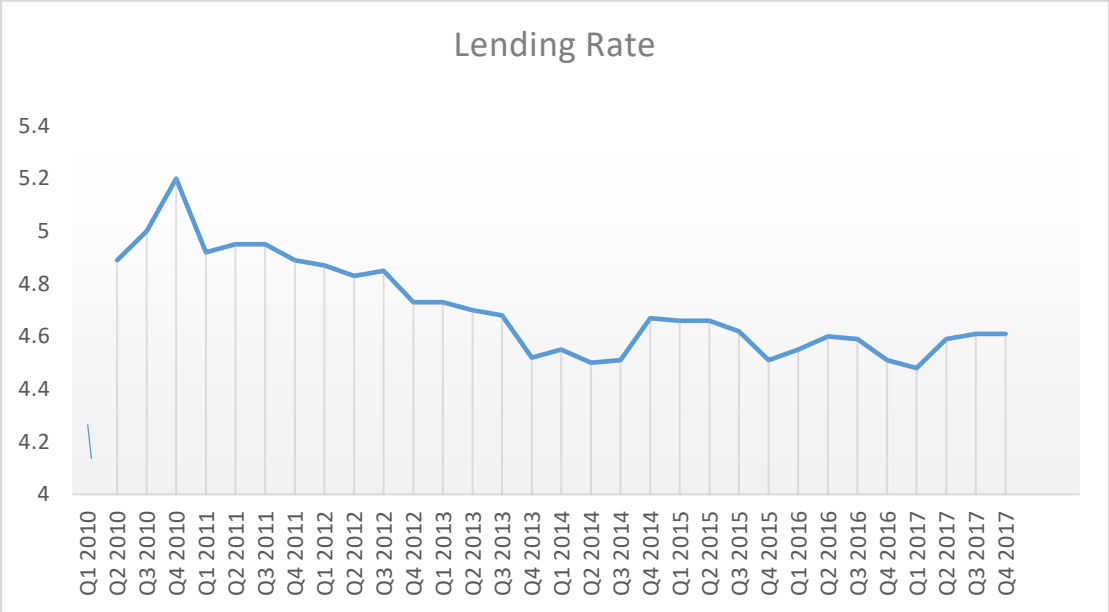


Graph 1.4 Malaysian Unemployment rate in % from year 2010 Q1 to 2017 Q3

The unemployment rate in Malaysia was decreasing steadily at approximate 0.6% from year 2010 to 2011 and then fluctuating between 3% and 3.2% from 2011 to 2013. At the beginning of year 2014, unemployment rate dropped sharply to its bottom of 2.7%. It then continued to fluctuate between 2.7% and 3.5% during the period of year 2015 to year 2017. The housing demand will right influence the housing prices through the supply demand theory.

According to Mahon (2015) unemployment rate is a significant factor that determine the economy situation and it does influence the housing prices. When the unemployment rate is increase, the household income will decrease and reduce consumer's purchasing power. Therefore, the housing demand will be declined hence cause reduction in house price as well. Some researchers including Pinter (2015), Zhu (2010) have used the unemployment rate as a variable to examine the housing price in their researches. From the view of Blanco, Martin and Vazquez (2015), housing bubble is happening when unemployment rate is high.

1.1.2.5 Lending Rate



Graph 1.5 Malaysian Lending rate in % from year 2010 Q1 to 2017 Q3

Credit market is popular nowadays as people tend to use credit purchase to buy a house since they have no ability to buy a house directly in one lump sum, hence they prefer to lend housing loan from bank and pay monthly instalment. This is one of the way to own a house (Wachter, 2014). Based on the statistic adopted from Central Bank of Malaysia, it presented that the lending rate in Malaysia keep dropping while the decline of cost of borrowing generated an increase in money supply which lead the rapidly increase in prices of housing (Fitwi, Hein & Mercer, 2015). Investors prefer to take loan to buy a new house through borrowing when lending rate is low (Tan, 2010).

1.2 Problem Statement

According to Graph 1.0, housing price continue increasing throughout the years from 2010 to 2017. As housing price keep arising, it creates housing stress and housing affordability problems to household. It cannot be denied that the high housing price today in Malaysia will bring several negative impacts to Malaysia economy. In other words, the purchasing power of consumers on housing property give impact on economy growth, equity and stability.

One of the potential consequences of high housing price is increase the risk of housing bubble. Housing bubble can be referred to housing prices grow without supportive reason, something outside the norm, for example demand, speculation, or fanatical investing, drives house prices moving up until they can no longer be supported. Housing bubble caused by speculators and investors in market as they desire a sharp increase in the housing price for their own profit. The hike in the housing price has beyond the affordability what people normally and previously could. Besides that, low interest rate and loose lending standards also lead to high risk of housing bubble. When there is strong credit growth, people tend to take loan and spend on housing without further consideration about housing prices. They willing to pay as much for the house on the market, at the end many owners have to pay more than their borrowing.

Furthermore, arising of housing prices may lead to wealth inequality. Wealth inequality can be defined as the distinct from fairness and wealthy. High housing costs will widening the gap among them, meaning that wealth people becomes richer and fair people becomes poorer. This is because rich people have more money to invest and purchase houses and then resell them to market with higher price while people outside the wealthiest category found it increasingly difficult to afford the particular housing prices. (Wilkinson & Pickeh, 2009: 296). For instance, a person bought a house at RM500, 000 and then sold it in two years at RM568,000. The price difference of $68,000 is his capital gain. Obviously,

RM68, 000 comes from the buyer for living purpose. The buyer might find difficult to repay the housing loan as the burden of living cost had increased, hence contributed to lower living standard and wealth inequality is formed.

A lack of housing affordability can also affect economic outcomes such as slow down economic growth. As house is a basic needs of human, they are willing to purchase although housing price or housing loan is high. When the housing loan is too high, they are forced to lower down disposable income, hence purchasing power and consumption level decreased. Moreover, buyer have to pay a higher initial deposit of housing loan which will also lower down consumption level. As a result, the rising of housing price may lead to lower GDP hence slow down economic growth.

Last but not least, high housing price can lead to labour shortage and affect efficiency of labour market in national and regional areas. Housing price in metropolitan area is extensively higher than regional area. When people unable to afford such high price of housing at certain area, they tend to move and migrate to other areas. The process of labour mobility would form a discrepancy between jobs and workers. It will also find that difficulty in hiring low-paid workers in high-cost global cities. (Judith and Vivienne, 2007)

1.3 Research Questions

Main: What are the core macroeconomic determinants of Malaysia's housing price?

Specific: What are the effect of lending rate, Gross Domestic Product (GDP), unemployment rate, exchange rate and real property gain tax (RPGT) towards the Malaysian price of housing?

1.4 Research Objectives

Main: To examine the macroeconomic determinants of Malaysia's housing price.
Specific: To identify the effect of the five variables above towards the housing price in Malaysia.

1.5 Hypothesis of Study

According to this study, there are five hypotheses to examine the association between the macroeconomic factors and the housing amount in Malaysia.

1.5.1 Lending Rate

H_0 : Lending rate does not bring any significant impact on Malaysian index of housing price.

H_1 : Lending rate bring significant impact on Malaysian index of housing price.

Base lending rate can be interpreted by lending or mortgage rate. Pillaiyan (2015) found that lending rate and the price of the house are inversely related among each other in a long-term manner. To make the houses affordable, one of the ways is to reduce the rate of the interest as it will lower down the monthly instalment of the loan. Another research that done in Penang Island by Zandi, Supramaniam, Aslam and Theng (2015) which stated that lending price are actually highly correlated with the price of the house in a positive way. Once the lending rate become more affordable, for sure it will increase the demand on buying houses and thus, this phenomena will affect the housing price index positively. (Barakova, 2003). Moreover, Hui, Wong & Seabrook (2003) have been found that different

impact of lending rate during inflationary and deflationary period. The study was conducted when lower the interest rate does not have impact falling on housing price index when during deflationary period. While, during inflationary period when lower interest rate will leads housing price index higher.

1.5.2 Gross Domestic Product (GDP)

H_0 : GDP does not bring any significant impact on housing prices index in Malaysia.
H_1 : GDP bring significant impact on housing prices index in Malaysia.

Gross Domestic Product could be said that total amount of all citizen and industry produced everything in the country. Based on journal written by Xu (2017), by using Granger causality test can prove that both housing price index and Gross Domestic Product are related to each other. When housing price decrease, the value of housing will also decrease. Thus, GDP and housing price are complementarily correlated. According to Shaari, Mahmood, Affandi and Baharuddin (2016) using the fixed effect model of panel data, the results show that GDP are significant and positively affecting housing price index. The results for GDP suggest that with the rise in national economic growth, the housing price will be higher due to the high demand for people who have an excessive amount of money. With additional liquid funds, people will be investing in real estate or other investments due to their high return on investment. By using Granger Causality knows the result between GDP and housing price are significantly relationship. As demand for housing price rises, more flats or houses are built and capital investment also will increases. Besides, total sum of all nation consumption, investment, manufacturing produced in the country knows as Gross Domestic Product (GDP). If suddenly changes in the housing area will be no important to the macroeconomic variable such as lending rate, unemployment rate and GDP (Zabihi and Ashena, 2011). Apart from this, the result indicates GDP has insignificant impact of change housing price index in the country (Gasparenienne, Remeikiene and Skuka, 2016). This can be said that

enhanced economic performance can boosts aggregates demand and increase the prices which is including the prices of housing to raise.

1.5.3 Unemployment rate

H_0 : Unemployment rate does not bring any significant impact on housing prices index in Malaysia.

H_1 : Unemployment rate bring significant impact on housing prices index in Malaysia.

Unemployment can be defined as workers that are capable to work and wish to have a work but does not manage to get one. Unemployment rate is the ratio of people that do not able to find any jobs to do. If employment rate rises, it will increase the financial power of a people and make them capable to buy a house. This will lead the housing prices to increase and will generate demand on housing (Taltavull de La Paz, 2013). Based on journal written by Yin, Mei, Yee & Vivian (2017), their studied shows that unemployment rate are directly proportional to the housing price index in Japan by using 5% of significance. However, job opportunity and proficient skills are very vital, a low level of occupation can provide prospects to improve their skill and move out from poverty. Nevertheless, Stratton (2017) proved that there have negative association between housing price index and unemployment rate. This is because lower unemployment rate are related with higher housing prices experienced in the United States during the recession. Another researcher that done United Kingdom by Aspden (2012), when the unemployment rate increase, households will difficulty buying a new house because of the decline in household income, thus lowering real estate prices. It is an opposite link between the price of the room and the unemployment rate.

1.5.4 Exchange Rate

H_0 : Exchange rate does not bring any significant impact on the Malaysian index of housing price.

H_1 : Exchange rate bring significant impact on the Malaysian index of housing price

Exchange rate can be defined as the rate to be used to exchange the currency of a country with the currency of another country. Journal written by Kiat, Han, Hao & Hui (2015), the research proved that the foreign exchange and the housing price index are having an inverse relationship during 1996 first quarter to 2014 fourth quarter in Malaysia. One of the reasons is the lower exchange rate as compared to foreign currency, this could attract the foreign investors more prefer residential property in Malaysia. On the other hand, exchange rate and housing price index is inverse association in Australia. Since, local house price will become more expensive and exist in long-run relationship because of the local exchange rate is decreasing (Abelson, Joyeux, Milunovich & Demi, 2005). Therefore, another researcher done in Hong Kong by Chiu (2011), direct association between housing price and exchange rate of Renmenbi (RMB) in the medium market. When Hong Kong's housing units become inexpensive could be said that RMB rises versus Hon Kong Dollar.

1.5.5 Real Property Gain Tax (RPGT)

H_0 : RPGT does not bring any significant impact on the housing prices index in Malaysia.

H_1 : RPGT bring significant impact on housing prices index in Malaysia.

According to the study by Ong (2013) there is positive and significant relationship between RPGT and housing price in Malaysia. This finding is against her previous study. She explained that RPGT is not significant for the

speculators and high-income individuals. These group of people are ready to pay the RPGT as they believe the profit from housing price appreciation is able to deal with RPGT and give them the favourable income.

Currently, there are only few studies investigate the relationship between RPGT and housing price. Therefore, it is crucial for us to know the significance of RPGT on housing price in Malaysia.

1.6 Significance of the Study

The important of this research is to identify the major factor that affects Malaysia's housing price. The potential factors are including lending rate, unemployment rate, GDP growth, exchange rate from year 2010 Quarter 1 to 2017 Quarter 3. By having this research, we can figure out the relationship among housing price index with macroeconomic. The reason we choose exchange rate as our uncommon variable because not many researcher use exchange rate as variable. Moreover, our data is more relatively new from year 2010 to 2017 as compare to past researcher study.

Currently, the real estate price in Malaysia has risen steadily as compared to previous years. It has caused many problems for countries, particularly in economic development. The rising price of homes in Malaysia has attracted the attention of investors, government, policy makers and economists. The rise in real estate prices has many negative effects on low-and middle-income households. It will make you choose to rent a house instead of enjoying the advantages of home ownership. The macroeconomic determinants of Malaysian real estate prices, it has been shown that the vital of macroeconomics will affects the real estate price and calls for future studies in this area (Ong, 2013). Therefore, by carry out the research, it able to point out the macroeconomic factor that may affect the housing price index including level of unemployment, GDP, rate of lending and exchange rate. This enables home

buyers or investors to have a basic knowledge of which determinants would most affect house prices.

According to Pillaiyan (2015), this study assists governments and investors to find more detailed information on the macroeconomic factors that may bring a huge strike on defining the real estate prices. This study allows policymakers and governments to manipulate or control the element that have a strong impact on the real estate market in terms of the fluctuation of price. In this way it could help governments and policymakers to control the price movement for home ownership.

In addition, this study also helps governments and investors to give an overview of the future development of the real estate price. It allows governments or policymakers to implement the new planning to be faced with unexpected price fluctuation in real estate prices. Moreover, it has made a great contribution for investors to anticipate the development of real estate prices. One of the reason because they can assess real estate prices and make investment decisions on the basis of macroeconomic factors in the future (Ong, 2013).

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

The background for each variable in Malaysia have been studied in the previous chapter. The literature review of the housing prices together with the macroeconomic factors which are GDP, unemployment rate, lending rate, exchange rate and real property gain tax will be discussed in chapter 2. There are a lots of researchers publish their opinions in explaining the relationship between the housing prices with the relevant independent variables. Therefore, we can clearly explain the relationship in the literature review, which is the first part of chapter 2 with the supports of the researchers' viewpoints.

Furthermore, second part of this chapter we will discuss deeply in the part of review of theoretical model. Based on the review of theoretical model, we have reviewed theories of selected variables to strongly support explanation of the housing price in proposed conceptual framework. Lastly, the final part of this chapter would be the conclusion. In conclusion part, we would summarize the whole chapter and describe the outcomes we got from the study of the relationship between housing prices and those selected macroeconomics factors.

2.1Review of the Literature

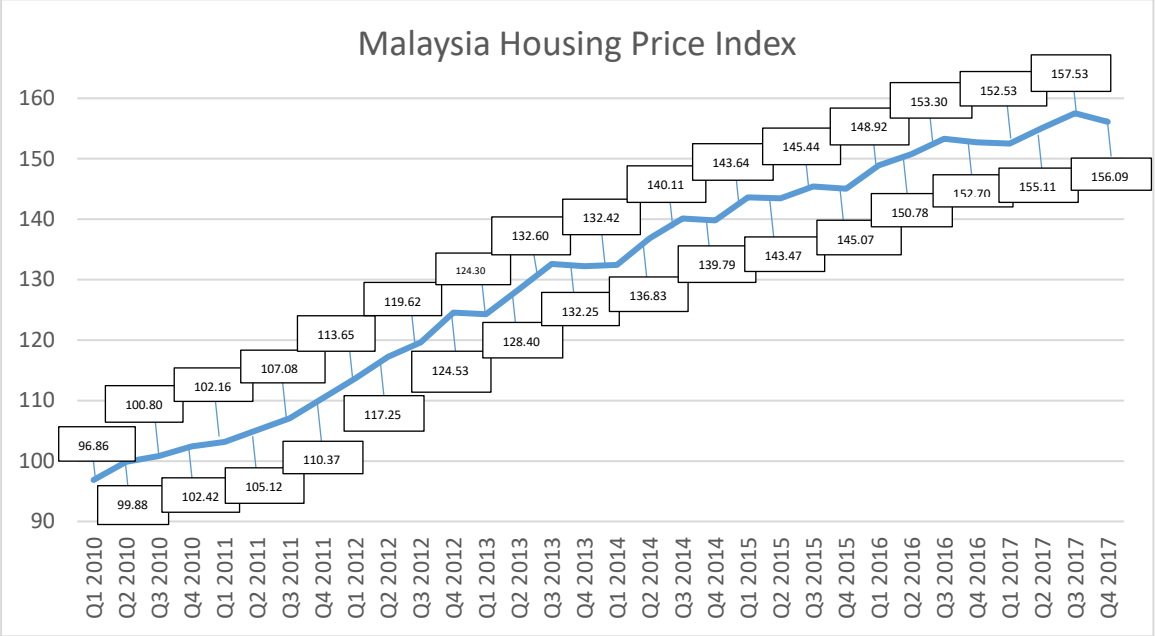
HPI is the index that indicate the movement of housing price in Malaysia. In addition, the buyer or seller may refer it as a reference when making purchasing or selling decision. According to Muhammad Najib Razali (2016), the changes in housing prices will influence the household wealth. The decline in housing prices will result in capital losses of household. According to the results of the housing price index and those independent variables, investors are able to make a better decision on their investments.

In this study, we are focusing on the year which from 2010 Q1 to 2017 Q3 and we are going to explore those variables and the relationship between housing prices index and Growth Domestic Products (GDP), unemployment rate, lending rate and Exchange Rate.

2.1.1 Housing Prices index (HPI)

HPI represent the changes of housing prices over a period time. In Malaysia, housing prices index is called as Malaysia Housing Prices Index (MHPI), this is published by the National Property Information Centre (NAPIC) under the Valuation and Property Services Department (VPSD) of the Ministry of Finance, Malaysia. MHPI represents the movement housing prices of Malaysia. The function of MHPI is actually to view the overall Malaysia housing price and control the changes of the housing prices over a period of time. (Salina H.K, Nur H.R, Nor Z.H, 2017). Hedonic Method is one of the methods used to construct the HPI. It is introduced by Griliches, and Rosen formalised it in 1974. According to Rosen, the concept of hedonic method to value the products is based on their characteristics.

Graph 2.1: Movement of Malaysian Index of Housing Price, cited from FRED, from 2010-2017 (Quarterly)



Based on Graph 2.1, it shows that Malaysia Housing Price Index is escalating from 2010 to 2017. In 2012 Bank Negara Malaysia report, it showing a finding on housing price trend since 2010, said that the trend was showing speculative behaviour, which resulting in early housing bubble. Housing bubble occurs when the growing house price increases the consumption of household, the consumers are willing to spend their income to buy houses. Furthermore, according to the Malaysian Deputy Finance Minister (2011), after the economic recession in 2007, the average of Malaysia housing price index is keep rising up to 20% every year. From the figure, we can see that the highest housing price among the years is 157.53 which in 2017 Q3, and the lowest housing price is 96.86 which in 2010 Q1. (Paul Anthony Mariadas , Mahiswaran Selvanathan , Tan Kok Hong, 2016)

Based on Maryam Zabihi (2011), he found that GDP is positively correlated with the housing price. When the GDP increases which means that the personal consumption increases and lead to the increase in housing price. (Tze San Ong, 2013). Besides, lending rate are found that it is positively influence the housing price. Bank lending can influence the housing price changes through various liquidity effects. The better availability of credit

enables consumers to borrow more money to buy houses, the demand of houses will be increased. As demand increases, it will lead to a raise in housing price (Tze San Ong, 2013). On the other hand, negative relationship is found between housing price and unemployment rate. When the unemployment rate decrease, people have ability to borrow mortgage loan to buy houses, therefore, demand of houses increases lead to a higher housing prices. (Li Gan, QingHua Zhang, 2013). Finally, exchange rate is positively correlated with housing prices. According to Joseph B. Lipscomb, John T. Harvey and Harold Hunt (2003), he mentioned that when there is a raise in exchange rate, the housing prices will rise further high.

2.1.2 Gross Domestic Product (GDP)

Prior studies have demonstrated that the housing price can be greatly affected by the various macroeconomic indicators, including GDP, interest rates, unemployment rate and etc. According to Kamal, Hassan, and Osmadi (2016) macroeconomic factors play the second major role in fluctuating the housing price in Penang, Malaysia. This statement is also in accordance with the study done by Hashim (2010) who indicated that economic fundamentals have the huge impact on housing price. Out of the various macroeconomic variables, GDP is one the most general and traditional tools used to measure the strength of a country's economy. According to the expenditure approach, GDP can be calculated by the sum of total consumption, investment, government spending and net export. In short, GDP is important as it represents the total value of all goods and services produced in a country for a certain period. The policy makers, investors and businessmen are always take notice of the GDP because any fluctuation in GDP will affect their decision making and profit as well.

In Ong (2013) research, she found that the GDP is important in determine the Malaysian housing price. She explained that the housing investment is calculated as part of investment components in GDP therefore

increase in housing investment will lead the GDP to increase. Dietz (2015) has mentioned the housing is strongly linked with the economy. When a country's economy is growing, it will create many job opportunities for its citizens. Accordingly, the citizens have the higher income to purchase their desired house, lead to an increase in the demand of housing market and so does the price of housing. Meanwhile, GDP has included in the model developed by Guo and Wu (2013) to examine the housing price in Shanghai,China. They concluded that GDP is the one of the significant drivers to examine the housing price. For example, part of GDP can be used to improve the urban infrastructure, it will contribute to an added value of housing therefore lead the housing price rose. In Liew & Haron (2013) study, by using the qualitative method, found that GDP can mainly influence the housing price in Klang Valley, Malaysia. 70% of the respondents in the survey believed that higher housing price is associated with the higher GDP growth rate. Furthermore, Kok, Ismail, and Lee (2018) have proved that real GDP is the most powerful variables to explain the changes in housing price in Malaysia compared to other macroeconomic variables such as exchange rates and interest rates. They stated that GDP can affect the housing prices in both short run and long run.

On the other hand, Pour, Khani, Zamanian, and Barghandan (2013) has found that GDP have the remarkable impact but negative relationship on the volatilities of housing price in Iran. They draw up a conclusion saying that when the economic activities increase, the supply of house increases and lead to the lower housing price. Besides, Chui and Chau (2005) suggested GDP has no correlation with real estate investment in Hong Kong due to the significant discrepancy in project duration. However, they found that GDP is strongly associated with real property price. Additionally, Gaspareniene, Remeikiene, and Skuka (2016) stated GDP is insignificant to affect the housing price in Lithuania compared to others macroeconomic variables. Based on their study, the changes in interest rates and accessibility of bank loan are the most important variables to affect the housing price. Meanwhile, Pillaiyan (2015) identified that GDP is fail to affect the housing price in

Malaysia. She explained that it could be an alarming findings for Malaysia because most of studies discovered the housing prices are determined by GDP. She presumes there is highly probability that Malaysian housing price are in bubble so the investors have to be alert when participating in the housing market of Malaysia.

2.1.3 Lending rate

Lending rate refer to a cost to borrower by lender mainly because this is a rate at which the borrowers need to pay back the principal with extra cost to the lender for the use of the money. There is a strong relationship between housing price and lending rate, the reason is that if customers are requiring houses, they need huge of capital. In this case, most of the people are not able to afford on savings and therefore they will go to bank for borrowing the money. Banks will charge an interest rate on the loan borrowed by customers according to the length of the period borrowed, otherwise banks will require some liquidity assets as collateral. When they are unable to pay back the principle and interest charged, banks will sell all the collateral and convert them into cash.

Based on the study of Barakova (2003), the better accessible of the loan will cause an increase in housing since the people can borrow more money. The increase in demand will then reflected in higher housing prices. Besides that, in Theodore Panagiotidis and Panagiotis Printzis (2015) interpretation of result, they found out that interest rates are highly related with housing market. Assuming the interest rate raise, the potential buyers have to pay a higher cost to own a house. As this situation happens will result in decrease in housing demand. The housing demand decrease will cause the housing price to drop. On the contrary, when the interest rate decrease, then the cost of borrowing will be going down and the housing demand increases. This will result an increase in housing prices. Based on Andrews (2010), he argues housing price and interest rate are adversely related.

According to Kenneth N. Kuttner (2012), the relationship between interest rate and housing prices has been closely concentrated by researchers since the housing boom of the mid-2000s, and the ensuing financial crisis of 2007-2009. From this situations, 2 views have emerged from researchers, for the first one is monetary policy should respond more aggressively to asset price increases, especially to the real estate market. For the second is that, the over-expansion of monetary policy itself is the cause of asset price bubbles, especially the Fed should be responsible for the recent housing price bubbles. From these 2 views, there is hypothesis showing that interest rates have a significant effect on housing prices. When interest rates decrease, credit affordability is rising, this will result in an increase demand for houses, pushing house prices to increase. Conversely, when interest rates rise, credit affordability becomes expensive, demand for house lowers and house prices fall.

2.1.4 Exchange rate

Exchange rate can be defined as the value of a country's currency in terms of another currency. The depreciation or appreciation of a country's currency might have the significant impact on that country's housing market. For example, when the Ringgit Malaysia depreciate against the foreign currency, it will attract the foreign investors to participate in our housing markets since our currency is cheaper for them. As a result, foreigners tend to demand more houses in Malaysia for many purposes such as investment and so on. Thereafter the Malaysian housing price will experience the sharp increase. Besides, the changes in exchange rate might affect the cost of materials which will directly affect the supply of house and the price of house. Depreciation of home currency cause the import expenses to raise and therefore the overall construction cost and housing price hike. Moreover, housing price can be influenced by exchange rate through the liquidity effect, wealth effect and so on (Kok et al. , 2018)

Various studies proved that the exchange rate and housing price have a significant association. According to Liu and Hu (2016), the increase in real estate prices cause the China's currency depreciate in short term, nevertheless in the long term, it leads the China's currency to appreciate. They also suggested some recommendations to the government of China including the rigid credit policy, enhance the structure of property market ,and reinforce the supervisions on local companies in order to stabilize the China's currency. Kok et al. (2018) mentioned the exchange rates have the large impact on the housing price in the long run. They explained that the high currency value of Ringgit Malaysia indicates the country's economy is continue to growth and expanding and it will nourishes the confidence of families who are thirsty to buy a house. The high exchange rate is always linked with the housing booms, especially for the countries who mainly depend on the foreign investments (Glindro, Subhanij, Szeto, & Zhu, 2011). This statement is in line with the research done by Liu and Zhang (2013) who focuesd on the relationship between exchange rate and real estate price in China and found out there is positive relationship between them. When the market anticipate the RMB will appreciate, the investors and speculators will focus on the housing market to cause the housing price increase, in turn, it attract the global speculative capital come into the housing market and accelerate the housing price to increase.

There are few studies found out the exchange rate and housing price is negatively associated. Abelson, Joyeux, Milunovich, and Chung (2005) stated the low domestic currency can entice the foreigners to purchase the house in the domestic country and the housing price will increase eventually. The result is supported by the finding of Mahalik and Mallick (2011) who mentioned the foreigners took more investments in the country where the exchange rate is undervalued compare to their countries' exchange rates. The increasing currency value trigger the demand of house increase to preserve the asset value (Meidani, Zabihi, & Ashena, 2011).

2.1.5 Unemployment rate

Unemployment rate is the percentage of people who are jobless but still seeking for job actively. During the economic recession, the unemployment rate will become higher, thereby, the demand of residential building will become lower as majority of people cannot bear the burden to buy a house. Thus, the housing price drop.

According to Birgitta and Mark (2010), they found that unemployment rate and housing price in Britain (UK) is negatively correlated. From their research, they found that minority demand of house is due to the unemployed people were restricted to move out from the high unemployment area. Despite they have high tendency to migrate to high employment opportunities area, but they lack of resource and ability to migrate. As a result, the housing price of the same area drop significantly due to the reduction of housing demand as the unemployed people lack of funds and capability to own the house in the high unemployment area.

Brooks and Tsolacos (1999) investigated the influence of macroeconomic components on UK real estate return series and they discovered that rate of unemployment and price of housing in UK is inversely linked. From the study, people who live in high unemployment rate region were more emphasis on the financial resources compared to the demanding of house as they do not have fixed income. In consequence, the price of house drop as the demand of house decline. Gan and Zhang (2013) also agreed that level of unemplyment and price of housing are negative related. Based on their study, they implemented a search matching model to examine how the unemployment rate influnce the housing price in the absence of thin market. Gan and Zhang (2013) stated that people at higher unemployment area tend to aviod to purchasing or changing house due to the uncertainty and insecurely of job. This situation is because of they might have higher probability to being unemployment in future in the high unemplyment area. In consequnece, the rise of unemployment rate will lead to the decline in the transcaion volume

de to the decreasing demand of owning a house. Hence, the housing price drop significantly.

In contrast, Xu and Tang (2014) conducted a research in UK by applying co-integration approach and discovered that rate of unemployment is positively influence the price of housing in UK which different from the previous studies. However, the authors explained that this situation is still allowable in UK as the relationship of unemployment rate and housing price in UK are not obvious.

2.1.6 Real property gain tax

Real Property Gain Tax (RPGT) is one of the taxation imposed by the Malaysian government with the aim of reducing the speculating activities in housing market. When someone has gained from the disposal of a property, he/she is required to pay certain percentage e.g. 30% tax of the amount gained to the Inland Revenue Board (IRB). RPGT is not only apply on the Malaysian citizens, but also for the companies and foreigners. This particular tax is only related to the property seller. It is noteworthy that RPGT is only not taxable when the property seller sells his house lower than the purchase price. Government had postponed RPGT temporarily from April 2007 to December 2009. This initiative is to boost up the housing market. As a result, it had attracted many foreign investors and speculators to engage in the housing sector. Consequently, the housing price are keep rising over the years. However, RPGT was reintroduced in 2010 in order to reduce the speculation and help the lower-income population own the first house.

According to the study by Ong (2013) RPGT are important and positively influence the Malaysian housing price. This result is against her previous study. She explained that RPGT is not significant for the speculators and high-income individuals. These group of people are ready to pay the

RPGT as they believe the profit from housing price appreciation is able to deal with RPGT and give them the favourable income.

Currently, there are only few studies investigate the relationship between RPGT and housing price. Therefore, it is crucial for us to know the significance of RPGT on housing price in Malaysia.

2.2 Review of Underlying Theoretical Models

2.2.1 Portfolio Balance Approach

Portfolio Balance Approach is a theory which evolved from the monetary approach. The difference between monetary approach and portfolio balance approach is the latter consider the financial assets such as bonds while monetary approach does not consider any financial assets. Portfolio balance approach has the advantages of more realistic and simple to analyse the determinants of exchange rates. This approach assumes that household only hold three types of asset which are home currency, domestic bonds and foreign bonds in their portfolio. Based on the theory, it hypothesized that when a country's money supply increases, it will cause the country's interest rate drop instantly. Therefore, the households will rebalance their portfolio from domestic bonds to foreign bonds due to the return is low in investing in the domestic bonds. It leads the home currency to depreciate because the supply is more than demand as people supply the home currency to demand foreign currency. However, the depreciation will stimulate the exports of home country and reduce in imports. Over the time, the country's will experience a trade surplus and the exchange rate will return to its initial equilibrium point. Khan and Abbas (2015) had employed the Augmented Dickey Fuller (ADF) and Phillips Perron (PP) test to test the validity of portfolio balance approach in the determination of exchange rates between U.S. and Pakistan. By using the unit root test, they found portfolio balance

approach was valid. Therefore, the variables inside the portfolio balance approach have to be controlled in order to stabilize the exchange rate.

2.2.2 Balance of Payment (BOP) Theory

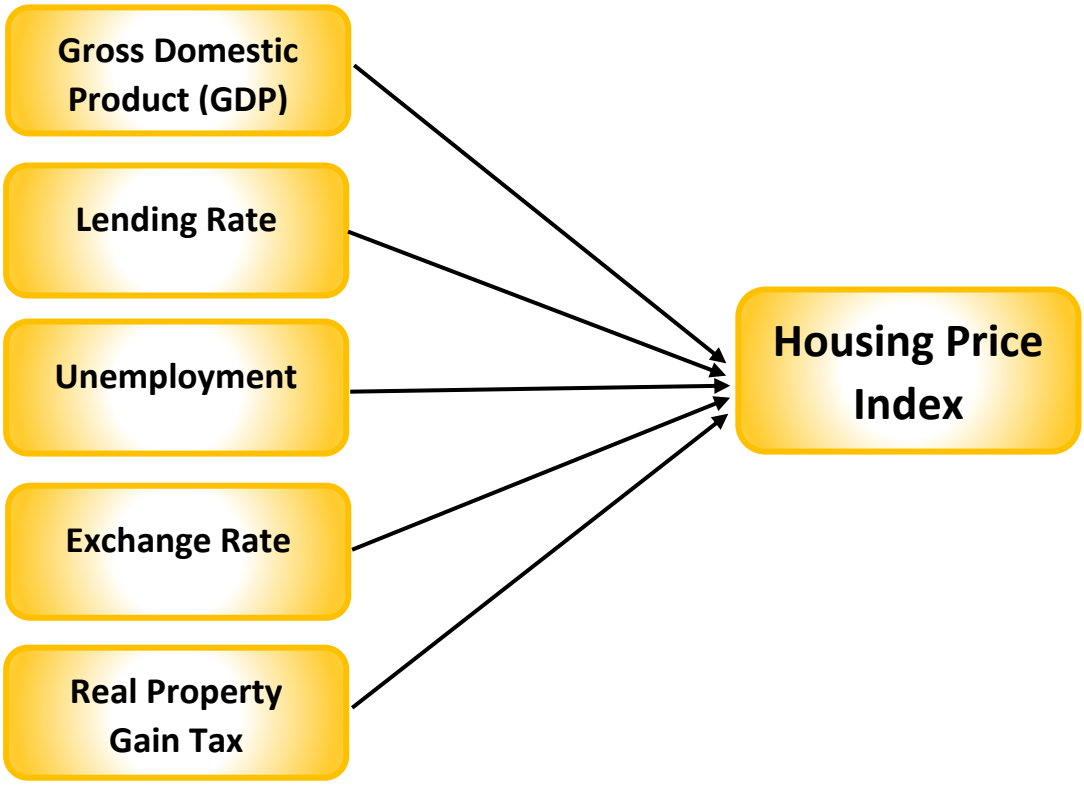
As the name suggest, Balance of Payment (BOP) theory holds the exchange rates are influenced by the country's balance of payment. Balance of payment is an account that record all the payment and receipts of a country in transactions with foreign countries. If the payments of a country are greater than its receipts, its call BOP deficits. If vice versa, it's called BOP surplus. This theory stated the exchange rates are in equilibrium when the BOP is in equal. Exchange rate will shift to respond the unequal BOP. Over the time, exchange rates will back to its equilibrium point to the BOP. When a country falls under BOP deficits, it hinted that the country has the higher imports than its exports. The nation's citizens have to supply their home currency and demand foreign currencies to conduct imports activities. Therefore, the value of home currency decline and foreign currencies appreciate. However, the depreciation of home currency will stimulate the export and reduce the import. It leads the BOP deficit decline and home currency strengthen to its initial points. Nazeer, Shafi, Idrees, and Hua (2015) has used the exchange rate in their study to identify whether it has relationship with the balance of trade (BOT) and balance of payment (BOP). Based on their findings, exchange rates have the strong asssociation with the balance of trade and balance of payment.

2.2.3 Rural-urban Migration and Urbanization Theory

This theory holds that urbanization and rural-urban migration have the important influence to the housing price in urban areas. Rural-urban migration is an unexceptional event in every country. People migrate to the cities from

rural areas because of they believe they can uplift their lifestyles in the cities. The general perception in the cities including many job opportunities and high salary. When people migrate to the cities, they have to demand a house in the cities definitely. As a result, the housing price in urban areas will surge. In our country, rural-urban migration is the crucial determinants of economic expansion (Hussain, Abdullah, & Abdullah, 2014).

2.3 Research Conceptual Framework



2.4 Conclusion

In short, all of the independent variables that applied in our study are supported by the previous researcher's findings. In this study, we will put more emphasis on the macroeconomic determinants of Malaysia's housing price from 2010 Quarter 1 until 2017 Quarter 3, which have 31 observations. Furthermore, the conceptual framework provides a better understanding about the relationship between the housing price index in Malaysia and Gross Domestic Product (GDP), Lending Rate, Unemployment Rate, Exchange Rate and Real Property Gain Tax.

Chapter 3: Methodology

3.0 Introduction

The methodology and its design are listed out in this chapter. The sample period applied in this study is from year 2010 Q1 to year 2017 Q3. In addition, all of the data are in quarterly form and the data are derived from different DataStream which are National Property Information Centre (NAPIC), Department of Statistics Malaysia (DOSM), Bank Negara Malaysia (BNM), and International Monetary Fund (IMF).

In order to illustrate and clearly explain the results of the research, econometric tests is playing an important role. The reason is that it is used to check the econometric problem in the model the problem. For instance, Multicollinearity which check by Variance Inflation Factor(VIF), Heteroscedasticity which check by ARCH Test, Autocorrelation can be checked by Breusch-Godfrey Serial Correlation LM test, and Model Misspecification which check by Ramsey RESET Test.

3.1 Research Design

3.1.1 Model Specification

Multiple regression model refers to a set of model that multiple independent variables are related to a dependent variable. This model is to estimate the values of housing price index. Other than that, multiple regression model involves error term to capture omitted variables. Omitted variable refers to other factors that are not involved as independent variables which might affect dependent variables possibly. Error term should be result in normally distributed, independent with each other, uncorrelated with error

term as well as homoscedasticity. In the study, the multiple regression model is applied to investigate the relationship between Malaysia housing price index with Growth Domestic Products (GDP), Lending Rate (LR), Unemployment Rate (UR), Exchange Rate (ER) and Real Property Gains Tax (RGPT).

Economic Function:

HPI = f (Lending Rate, Exchange Rate, Growth Domestic Products, Unemployment Rate, Real Property Gains Tax)

Economic Model:

Log $HPI_t = \beta_0 + \log \beta_1 \, ER_t + \beta_2 \, LR_t + \beta_3 \, UR_t + \beta_4 \, GDP_t + RPGT_t + \varepsilon_t$

N = 31 Observations t = 2010 Q1 – 2017 Q3

Where,

HPI_t = Housing Price Index in Malaysia from 2010 Q1 to 2017 Q3 (Index)

ER_t= Exchange Rate 2010 Q1 to 2017 Q3

LR_t = Lending Rate in Malaysia from 2010 Q1 to 2017 Q3

UR_t = Unemployment Rate in Malaysia from 2010 Q1 to 2017 Q3

GDP_t= Growth Domestic Products in Malaysia from 2010 Q1 to 2017 Q3

$RPGT_t$= Real Property Gains Tax in Malaysia from 2010- 2017

3.1.2 Expected Sign between dependent variable and independent variables

Variables	**Expected Sign**
Housing Prices Index and Exchange rate	Positive Sign (+)
Housing Prices Index and Lending Rate	Negative Sign (-)
Housing Prices Index and Unemployment rate	Negative Sign (-)

Housing Prices Index and Growth Domestic Products	Positive Sign (+)
Housing Prices Index and Real Property Gains Tax	Negative Sign (-)

3.1.2.1 Housing Prices Index and Exchange rate

There are few researches have been done, saying that the exchange rate has positively correlated with the housing prices index in Malaysia. It means when the Ringgit Malaysia depreciate against the foreign currency, it will attract more foreigner to engage in Malaysia's property market. Thereafter, the demand of Malaysia's houses increase. Hence, the housing prices result in a sharp increase. The researches includes Kok et al (2018), Liu and Hu (2016), Glindro, Subhanij, Szeto, and Zhu (2011), and Liu and Zhang (2013).

3.1.2.2 Housing Prices Index and Lending Rate

Most of the researchers found that housing prices index and lending rate are negatively correlated. It means that lower interest rate, people tend to borrow more money and have affordability to own a house. Hence, the housing price will rise as the demand of house increase. The researchers who have been done on this researches are Ong (2013), Pillaiyan (2015) and Kamal, Hassan and Osmadi (2016), saying that the lending rate is associated with housing prices index negatively.

3.1.2.3 Housing Prices Index and Unemployment rate

The researchers have found that unemployment rates and housing prices index reflected negative relationship in Malaysia, those researchers are Birgitta and Mark (2010), Brooks and Tsolacos (1999), and Gan and Zhang (2013). It means that , when the unemployment rates is higher, the demand of residential building will become lower as majority of people cannot bear the burden to buy a house. Hence, the housing prices will be drop.

3.1.2.4 Housing Prices Index and Gross Domestic Products

There are few researches have been done, saying that the growth Domestic Products has positively correlated with the housing prices index in Malaysia. Housing investment is calculated as part of investment components in GDP therefore increase in housing investment will lead the GDP to increase. When the economy is growing, it may create new job to citizens. Therefore, the citizens have the higher income to purchase their desired house, and the demand of houses goes up and so does the price of housing. The researches includes Ong (2013), Dietz (2015), Guo and Wu (2013), and Kok, Ismail, and Lee (2018).

3.1.2.5 Housing Prices Index and Real Property Gains Tax

The researchers found that unemployment rates and housing prices index are negatively associated in Malaysia, as the higher the real property gains tax, will lower the housing prices. The higher real property gains tax allows people to buy affordable houses. There is only less researchers have been done on relationship between housing prices index and real property gains tax, includes Ong (2013), Nielsen (2004), and refers to budget 2014 of Malaysia.

3.2 Data Sources

Data collection model is fundamental part of research design which means to gather and collecting the data. The Data Collection Model is carried out purposely to investigate the relationship between housing prices index (HPI) with those macroeconomics factors in Malaysia (Growth Domestic Product (GDP), lending rate (LR), unemployment rate (UR), exchange rate (ER) and Real Property Gains Tax (RPGT)), and to evaluate whether it has significant correlation towards housing prices index (HPI). All the secondary data are derived from different DataStream which are National Property Information Centre (NAPIC), International Monetary Fund (IMF), Bank Negara Malaysia (BNM), and Department of Statistics Malaysia (DOSM). Time series data is applied to accomplish the regression model start from the year of 2010 Q1 to 2017 Q3 in quarterly basis with 31 observations. The reasons that we use secondary data to investigate the relationship instead of primary data are the data can be collected easily without spending more time and financial resources. In addition, secondary data is much easier to access, which means that we can easily access via internet. (Sarah Boslaugh, n.d).

Table 3.2: Data sources and its explanation

VARIABLES	**PROXY**	**UNIT MEASUREMENT**	**SOURCE**	**DEFINITION**
Exchange Rate	ER	RM/USD (Index (2010 = 100))	Data Stream (IMF – International Financial Statistics)	Exchange rate defines as the value of a domestic currency in exchange of foreign currency.

Unemployment Rate	UR	In percentage, %	Data Stream (BNM- Bank Negara Malaysia)	Unemployment rate refers to the amount of labour that is jobless, it stated in term of percentage.
Lending Rate	LR	In percentage, %	Data Stream (IMF – International Financial Statistics)	The standard rate that is provided in terms of loans in national currency. The weight of the lending rate is depending on the amount of loan
Gross Domestic Product	GDP	In percentage, %	Data stream (DOSM- Department of Statistics Malaysia)	Gross domestic product refers to the value of all the finished goods and services produced within a country during a specific time period.

Real Property Gain Tax	RPGT	In percentage, %	Data Stream (LHDN-Lembaga Hasil Dalam Negari)	Real Property Gain Tax is Capital Tax which is charged on the disposal of real property.
Housing Price Index	HPI	In index (2010 =100)	Data Stream (NAPIC-National Property Information Centre)	Housing price index is an annual change in house prices index within a country.

3.2.1 Description of Variables

3.2.1.1 Housing Prices Index (HPI)

HPI represents the changes of housing prices over a period time. In Malaysia, the housing prices index known as Malaysia Housing Prices Index (MHPI), MHPI represents the movement of all types of housing prices in Malaysia. The purpose of index is actually to view the trend of the Malaysian price of housing and control the changes of the housing prices over a period of time. (Harun, 2017). The data of MHPI is obtained from National Property Information Centre (NAPIC) from year 2010 Q1 to year 2017 Q3. Most of recent researchers, Ong (2013), Zabihi (2011), Gan (2013), have been using Housing Prices index as an important indicator to determine the changes of Malaysia's housing Prices.

3.2.1.2 Growth Domestic Products (GDP)

Growth Domestic Product (GDP) represents the total amount of overall market value of finished goods and services produced in every country in a given period of time. It indicates the economic conditions of a country. The GDP reflected the most popular housing prices indicators since most partial of GDP are from real estate development and construction. The data of GDP is obtained from Department of Statistics Malaysia (DOSM) from the year 2010 Q1 to year 2017 Q3. There are more recent researchers have been done the research on GDP as it is important indicator to determine economic condition as well as housing prices, such as Guo and Wu (2013), Naji Meidani in Iran (2011), David (2014), and Ali A. Naji Meidani in Iran (2011), etc.

3.2.1.3 Lending Rate (LR)

It refers to a cost to borrower by bank mainly because this is a rate at which the borrowers need to pay back the principal with extra cost to the bank for the use of the money. The housing prices can be affected by the interest charged by bank, the reason is that, higher cost of borrowing tend to lower the consumptions in housing and it will cause the housing price decline. In addition, when the interest is low, people tend to borrow more money and the demand of houses will be caused to increase. Thus, the increase in demand of houses, will increase the housing prices. Moreover, data of lending rate is obtained from International Financial Statistics (IMF), covering from 2010 Q1 to 2017 Q3. The same researches have been done by few researchers on the lending rate as it is an important indicator to determine housing prices, such as Ong (2013), Pillaiyan (2015), and Kamal, Hassan and Osmadi (2016).

3.2.1.4 Unemployment Rate (UR)

It refers the amount of people who are jobless but still seeking for job energetically and it expressed in percentage. According to the researches, the unemployment rate will become higher during the economic recession, and the demand on houses will become lower as most of people cannot afford the houses. Hence, the housing prices drop. The main DataStream of unemployment rate is Bank Negara Malaysia (BNM), covering the same period from 2010 Q1 to 2017 Q3. There are few researchers, Birgitta and Mark (2010), Brooks and Tsolacos (1999), Gan and Zhang (2013), and Xu and Tang (2014), have been using unemployment as an important indicator to determine housing prices.

3.2.1.5 Exchange Rate (ER)

It refers to the value of a domestic currency in exchange of foreign currency. It is an important indicator because when the Ringgit Malaysia depreciate against the foreign currency, it will attract the foreign investors to participate in our housing markets since our currency is cheaper for them. As a result, foreigners tend to demand more houses in Malaysia for many purposes such as investment and so on. Thereafter the Malaysian housing price will experience the sharp increase. International Financial Statistics (IMF) is the DataStream for getting the data of Exchange rate from 2010 Q1 to 2017 Q3. The researchers Kok et a (2018), Liu and Hu (2016), Glindro, Subhanij, Szeto, and Zhu (2011), Abelson, Joyeux, Milunovich, and Chung (2005) and Mahalik and Mallick (2011).

3.2.1.6 Real Property Gains Tax (RPGT)

Real property gains tax refers to the capital tax which charged on disposal of housing property. It is reintroduced in year 2010 and it is increase

every year from 2009 to 2014. In year 2014, the percentage is at 30% for the properties sold within 3 years or less, 20% for the properties sold within 4 years and 15 % within 5 years. The RPGT imposed is for citizens and non-citizens in Malaysia. In this study, the RPGT rate used was the first year rate. According to the researches, real property prices has significant relationship with housing prices. The data of RPGT is obtained from Lembaga Hasil Dalam Negari (LHDN). There are only less researchers have been done on RPGT research, includes Ong (2013) and Nielsen (2004).

3.2.2 Secondary Data

It is the source obtain through past data, summary, journals, articles and even conference papers. Secondary data is applied in this study since it enables to enhance the step of research which reducing time consuming steps, including data collection and measurement development (Johnston, 2014). Furthermore, all secondary data that applied in investigating the relationship between housing price index (HPI) with those macroeconomics factors in Malaysia (Growth Domestic Product (GDP), lending rate (LR), unemployment rate (UR), exchange rate (ER) and Real Property Gains Tax (RPGT), are directly derived from different DataStream which are National Property Information (NAPIC), Bank Negara Malaysia (BNM), Department of Statistics Malaysia (DOSM) and International Monetary Fund (IMF). The sample size of the study is covering from the year of 2010 Q1 to year of 2017 Q3.

3.3 Data Analysis

3.3.1 Ordinary Least Square (OLS)

OLS helps to form an equation which minimize the sum of square errors. The reason we adopt the OLS method is due to its general application. OLS is one of the most effective and widespread estimation method for the linear regression models (Frost, 2018). Other than that, it can deal with the multiple variables concurrently and produce the precise estimates of the parameters when the certain assumptions are met.

If we fail to meet the assumptions, OLS may produce the false results (Gujarati, 2012). Therefore, we must make sure the assumptions are satisfied. When all of the assumptions are fulfilled, OLS estimator is said to be a best linear unbiased estimator (BLUE). The renowned Gauss-Markov theorem stated that BLUE estimators must possess the following properties:

1. Best refers to the estimators have minimum variance.
2. Linear implies linear in parameter.
3. Unbiased means expected value same with the true values.
4. Efficient refers the estimators are precise and dependable.

The model will be tested by using E-view software which assist us to run the diagnostic test to preclude the model struggle with the econometric problems such as Multicollinearity, Heteroscedasticity and etc.

3.3.2 T-test statistic

H_0: $\beta_1 = 0$, $\beta_2 = 0$, $\beta_3 = 0$, $\beta_4 = 0$, $\beta_5 = 0$(insignificant)

H_1: $\beta_1 \neq 0$, $\beta_2 \neq 0$, $\beta_3 \neq 0$, $\beta_4 \neq 0$, $\beta_5 \neq 0$ (significant)

Where,

β_1= Unemployment Rate (UR)

β_2= Lending Rate (LR)

β_3= Gross Domestic Product growth rate(GDP)

β_4= Exchange Rate (ER)

β5 = Real property gain tax (RPGT)

The t-test was developed by William Sealy Gosset in 1908. T-test is applied to test the hypothesis concerning the mean of a small sample which obtained from a normal distributed population (The Editors of Encyclopaedia Britannica, n.d.). This is a proper test for the research with small sample size, namely less than 30 observations and the population standard deviation is unknown. For the larger sample size and population standard deviation is known (n ≥30), z-test is recommended (BSAIKRISHNA, 2010).

This study use t-test to check whether rate of unemployment and Malaysian index of housing price are associated. The null hypothesis of t-test, H_0, states that there is no relationship between the independent variable and dependent variable. In the meantime, the alternative hypothesis, H_1, states that the independent variables and dependent variable have the association where the association can be positive or negative. In order to examine the relationship, results can be known either compare the t-test statistic value with the critical value or compare the p value with the significance level. When the t-test statistics go beyond the critical value, we are going to reject the null hypothesis. Otherwise, we don't reject null hypothesis. If the p-value is less than the significance level, we should reject null hypothesis which mean that the independent variables have the association with dependent variable.

Therefore, all of the five independent variables comprised in this study will be tested individually to investigate whether they are statistically significant on the Malaysian index of housing price by applying t-test.

3.3.3 F-test statistic

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ (insignificant)

H_1: $\beta_i \neq 0$, at least one of β_i is different from zero (significant to Y), where i = 1, 2, 3 & 4 & 5

Where, Y = Housing Price Index in Malaysia (HPI)

β1 = Unemployment Rate (UR)

β2 = Lending Rate (LR)

β3 = GDP Growth Rate (GDP)

β4 = Exchange Rate (ER)

β5 = Real property gain tax (RPGT)

The name of F-test is derived from its founder, Sir Ronald Fisher (Minitab , 2016). Whichever statistical test that use the F-distribution, it can be considered as F-test. F-test has the features of evaluating the multiple coefficients simultaneously (Minitab, 2015). In this study, F-test is used to determine the overall significance of the model. F-test compares the model we specified to a model that without the slopes, which also known as an intercept-only model. Same as the t-test above, if p-value less than the significance level, we reject null hypothesis. Otherwise, we don't reject null hypothesis. In addition, if the F-test statistic is greater than its critical value, we reject the null hypothesis. If the F-test statistic is lower than its critical value, we don't reject the null hypothesis.

In a nutshell, F-test will be employed to test the overall significance of the model in this research.

3.3.4 Multicollinearity

Multicollinearity means two or more independent variables had the relationship with each other. When multicollinearity happen, explanatory variable in the regression model are highly dependent and correlated to another and unable to know or determine the dependent variable are

influenced by which variables. There are few methods to detect multicollinearity.

Firstly, high R^2 in the model but few significant t ratios shows in the result of the model we can consider that this model have multicollinearity. If the R^2 is more than 0.8 is consider high and only least independent variables can clarify in the model but normally we consider it doesn't make sense. Secondly to detect multicollinearity is high pair wise association between two independent variables. If the positive relationship between X_1 and X_2 indicates that the relationship between 0 and 1 means that will moving in same direction (Gujarati, 2004).

In addition, another method to detect multicollinearity which is Variance Inflation Factor (VIF) and Tolerance (TOL). If the VIF is more than 10 is point toward that there is a severe multicollinearity occurs in this regression model (Williams, 2015). If the VIF is less than 10 is indicate that there is no serious multicollinearity. If TOL is 0 means that there is serious multicollinearity, if TOL is equal to 1 indicate that there is no multicollinearity in the model. Below is the Formula of Variance Inflation Factor and Tolerance:

Variance Inflation Factor (VIF)	Tolerance (TOL)
$\frac{1}{1 - R^2_{x_1,x_2}}$	$\frac{1}{\text{VIF}}$

The consequences of multicollinearity is the standard error of the coefficient will increase could be said that lower t-statistics. The coefficient in the regression model will become very sensitive specifications. Regression coefficients can change significantly when variables are added or omitted.

Moreover, there have certain approaches to remedies of multicollinearity which is drop one of redundant variable. Dropping the

redundant data is correct for a specification error because the redundant data should not include in the model. Increase the sample size of the model could enhances the accuracy of an estimator and decrease contrary effect of multicollinearity. Other approaches to remedies which is transform the multicollinearity variables. Economic guide should be used to guide for which variable to drop. Re-specifying the model can reduce multicollinearity and create a combination of the multicollinear variables. For example, including the (GDP per capita) is better than include the variable GDP and population in the model. Thus, by using this few way to detect or knows that whether exchange rate, lending rate, Growth Domestic Product (GDP) , unemployment rate have the relationship among each other.

3.3.5 Heteroscedasticity

Heteroscedasticity can be known as unequal scatter. When talk about heteroscedasticity automatically linked to error term or residuals. Heteroscedasticity change in the spread of the error term over the range of measured values. It happens when the variance of the error term is not constant. One of the reason is omitted some important variable or incorrect the functional form of the regression model. When omit some important variable in a model, error term will be absorbed by omitted consequence (Taylor, 2018).

Heteroscedasticity makes the OLS estimator no longer BLUE. The OLS estimator are consistent but no longer efficient and the formulae used to estimate the coefficient standards error are incorrect. Therefore, confidence interval based on standard error will be mistaken (Williams, Heteroskedasticity, 2015). In the presence of heteroscedasticity, the variance of OLS estimator didn't provide by the usual OLS formula. There have informal way to detect heteroscedasticity which is through graphical method which is plot the residuals against each of the regressor.

This research will use ARCH test to detect whether have heteroscedasticity occurred in the model. One of the reason by using ARCH test because it only appropriate for time series data. In addition, heteroscedasticity can be solved by using Generalized Least Square (GLS) and Weighted Least Square (WLS). Re-specify the model to looking for other missing variables, possibly take log or select suitable functional form or relevant variables. Moreover, make assumptions about the possible pattern of heteroscedasticity and transform the original data so that there is no heteroscedasticity in the transformed data and then use Ordinary Least Squares (OLS) estimates.

3.3.6 Autocorrelation

When the observation's error terms are correlated with the error term from other observation between two different time series will cause the problem which is autocorrelation. Autocorrelation also known as lagged correlation. Two different time series is one from the original form and another one is lagged one or more than one period from linear regression model (Chen, 2016). When autocorrelation happen, there have few causes which is omitted explanatory variables such as one of the variable is affected by various variables because of the error term in one period had a relation with the error terms in continuous periods. Other than that, data manipulated and wrong functional form of the model or misspecification of error term. If the independent variables are have error and wrongly, the disturbance will be auto associated.

The consequences of autocorrelation is the OLS estimators are still unbiased, inefficient and consistent and no longer BLUE. The standard error and t-values will be affected. In this case, t and f test could not be apply because no longer valid and R^2 will overestimated and t statistics will tend to

be higher. Thus, by using Breusch-Godfrey LM test, Durbin h test, and Durbin-Watson to detect whether have autocorrelation in the model.

When the sample is large, Newey-West Method can be used to remedies autocorrelation problem. By using this method to get standard error or OLS estimator that are correlated. It just addition of White's heteroscedasticity constant standard error approaches. Another way to remedies is try to find out whether it is pure correlation or not and if is pure correlation and transform original model to new model so that don't have the problem of pure autocorrelation. Consider possible model re-specification of the model such as a different functional form and missing some important variables.

3.3.7 Normality test

H_0 : Error terms are normally distributed.

H_1 : Error terms are not normally distributed.

In statistic, the role of normality test is to prove whether the error terms in the model is normally distributed. It is important for researcher to conduct normality test because test statistic result, including t-test and f-test will be inaccurate as the normality assumption does not meet. If the error terms are normal distributed, the entire model will be normal distributed. As a result, the hypothesis testing is valid. As specified by central limit theorem, in case the sample sizes are huge enough, which greater than 30 or 40, we may consider the model is normally distributed as it would not violate the assumption of normality. Normality test can be performed through several ways, including Jarque-Bera Test, graphical approach. By applying graphical approach, it might lead to an inaccurate and unreliable result. This study comprises 31observations which is larger than the sample sizes specified by the Central Limit Theorem. Hence, we can judge that the model is normally

distributed. Despite that, we still have run the Jarque-Bera Test to obtain more precise result.

Jarque-Bera Test

Jarque-Bera test belongs to the Lagrange multiplier test, which used to examine the normality of the model. In particular, it observes the skewness and kurtosis of our data to check whether our data corresponds to the normal distribution. By using the Jarque-Bera test, it is not mandatory for us to identify the mean or the standard deviation of the data. The formula is as below:

$$\text{JB} = \frac{N}{6}\left(S^2 + \frac{(K-3)^2}{24}\right)$$

Where *N* reperesents the sample size, *S* represents the sample skewness, and *K* represents the sample kurtosis. The greater the Jarque-Bera test statistic, the more the data differs from the normal (Stephanie, 2018).

In this study, Jarque-Bera test will be performed by running the E-view software. Null hypothesis states that error terms are normally distributed while the alternative hypothesis states that the error terms are not normally distributed. Hence, if the test statistic is larger than the upper critical value or p-value is smaller than the significance level, null hypothesis will be denied. Otherwise, we don't reject the null hypothesis.

3.3.8 Model Specification

H_0 : Specification of model is accurate.
H_1 : Specification of model is inaccurate.

Model specification refers to procedure of deciding which independent variables have to be included or excluded (Frost, 2017). If the model has included the irrelevant variables, exclude the important variables

or use the incorrect functional form, then this model is committed to the specification bias / error. According to the Gujarati (2004), omission of important variables is more serious than inclusive of irrelevant variables. Model specification error can lead to severe consequences such as biased estimators and the hypothesis-testing results are misleading and invalid. After knowing the consequences of specification error, it is crucial for us to find a way to identify the problems. In practice, there are various methods to detect the model specification error, including Durbin-Watson d test, Ramsey's RESET test, and Hausman test.

In this study, Ramsey's RESET test is used to detect the specification error by running E-view software. Null hypothesis states that the model specification is correct, whereas alternative hypothesis states that the model specification is incorrect.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

Hypothesis testing of housing prices index and its independent variables, real property gain tax, exchange rate, GDP, unemployment rate, lending rate will be conducted in this chapter. Based on the chapter 3, regression analysis has been adopted in this study in order to investigate the housing price index in Malaysia start from the first quarter of 2010 to the third quarter of 2017. By using the E-view, hypothesis testing and diagnostic checking results will be obtained. The result tested through those diagnostic checking can be used to measure and ensure that the estimated parameters are consistent, efficient and unbiased.

4.1 Multiple Linear Regression Model

In order to accurately estimate the significant association between housing price index and five variables in Malaysia, specific econometric models are applied.

The specific econometric models that are applied are stated below:

Economic Model:

$HPI_t = \beta_0 + \beta_1 ER_t + \beta_2 LR_t + \beta_3 UR_t + \beta_4 GDP_t + \beta_5 RPGT_t + \varepsilon_t$ **(Model 4.1)**

Estimated Economic Model:

$\widehat{HPI_t} = \hat{\beta}_0 + \hat{\beta}_1 ER_t + \hat{\beta}_2 LR_t + \hat{\beta}_3 UR_t + \hat{\beta}_4 GDP_t + \hat{\beta}_5 RPGT_t + \varepsilon_t$ **(Model 4.2)**

$\widehat{HPI_t} = 475.1437 - 1.401301\ ER_t - 41.18320 LR_t - 5.848209\ UR_t - 1.806661 GDP_t + 1.233988 RPGT_t + \varepsilon_t$

$R^2 = 0.941247$ Adjusted $R^2 = 0.929496$

N = 31 Observations

Where,

HPI_t : Housing Prices Index from year 2010 Quarter 1 to year 2017 Quarter 3 (Index)

ER_t : Exchange Rate from year 2010 Quarter 1 to year 2017 Quarter 3 (Percentage)

LR_t : Lending Rate from year 2010 Quarter 1 to year 2017 Quarter 3 (Percentage)

UR_t : Unemployment Rate from year 2010 Quarter 1 to year 2017 Quarter 3 (Percentage)

GDP_t : Growth Domestic Product from year 2010 Quarter 1 to year 2017 Quarter 3 (Percentage)

$RPGT_t$: Real Property Gain Tax from year 2010 Quarter 1 to year 2017 Quarter 3 (Percentage)

ε_t : Error Term

t : Quarterly Period (2010-2013)

Model 4.1 and 4.2 represent the basic economic model and estimated economic model respectively. Housing price is estimated by applying the 5 predictor variables (Exchange Rate, Unemployment Rate, Lending Rate, Gross Domestic Products, and Real Property Gains Tax). These independent variables are measured in percentage and the dependant variable (HPI) is measured in Index. An error term will be taken into account of the other factors that affect the housing price.

4.2 Descriptive Statistics

Table 4.1: Descriptive Statistics

	HPI	ER	GDP	LR	RGPT	UR
Mean	143.3839	95.4712	5.4709	4.7074	19.6774	3.1645
Median	145.0000	99.4400	5.3000	4.6600	15.000	3.1000
Maximum	190.1000	103.930	10.100	5.2000	30.000	3.6000
Minimum	97.2000	81.3900	4.0000	4.4800	5.0000	2.7000
Std. Dev	28.9526	7.5379	1.2982	0.1816	10.4829	0.2153
Skewness	-0.06200	-0.8234	2.0365	0.7836	-0.1120	0.1848
Kurtosis	1.7161	2.0211	7.6969	2.8830	1.2208	2.5679
Observations	31	31	31	31	31	31

This study included 31 observations and these observations are on the quarterly basis. From the table above, the midpoint of the Malaysian index of housing price stood at 143.3839. The maximum of the housing price index reaching 190.1000 and the minimum is 97.2000. Therefore, the result of standard deviation is 28.9526 and the median of the housing price is 145.0000. Moreover, the data measured in housing price index is quite stable as the kurtosis is less than 3 which is 1.7161.

Besides, the average exchange rate is 95.4712%. The highest exchange rate reaching 103.930% and the lowest exchange rate fall at 81.3900%. Furthermore, the standard deviation of exchange rate is 7.5379, whereas the median is 99.4400. The data of exchange rate is not volatile as well, because it is less than 3, which is only 2.0211.

Moreover, the average GDP is 5.4709% in this study from year 2010 Quarter 1 to year 2017 Quarter 3. The maximum of GDP reached 10.100% and the minimum fell at 4%. In addition, the result leads to the 1.2982 of the standard

deviation and 5.3 of the medium of the GDP. The data of the GDP is more volatile compare to others, it result in high kurtosis as 7.6969, which is more than 3.

Apart from that, the average of lending rate is 4.7074% of the study from year 2010 Quarter 1 to year 2017 Quarter 3 in Malaysia. Highest reading reached 5.2% and lowest reading reached 4.48%. The median of the lending rate result in 4.66 and the standard deviation result in 0.181603. In addition, the lending rate in Malaysia is not volatile, since kurtosis not exceed 3, which is barely 2.8830.

Additionally, the mean of real property gains tax is result in 19.677%. The maximum tax rate peaked 30% and the minimum fell until 5%. Besides that, the standard deviation results in 10.4829 and the medium of RGPT results in 15. The data of this variable is less volatile due to its kurtosis is less than 3 which is only 1.2208.

Last but not least, the average of the unemployment rate is 3.1645% in this study from year 2010 Quarter 1 to year 2017 Quarter 3. The highest of UR peaked 3.6% and the lowest UR reached 2.7%. Moreover, the standard deviation result in 0.2153 and the medium is 3.1. In addition, the kurtosis of UR is 2.5679, which lower than 3 therefore the data is not less volatility.

4.3 Model Estimation and Interpretation

By using E-views 10, Model 4.2 will be verified for the hypothesis testing and also for the diagnostic checking.

$$HPI_t = \beta_0 + \beta_1 ER_t + \beta_2 GDP_t + \beta_3 LR_t + \beta_4 RPGT_t + \beta_5 UR_t + \varepsilon_t$$

Table 4.2 Original or Initial Regression Output

Variables	Coefficient
β_0	475.14
β_1 = Exchange Rate (ER)	-1.40

β_2 = Growth Domestic Product Growth Rate (GDP)	-1.81
β_3 = Lending Rate (LR)	-41.18
β_4 = Real Property Gain Tax (RPGT)	1.23
β_5 = Unemployment rate (UR)	-5.85

4.3.1 Interpretation of Beta

β_0 = 475.14

When all the explanatories are equivalent to zero, on average, the Malaysian index of housing price will increase by 475.14.

β_1 = -1.40

If the explanatory variable exchange rate (ER) goes up by 1 index, on average the Malaysian index of housing price will decrease by 1.40 index, by remaining other factors being equal.

β_2 = -1.81

If the explanatory variable growth domestic product growth rate (GDP) goes up by 1 percent, on average the Malaysian index of housing price will decrease by 1.81 index, by remaining other factors being equal.

β_3 = -41.18

If explanatory variable lending rate (LR) are goes up by 1 percent, on average, the Malaysian index of housing price will decrease by 41.18 index, by remaining other factors being equal.

β_4 = 1.23

If the explanatory variable real property gain tax (RPGT) goes up by 1 percent, on average, the Malaysian index of housing price will increase by 1.23 index, by remaining other factors being equal.

β_5 = -5.85

If the explanatory variable unemployment rate (UR) goes up by 1 percent, on average, the Malaysian index of housing price will decrease by 5.85 index, by remaining other factors being equal.

4.3.2 Interpretation of R-squared and Standard Error

R^2 = 0.941247

R^2 of the model is found to be 0.941247. It indicates that 94.12% of the variation in Malaysian housing price index explained by the variation in exchange rate, growth domestic product, real property gain tax, lending rate and unemployment rate.

Standard Error = 7.687685

It has 31 observations of the sample size. Its standard error is found to be 7.687685 can be refer in Appendix Table 4.2. Moreover, standards error to mean ratio are additional term of coefficient of variation which is 5.36% or 0.0536 (7.687685 / 143.3839). The better the regression model which include the lower the ratio.

4.4 Hypothesis Testing (Ordinary Least Square)

4.4.1 T – test

4.4.1.1 Exchange rate

Variable	Exchange Rate
T - statistic	-2.693574
P - value	0.0124

Hypothesis

$\boldsymbol{H_0}$ **:** Housing price index and exchange rate are not correlated.

$\boldsymbol{H_1}$ **:** Housing price index and exchange rate are correlated.

Decision rules: Reject H_0 if p – value is not greater than significant value of 0.05. Or else, do not reject H_0.

Decision making: Reject H_0 since the p – value is 0.0124 which is smaller than the significant level of α = 0.05

Conclusion: According to the result above, there is adequate evidence to determine that the housing price index and exchange rate are correlated.

4.4.1.2 Gross Domestic Product

Variable	GDP
T - statistic	-1.497981
P - value	0.1467

Hypothesis

$\boldsymbol{H_0}$: Housing price index and GDP are not correlated.

$\boldsymbol{H_1}$: Housing price index and GDP are correlated.

Decision rules: Reject H_0 if p – value is not greater than significant value of 0.05. Or else, do not reject H_0.

Decision making: Do not reject H_0 since the p – value is 0.1467 which is greater than the significant level of α = 0.05

Conclusion: According to the result above, there is adequate evidence to determine that the housing price index and GDP are not correlated.

4.4.1.3 Lending rate

Variable	Lending rate
T - statistic	-3.016702
P - value	0.0058

Hypothesis

$\boldsymbol{H_0}$ **:** Housing price index and lending rate are not correlated.

$\boldsymbol{H_1}$ **:** Housing price index and lending rate are correlated.

Decision rules: Reject H_0 if p – value is not greater than significant value of 0.05. If not, do not reject H_0.

Decision making: Reject H_0 since the p – value is 0.0058 which is smaller than the significant level of α = 0.05

Conclusion: According to the result above, there is adequate evidence to determine that the housing price index and lending rate are correlated.

4.4.1.4 Real Property Gain Tax

Variable	Real Property Gain Tax
T - statistic	3.687558
P - value	0.0011

Hypothesis

$\boldsymbol{H_0}$ **:** Housing price index and real property gain tax are not correlated.

$\boldsymbol{H_1}$ **:** Housing price index and real property gain tax are correlated.

Decision rules: Reject H_0 if p – value is not greater than significant value of 0.05. If not, do not reject H_0.

Decision making: Reject H_0 since the p – value is 0.0011 which is smaller than the significant level of α = 0.05

Conclusion: According to the result above, there is adequate evidence to determine that the housing price index and real property gain tax are correlated.

4.4.1.5 Unemployment rate

Variable	Unemployment rate
T - statistic	-0.430351
P - value	0.6706

Hypothesis

$\boldsymbol{H_0}$ **:** Housing price index and unemployment rate are not correlated.

$\boldsymbol{H_1}$ **:** Housing price index and unemployment rate are correlated.

Decision rules: Reject H_0 if p – value is not greater than significant value of 0.05. Or else, do not reject H_0.

Decision making: We do not reject H_0 since the p – value is 0.6706 which is greater than the significant level of $\alpha = 0.05$

Conclusion: According to the result above, there is adequate evidence to determine that the index of housing price and rate of unemployment have no relationship.

4.5 Diagnostic Checking

Diagnostic checking is conducted to identify if the model is dealing with the econometric issues. If the problems exist, the model is not fulfilled with the requirement of Best Linear Unbiased Estimators (BLUE) and tough to make the accurate estimation. Therefore, the researchers have to take certain remedial measure.

4.5.1 Multicollinearity test

It is applied to identify if there is the linear relationship among some or all independent variables of a regression model.

4.5.1.1 High pair wise correlation coefficient

Hypothesis:

H_0 : There was no multicollinearity existed among explanatory variables

H_1 : There was multicollinearity existed among explanatory variables

Table 4.3: Correlation Analysis

	ER	**GDPGR**	**LR**	**RPGT**	**UR**
ER	1.0000	0.1692	0.5626	-0.6945	-0.7166
GDPGR	0.1692	1.0000	0.2959	-0.2971	0.1488
LR	0.5626	0.2959	1.0000	-0.8164	-0.1627
RPGT	-0.6945	-0.2970	-0.8164	1.0000	0.1572
UR	-0.7166	0.1488	-0.1627	0.1572	1.0000

*Correlation > 0.8, indicating that the two variables are highly correlated based on the rule of thumb.

*Correlation < 0, indicating that the two variables are negatively correlated.

*Correlation > 0, indicating that the two variables are positively correlated.

*Correlation = 0, indicating that the two variables are no correlated.

The correlation coefficient is a gauge that verify the magnitude to which two variables' movement are corresponded. Correlation coefficient range from +1 to -1. A correlation of -1 specifies a perfect negative relationship, denoting that as one variable increase by one unit, the other decrease by one unit. A correlation of +1 denotes a perfect positive

relationship, suggesting that both variables move in the same direction. Based on the rule of thumb, when the correlation coefficient between two variables is higher than 0.8, it is to be said severe multicollinearity problem.

By refer the table 4.3 above, the correlation coefficient between real property gain tax and lending rate is -0.8164, which is excess of 0.8, signifying that the serious multicollinearity problem. In order to further detect the multicollinearity, Variance Inflation Factor (VIF) and Tolerance (TOL) will be carried out afterwards.

4.5.1.2 Variance Inflation Factor (VIF)

Table 4.4 VIF results

Variables	R^2	VIF= [1/(1-R^2)]	Low / High
ER & GDP (Refer to appendix 4.4)	0.0286	1/ (1-0.0286) =1.0294	Low
ER & LR (Refer to appendix 4.5)	0.3165	1/ (1-0.3165) =1.4631	Low
ER & RPGT (Refer to appendix 4.6)	0.4823	1/ (1-0.4823) =1.9316	Low
ER & UR (Refer to appendix 4.7)	0.5135	1/ (1-0.5135) =2.0555	Low
GDP & LR (Refer to appendix 4.8)	0.0875	1/ (1-0.0875) =1.0959	Low
GDP & RPGT (Refer to appendix 4.9)	0.0883	1/ (1-0.0883) =1.0969	Low
GDP & UR (Refer to appendix 4.10)	0.0221	1/ (1-0.0221) =1.0226	Low
LR & RPGT (Refer to appendix 4.11)	0.6665	1/ (1-0.6665) =2.9986	Low
LR & UR (Refer to appendix 4.12)	0.0265	1/ (1-0.0265) =1.0272	Low

RPGT & UR (Refer to appendix 4.13)	0.0247	1/ (1-0.0247) =1.0253	Low

4.5.1.3 Tolerance (TOL)

Variables	VIF	TOL= 1/VIF	Low/ High
ER & GDP	1.0294	1/ 1.0294= 0.9714	Low
ER & LR	1.4631	1/ 1.4631= 0.6835	Low
ER & RPGT	1.9316	1/ 1.9316= 0.5177	Low
ER & UR	2.0555	1/ 2.0555= 0.4865	Low
GDP & LR	1.0959	1/ 1.0959= 0.9125	Low
GDP & RPGT	1.0969	1/ 1.0969= 0.9117	Low
GDP & UR	1.0226	1/ 1.0226= 0.9779	Low
LR & RPGT	2.9986	1/ 2.9986= 0.3335	Low
LR & UR	1.0272	1/ 1.0272= 0.9735	Low
RPGT & UR	1.0253	1/ 1.0253= 0.9753	Low

Based on the results above, the multicollinearity problem is not serious.

4.5.2 Heteroscedasticity Test

Ensuring the model to satisfy the assumption of homoscedasticity in error term is very important. Heteroscedasticity means that the variance of error term is different with each other. It's important because heteroscedasticity will destroy the property of Best Linear Unbiased Estimators. In order to identify heteroscedasticity, Autoregressive Conditional Heteroscedasticity (ARCH) test will be applied. It is noteworthy that cross-sectional data has higher chance to encounter the heteroscedasticity than time-series data.

Hypothesis:

H_0 : The variance of error term is constant

H_1 : The variance of error term is not constant

Decision rule: Reject H_0 when the P-value of Chi-Square is not greater than the 5% significance level. Elseways, do not reject H_0.

Table 4.6: Autoregressive Conditional Heteroscedasticity(ARCH), (refer to appendix 4.14)

F-statistic	0.218659	Prob.F(1,28)	0.6437
Obs*R-squared	0.232462	Prob.Chi-square(1)	0.6297

Decision making: We do not reject the null hypothesis since the P-value of Chi-Square (0.6297) is greater than significance level of 5%.

Conclusion: The variance of error term is constant, in other words, this model fulfils the homoscedasticity assumption at 5% significance level.

4.5.3 Autocorrelation

Unlike with the heteroscedasticity, autocorrelation refers to the disturbance terms have correlation with each other. Breusch-Godfrey LM test will be employed in this study to examine the autocorrelation problem between the error terms.

Hypothesis:

H_0 : There is no autocorrelation problem

H_1 : There is autocorrelation problem

Decision rule: Reject H_0 if the P-value of Chi-Square not greater than the significance level of 5%. Otherwise, we do not reject H_0.

Table 4.7: Breusch-Godfrey Serial Correlation LM test, (refer to appendix 4.15)

F-statistics	2.431331	Prob.F(2,23)	0.1102
Obs*R-squared	5.410198	Prob.Chi-Square (2)	0.0669

Decision making: We do not reject the null hypothesis since the P-value (0.0669) is more than significance level of 5%.

Conclusion: The autocorrelation problem does not exist at 5% significance level.

4.5.4 Normality Test

The normality test is conducted to confirm the sample data is normally distributed. Once the sample data is distributed normally, the error terms are found to be normally distributed. Thus, the β and explanatory variables are automatically become normally distributed as well.

Hypothesis:

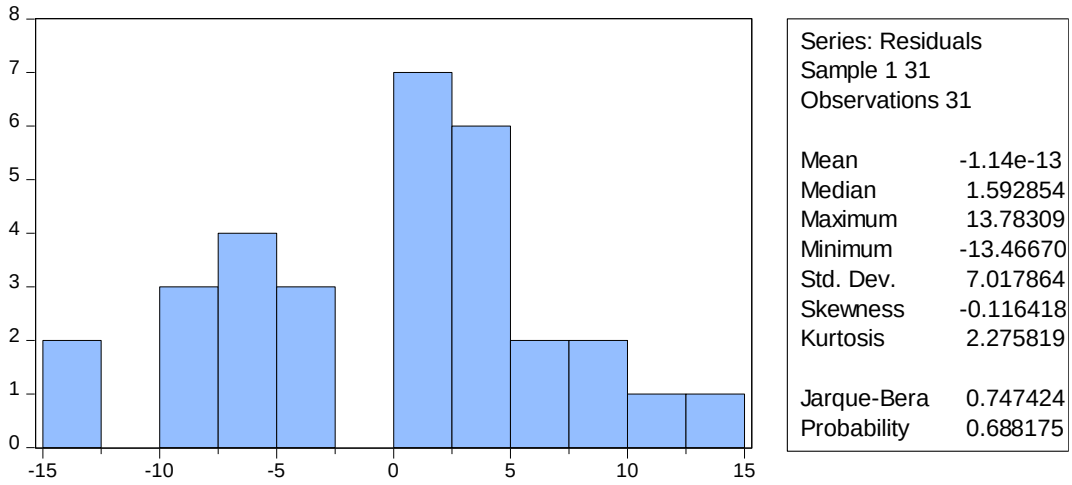
H_0 : The error terms are normally distributed

H_1 : The error terms are not normally distributed

Decision rule:

Reject H_0 if the P-value of Jarque-Bera test is less than the significance level of 5%. Otherwise, do not reject H_0.

Table 4.8: Jarque-Bera test, (refer to appendix 4.16)



Decision making: Do not reject the null hypothesis since the P-value of Jarque-Bera test (0.6882) is greater than significance level of 5%.

Conclusion: There is normal distribution in the error terms at 5% significance level.

4.5.5 Model Specification test

By examine whether the model is form correctly or incorrectly, the Ramsey RESET are carried out to test the model.
Hypothesis:

H_0 : The model is formed correctly

H_1 : The model is formed incorrectly

Decision rule: Reject H_0 if the P-value of F-statistic less than the significance level of 5%. Otherwise, do not reject H_0.

Table 4.9: Ramsey RESET Test (refer to appendix 4.17)

F-statistic	0.944270	Prob.F (1,24)	0.3409
Likelihood ratio	1.196299	Prob.Chi-Squared(1)	0.2741

Decision making: Do not reject the null hypothesis since the P-value of F statistic (0.3409) is greater than significance level of 5%.

Conclusion: There is sufficient evidence to conclude that the model is formed correctly at 5% significance level.

Chapter 5: Conclusion

5.0 Introduction

This chapter provides an overview of the previous Chapter 1 until the end of Chapter 4. Next, the empirical result that we run in chapter 4 will be compare to the purpose that wrote in chapter 1 to examine Malaysian housing price and regressors which is exchange rate (ER), growth domestic product growth rate (GDP), lending rate (LR), real property gain tax (RPGT) and unemployment rate (UR) from 2010 Quarter 1 until 2017 Quarter 3. Additionally, numerous policies are proposed in this study, along with a limitation and recommendation of the study.

5.1 Discuss of Major Findings

Table 5.2 Summary of results and theory

Dependent Variables	Independent Variables	Significance Level	Expected Sign (Theoretical)	Result
Housing Price Index	Lending Rate	5%	Negative sign and significant (-)	Negative and significant
Housing Price Index	Gross Domestic Product	5%	Positive sign and significant (+)	Insignificant
Housing Price Index	Unemployment Rate	5%	Negative sign and significant (-)	Insignificant
Housing Price Index	Exchange Rate	5%	Positive sign and significant (+)	Negative and significant

Housing Price Index	Real Property Gain Tax	5%	Positive sign and significant (+)	Positive and significant

According to table 5.2 indicate that the result from chapter 4. From the table indicate that, there is insignificant and no vital of Unemployment Rate (UR) and Gross Domestic Product (GDP) on housing price index in Malaysia. Whereas, Lending Rate (LR), Exchange Rate (ER) and Real Property Gain Tax (RPGT) on housing price index in Malaysia are significant.

This study predicted that Gross Domestic Product, Real Property Gain Tax and Exchange Rate are positively related whereas Unemployment Rate and Lending Rate are adversely significant to housing price index in Malaysia. Thus, several researchers which include Kok et al (2018), Liu and Hu (2016), Glindro, Subhanij, Szeto, and Zhu (2011), and Liu and Zhang (2013) proved that housing price index in Malaysia can be positively influeced by exchange rate. It means that when Ringgit Malaysia depreciate against the foreign currency, it will attract more foreign person to engage in Malaysia's property market. Thereafter, the demand of Malaysia's houses increase.

For Gross Domestic Product (GDP), Ong (2013), Dietz (2015), Guo and Wu (2013), and Kok, Ismail, and Lee (2018) found that Gross Domestic Product (GDP) can influence housing price index in Malaysia. When the economy is growing, it may build new job to nations. Therefore, the nations have the greater income to purchase their desired house, lead to an increase in the demand of housing market and so does the price of housing.

Lending Rate is negatively associated with the housing price index. If interest rate is low, people tend to borrow more money and have affordability to own a house. Hence, the housing price will rise as the demand of house increase. The researchers who have been done on this researches are Ong (2013), Pillaiyan (2015) and Kamal, Hassan and Osmadi (2016), saying that the lending rate is

negatively correlated with housing prices index. Several researchers which include Ong (2013), Nielsen (2004), and refers to budget 2014 of Malaysia probed that the higher the real property gains tax, the lower the housing prices. The higher real property gains tax allows people to buy affordable houses.

Other than that, for Unemployement Rate, the researchers who discovered a negative relationship exist between unemployment rates towards housing prices index in Malaysia are Birgitta and Mark (2010), Brooks and Tsolacos (1999), and Gan and Zhang (2013). It means that , when the unemployment rates is higher, the demand of residential building will become lower as majority of people cannot bear the burden to buy a house. Hence, the housing prices will be drop.

However, the table 5.2 show that only Real Property Gain Tax and Lending Rate have the same result as expected result. The actual result showed that Exchange Rate are negative and significance with housing price index in Malaysia. Based on outcome found that changes in interest rates and accessibility of bank loan are the most important variables to affect the housing price. However, GDP and rate of unemployment are uncorrelated with the price index of housing in Malaysia after the test run. GDP supposedly having positive relationship with housing price index in Malaysia but the outcome presented are negative relationship. GDP have the remarkable impact but negative relationship on the volatilities of housing price in Iran. They draw up a conclusion saying that when the economic activities increase, the supply of house increases and lead to the lower housing price (Pour, Khani, Zamanian, and Barghandan, 2013).

Through the research that done by Gaspareniene, Remeikiene, and Skuka (2016) stated GDP is insignificant to affect the housing price in Lithuania compared to others macroeconomic variables. One of the reason there is not only housing price will be influenced by the basic macroeconomic indicator, it also can be other categories of influence such as social, civil, environment and demographical so that a wider study of impact of dissimilar categories of issue on level of housing price would be determined.

For unemployement rate having an insignificant toward housing price index in Malaysia. One of the reason is the employee have job but provide lower the income and they don't have enough money or no afford to buy house (Lau & Li, 2006). Even though the employee have higher income and the chances to buy a house is very low unless they find suitable house. Moreover, Brooks and Tsolacos (1999) investigate the influence of macroeconomic components on UK real estate return series and they discovered an inverse relation between unemployment rate and housing price in UK. Throughout the study, people who live in high unemployment rate region were more emphasis on the financial resources compared to the demanding of house as they do not have fixed income. In consequence, people don't have the intention to demand the house, so the price of house will not be influenced.

For instance, exchange rate, there are few studies found out the exchange rate and housing price is negatively associated. Abelson, Joyeux, Milunovich, and Chung (2005) stated the lower domestic currency can attract the foreigners to purchase the house in the domestic country and the housing price will increase finally. The result is supported by the finding of Mahalik and Mallick (2011) who mentioned the foreigners took more investments in the country where the exchange rate is undervalued compare to their countries' exchange rates.

5.2 Policy implication

This papers intends to help the foreign investors, local home buyers, policy makers and property developers have a well knowledge to know which macroeconomic factors will alter the housing price mostly in Malaysia. In this few years, Malaysia's housing price is trading at a historical high level and many experts are predicting when the property bubble will burst.

The results in chapter 4 shows that the appreciation of Ringgit Malaysia will lead to the reduction in housing price. Therefore, foreign investors are encouraged to beware of the exchange rate movement of MYR/USD before making buying or

disposal decision. In spite of the fact that the investors can't manipulate the exchange rate, but, the investors could acquire an additional knowledge into the fluctuation of exchange rate in Malaysia. When the investors have equipped adequate skills and knowledge, they can consider to use the hedging technique to protect the value of their investment in Malaysia.

The results show that lending rate has a negative relationship with the housing price in Malaysia obviously. Since the transaction amount is large, most of the buyers are choose to purchase the property via borrowing from bank instead of paying cash. It is common that the higher lending rate will lead to the higher borrowing cost which cause the demand of housing drop substantially. Bank Negara Malaysia (BNM) is responsible to control the lending rate in Malaysia. Hence, BNM should be alert in constructing and implementing the monetary policy in order to stabilize the housing price in Malaysia. Foreign investor should also aware of the lending rate since it will affect its monthly instalment.

On the other hand, policy makers should adjust the RPGT rate from time to time to discourage the speculation activities. Besides, policy makers may introduce additional property-related taxes such as Land Value Tax (LVT) and impose the strict regulation on the property market to reduce the high housing price. LVT is likely to work since the cost of holding a real property is very high for the speculators so they will reduce the demand for housing and resulted in lower housing price. Government may intervene the price of building materials and control the professional fees such as lawyer fees to further control the housing price.

Although the government has introduced many initiatives such as 1Malaysia People's Housing Programme (PR1MA) and MyDeposit that intend to lower the housing price, most of the Malaysian especially the low and middle-income group are tough to afford the current housing price. Thus, it is crucial for the government to make more efforts in implementing housing policy with greater emphasis for the younger generation. The government may concentrate on raising the property market efficiency. It can be done via enhancing transparency of the market. Transparency can be enhanced by providing the timely and accurate property

market transaction data. Currently, the MHPI provided by NAPIC is based on quarter basis and is difficult to understand by the general public. Thus, if the government could update the information up to monthly basis or more frequent, the related stakeholders are able to obtain more reliable data and make the accurate response to the market.

The developers should collaborate with the authorities to concern about the high housing price problem together. When the housing price is too high, the cash flow and profit of the developers will be affected since the units are difficult to be afforded. The developers are suggested to use the 'small profit but quick turnover' technique which will lower their profit margin avoid the oversupply problem.

5.3 Limitations of study

Limitations will occur inevitably in the research. The first limitation of the study is the number of the observation is limited. The study uses 31 observations derived from 2010 quarter one until 2017 quarter three. The reason behind of it is all of the independent variables would become insignificant to the housing price index if the number of observation keep on increasing. Apart from these, such situation would arise another problem which is the coefficient of determination will be resulted in a very low percentage value if the number of observation is low as well. The higher the percentage value in the coefficient of determination means there would be more persuasive to conclude the changes of the dependent variables can be interpreted by the variation of its independent variables.

Next, we are using macroeconomic factors to determine housing price in Malaysia but in real market, housing price would be affected by microeconomic elements too, for example: household expenditure and market demand and supply. In this case, this study may not be comprehensive to analyse the housing price. Thus, future researchers are encouraged to examine housing price with macroeconomic and microeconomic factors in order to provide accurate information.

Moreover, qualitative variables are used in the study. Nevertheless, it become the limitations when rules and regulations change. For instant, GST was scheduled to be implemented by the government at 1 April 2015. The implementation of goods and services tax (GST) may indirectly affect the action of stakeholders. (The Malay Mail, 2016). However, the Government of Malaysia has repealed GST on 31 July 2018 and replaced GST with the Sales Tax and Service Tax starting 1 September 2018. The transformation of rules and regulations in Malaysia will also affect the demand and supply of real property, Hence, this study might be more dependable if taken into account modification of rules and regulation.

Lastly, only ordinary least squares (OLS) method was applied. OLS method is adopted because it is simple to apply and interpret. The advanced test such as Unit Root Test is not applied in the research. Thus, the result would be enhanced by using other more sophisticated method.

5.4 Recommendation of future research

Throughout the study, some of the problems and limitations arise that need to be improved. There are few suggestions are recommended in order for future researchers to enhance their future research studies. Firstly, the number of the observation can be obtained in the form of monthly or yearly rather than quarterly. For example, if data is derived in yearly based, the data can be lengthening from even earlier years in order to ensure there are sufficient observation to be used since there are 4 quarters in a year. However, the number of observation should be under control, this is because it can bring certain side effect. The coefficient of determination has a low percentage value as the number of observation is less. If the model increased with the number of observation, it will bring another unfavourable result which is the independent variables' probability would become higher. This may cause even more independent variables insignificant to the dependent variable.

Besides that, future researchers are recommended to obtain those data from more sources such as, World Bank database, OECD Economic Outlook Database, International House Price Database, Yahoo Finance before testing the E-view. This is to ensure that the results tested will avoided from econometric problem. Other than that, panel data or cross-sectional data are suggested to obtain the feasible results compared to the time-series data.

Last but not least, future researchers are encouraged to examine housing price with macroeconomic and microeconomic factors in order to provide a more comprehensive analysis for the Malaysian housing price. For example, urban and rural areas of people which having different income of salary per month, and having different consumptions. The data study is the overall housing prices of Malaysia, it cannot be represented to study in certain geographical regions, especially the rural areas.

References

Abelson, P., Joyeux, R., Milunovich, G., & Chung, D. (2005). Explaining House Prices in Australia: 1970–2003. *Economic Record, 81*(1), 96-103.

Askar Choudhury, I.S. (2014). LEAD-LAG ASSOCIATION OF MORTGAGE RATE WITH HOUSING PRICE. Journal of Economics and Economic Education Research. 15.

Aspden, A. (2012). Houses prices and unemployment for UK regions. Retrieved from University of Glasgow.

Athukorala, P.C. (2010). Malaysian Economy in Three Crises. *Working Papers in Trade and Development.*

B. Hosseinnia, N.K., G.R., (2017, June). A multi-plant emergency response plan for tockling major fire accidents in chemical clusters. Doi: 10.1201/9781315210469-19.

Barakova, I., Bostic, R. W., Calem, P. S., & Wachter, S. M. (2003). Does credit quality for homeownership Journal of housing economic, 318-336.

Birgitta, R., & Taylor. M. (2010). „Differences in Opportunities? Wage, Unemployment and House-Price Effects on Migration.“ *Institute for Social and Economic Research,* no. 2010-05.

Blanco, F., Martín, V., & Vazquez, G. (2015). Regional house price convergence in Spain during the housing boom. *Urban Studies*. Doi: 10.1177/0042098014565328

Brooks, C., & Tsolacos, S. (1999). The impact of economic and financial factors on UK property performance. *Journal of Property Research, 16(*2), 139-152.

Chui, L., & Chau, K. (2005). An Empirical Study of the Relationship between Economic Growth, Real Estates Prices and Real Estate Investment in Hong Kong. *Surveying and Built Environment, 16*(2), 19-32.

Dietz, R. (2015, January 14). *Good Signs for Housing in 2015*. Retrieved from U.S. News : https://www.usnews.com/opinion/economic-intelligence/2015/01/14/housing-market-showing-signs-of-a-good-2015

Economics, Management School, University of Sheffield, Sheffield, United Kingdom, 512, 57-64.

Engle, R. F. (1982). Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom Inflation. Econometric : Journal of the Econometric Society, 987-1007.

Fitwi, A. M., Hein, S. E., & Mercer, J. M. (2015). The US housing price bubble: Bernanke versus Taylor. *Journal of Economics and Business.*

Fuest. C, B.H, S.B.N, (2004, November). Capital gains taxation and house price fluctuations. Department of Economics.

Gasparenience, L., Remeikiene, R., & Skuka, A. (2016). Assessment of the impact of macroeconomic factors on housing price level: Lithuanian case. Intellectual Economics 10,122-127.

Glindro, E. T., Subhanij, T., Szeto, J., & Zhu, H. (2011). Determinants of House Prices in Nine Asia-Pacific Economies . *International Journal of Central Banking*, 163-204.

Gujarati, D. N. (2004).Basic Econometrics, 4th ed., Tata McGraw-Hill, New Delhi.

Guo, M., & Wu, Q. (2013). The Empirical Analysis of Affecting Factors of Shanghai Housing Prices. *International Journal of Business and Social Science, 4*(14), 218-223.

Hashim, Z. A. (2010). House Price and Affordability in Housing in Malaysia. *Akademika*, 37-46.

Henn.M, W.M, N.F, (2006). A Short Introduction to Social Research.

Hui, C. M. E., Seabrooke, W., & Wong, T. Y. J. (2003). "The impact of interest rate upon housing prices: an empirical study of Hong Kong's market", Property Management, 21(2), 153-170.

Hussain, N. E., Abdullah, N., & Abdullah, H. (2014). The Relationship between Rural-Urban Migration, Household Income and Unemployment: Malaysia Case Study. *International Journal of Managerial Studies and Research, 2*(8), 17-24.

Judith, Y., Vivienne, M. (2007) Housing affordability: a 21st century problem National Research Venture 3: *Housing affordability for lower income Australians.*

Kamal, E. M., Hassan, H., & Osmadi, A. (2016). Factors Influencing the Housing Price: Developers'. *International Scholarly and Scientific Research & Innovation, 10*(5), 1676-1682.

Khan, A., & Abbas, Z. (2015). Portfolio balance approach: An empirical testing. *Journal of Economics and International Finance, 7*(6), 137-143.

Kiat, G. W., Han, H. B., Yet, N. C., Hao, P. K., & Hui, T. S. (2015). Macroeconomic and financial determinants of Malaysian residential property market.

Kok, S. H., Ismail, N. W., & Lee, C. (2018). The sources of house price changes in Malaysia. *International Journal of Housing Market and Analysis, 11*(2), 335-355.

Leo Kardell, M.L. (2014). QRA with respect to domino effects and property damage.

Li Gan, Q.Z. (2013, October). MARKET THICKNESS AND THE IMPACT OF UNEMPLOYMENT ON HOUSING MARKET OUTCOMES, *NATIONAL BUREAU OF ECONOMIC RESEARCH.*

Liew, C., & Haron, N. A. (2013). FACTORS INFLUENCING THE RISE OF HOUSE PRICE IN KLANG VALLEY. *International Journal of Research in Engineering and Technology, 2*(10), 261-272.

Liu, Y., & Hu, Z. (2016). on Correlation between RMB Exchange Rate and Real Estate Price based on Financial Engineering. *Systems Engineering Procedia 3*, 146-152.

Liu, Y.-c., & Zhang, S. (2013). Econometric Analysis on the Relationship Between RMB Exchange Rate and Real Estate Price by VAR Model . *International Conference on Science and Social Research*, 428-430.

Lok Sang Ho, Y.M. (2007, January 27). Domino Effect within a Housing Market: the Response of House Price across Quality Tiers. *Journal of Real Estate Finance and Economics.*

Mahalik, M. K., & Mallick, H. (2011). What Causes Asset Price Bubble in an Emerging Economy? Some Emperical Evidence in the Housing Sector of India. *International Economic Journal, 25*(2), 215-237.

Maryam Zabihi, M.A. (2011). House Prices, Economic Output, and Inflation Interactions in Iran. *Macrothink Institute*, 3. Doi: 10.1.1.841.5273&rep=rep1&type=pdf

MASSIMILIANO FERRARA, A.L. (2008, January). THE NEOCLASSICAL MODEL OF SOLOW AND SWAN WITH LOGISTIC POPULTION GROWTH. Doi: 10.1.1.574.8396&rep=rep1&type=pdf

Meidani, A. A., Zabihi, M., & Ashena, M. (2011). House prices, Economic Output, and Inflation Interactions in Iran. *Research in Applied Economics, 3*(1).

MILTON BAROSSI-FILHO, R. G. (2005, May). THE EMPIRICS OF THE SOLOW GROWTH MODEL: LONG-TERM EVIDENCE. Journal of Applied Economic. (5), 31-51.

N. GREGORY MANKIW, D. R. (1992, May). A CONTRIBUTION TO THE EMPIRICS OF ECONOMIC GROWTH.

Nazeer, A., Shafi, K., Idrees, Z., & Hua, L. (2015). Exchange rate and determinants of balance of trade,its impact on balance of payment. *American Journal of Business, Economics and Management, 3*(1), 14-18.

Ong, T. S. (2013). Factors Affecting the Price of Housing in Malaysia. *Journal of Emerging Issues in Economics, Finance and Banking, 1*(5), 414-429.

Ozdemir, D. (2017, March). A Post-Keynesian Criticism of the Solow Growth Model. (5). Doi:10.18178/joebm.2017.5.3.500

Panagiotidis, T., Printzis, P. (2016). On the macroeconomic determinants of the housing market in Greece: a VECM approach. *International Economics and Economic Policy*, 2016, 13(3), 387-409.

Paul Anthony Mariadas, M.S., K.H., (2016). A Study on Housing Price in Klang Valley, Malaysia. International Business Research, 9. Doi: 10.5539/ibr.v9n12p103

Pillaiyan, S. (2015). Macroeconomic Drivers of House Prices in Malaysia. *Canadian Social Science, 11*(9), 119-130.

Pour, M. S., Khani, P. N., Zamanian, G., & Barghandan, K. (2013). SPECIFYING THE EFFECTIVE DETERMINANTS OF HOUSE PRICE VOLATILITIES IN IRAN. *Journal of Economics and Business, XI*(2), 15-20.

Rajendra Adhikari, P. (2018, January). Relevancy of Harrod-Domar Model in Nepalese Economy. *Journal of Economic anf Finance.*

Real Residential Property Prices for Malaysia. (n.d). FRED Economic Data

Rolle Remi Ahuru, U. E. (2015, june). TESTING THE SOLOW MODEL IN NIGERIA'S ECONOMY. JORIND 13(1).

RUTTAN, V. W. (1998, April). GROWTH ECONOMICS AND DEVELOPMENT ECONOMICS: WHAT SHOULD DEVELOPMENT ECONOMISTS LEARN (IF ANYTHING) FROM THE NEW GROWTH THEORY?. *ECONOMIC DEVELOPMENT CENTER.*

Salina Hj Kassim, N.H. (2017). WHAT DRIVES HOUSE PRICE IN MALAYSIA? IN SEARCH OF AN ALTERNATIVE PRICING BENCHMARK FOR ISLAMIC HOME FINANCING. Journal of the Malaysia Institute of Planners, 15(4), 21-34

Shaari, N. H., Mahmood, W. M. W., & Baharuddin, N. S. (2016). Housing prices, Macroeconomic Variables and Corruption Index in Asean. Journal of Applied Environmental and Biological Sciences, 6(3S), 67-71.

Soffian, N. S. M., Ahmad, A., & Rahman, N. A. (2018). Housing Development in Malaysia. International. *Journal of Academic Research in Business and Social Sciences*, 8(2), 852–860.

Solow, R. M. (1956, February). A Contribution to the Theory of Economic Growth. *The Quarterly journal of Economic.* 70. 65-94.

Sopranzetti, B.J. (2015, August). Hedonic Regression Models. Research Gate.

Stephy, L. (2016). How does the economy affect the Malaysia housing market?

Stratton, L. S. (2017). Housing prices, Unemployment rates, Disadvantage, and progress toward a Degree. IZA Institute of Labor Economics.

Sultan Sidi, N.S.B.(n.d) Quality Affordable Housing: A Theoretical Framework for Planning and Design of Quality Housing. *Journal of Techno-Social*.

Taltavull de La Paz, P. (2003). Determinants of housing prices in Spanish cities. Journal of Property Investment & Finance, 21(2), 109-135.

Taylor, J. J. (2018, March 20). Confusing Stats Terms Explained: Heteroscedasticity (Heteroskedasticity). Retrieved from Stats Make Me Cry Consulting.

William,R.(2015).Heteroscedasticity. http://www3.nd.edu/~rwilliam/stats2/l25.pdf

Xu, T. (2016). The relationship between Interest Rates, Income, GDP Growth and House Prices. Research in Economics and Management, 2(1).

Yin, L. S., Mei, S.K., Yee, J. T., & Vivian, C. K. M. (2017). The macroeconomic factor affecting movement of property price: evidence from Japan.

Zabihi, M., & Ashena, M. (2011). House prices, Economic output, and Inflation interactions in Iran. Macrothink Institute, 3(1).

Zandi, G.,Supramaniam, M., Aslam, A., & Theng, L. K. (2015). The economical factors affecting residential property price: The case of Penang Island. International Journal of Economic and Finance, 7(12).

Appendices

Appendix 4.1: Descriptive Analysis

	MHPI_2010...	UNEMPLOY...	RPGT_RATE	LENDING_...	GDP_GRO...	EXCHANGE...
Mean	143.3839	3.164516	19.67742	4.707419	5.470968	95.47129
Median	145.0000	3.100000	15.00000	4.660000	5.300000	99.44000
Maximum	190.1000	3.600000	30.00000	5.200000	10.10000	103.9300
Minimum	97.20000	2.700000	5.000000	4.480000	4.000000	81.39000
Std. Dev.	28.95265	0.215327	10.48296	0.181603	1.298254	7.537967
Skewness	-0.062006	0.184820	-0.112022	0.783672	2.036595	-0.823467
Kurtosis	1.716118	2.567939	1.220828	2.883010	7.696952	2.021184
Jarque-Bera	2.148987	0.417609	4.153546	3.190748	49.92580	4.741030
Probability	0.341471	0.811554	0.125334	0.202833	0.000000	0.093433
Sum	4444.900	98.10000	610.0000	145.9300	169.6000	2959.610
Sum Sq. Dev.	25147.68	1.390968	3296.774	0.989394	50.56387	1704.629
Observations	31	31	31	31	31	31

Appendix 4.2: Original Regression Output

Dependent Variable: MHPI_2010_100
Method: Least Squares
Date: 01/28/19 Time: 21:45
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCHANGE_RATE_2010_100	-1.401301	0.520239	-2.693574	0.0124
GDP_GROWTH_RATE	-1.806661	1.206064	-1.497981	0.1467
LENDING_RATE	-41.18320	13.65173	-3.016702	0.0058
RPGT_RATE	1.233988	0.334636	3.687558	0.0011
UNEMPLOYMENT_RATE	-5.848209	13.58939	-0.430351	0.6706
C	475.1437	122.6266	3.874720	0.0007

R-squared	0.941247	Mean dependent var	143.3839
Adjusted R-squared	0.929496	S.D. dependent var	28.95265
S.E. of regression	7.687685	Akaike info criterion	7.089102
Sum squared resid	1477.513	Schwarz criterion	7.366648
Log likelihood	-103.8811	Hannan-Quinn criter.	7.179575
F-statistic	80.10142	Durbin-Watson stat	1.084240
Prob(F-statistic)	0.000000		

Appendix 4.3: Correlation Analysis

	EXCHANGE...	GDP_GRO...	LENDING_...	RPGT_RATE	UNEMPLOY...
EXCHANGE...	1.000000	0.169202	0.562582	-0.694500	-0.716592
GDP_GRO...	0.169202	1.000000	0.295868	-0.297072	0.148819
LENDING_...	0.562582	0.295868	1.000000	-0.816389	-0.162676
RPGT_RATE	-0.694500	-0.297072	-0.816389	1.000000	0.157199
UNEMPLOY...	-0.716592	0.148819	-0.162676	0.157199	1.000000

Appendix 4.4: Exchange rate and GDP

Dependent Variable: EXCHANGE_RATE_2010_100
Method: Least Squares
Date: 03/07/19 Time: 22:42
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP_GROWTH_RATE	0.982424	1.062645	0.924508	0.3629
C	90.09648	5.970002	15.09153	0.0000

R-squared	0.028629	Mean dependent var	95.47129
Adjusted R-squared	-0.004866	S.D. dependent var	7.537967
S.E. of regression	7.556286	Akaike info criterion	6.944978
Sum squared resid	1655.826	Schwarz criterion	7.037493
Log likelihood	-105.6472	Hannan-Quinn criter.	6.975135
F-statistic	0.854715	Durbin-Watson stat	0.156521
Prob(F-statistic)	0.362851		

Appendix 4.5: Exchange rate and Lending rate

Dependent Variable: EXCHANGE_RATE_2010_100
Method: Least Squares
Date: 03/07/19 Time: 22:43
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LENDING_RATE	23.35158	6.372371	3.664504	0.0010
C	-14.45439	30.01902	-0.481508	0.6338

R-squared	0.316499	Mean dependent var	95.47129
Adjusted R-squared	0.292930	S.D. dependent var	7.537967
S.E. of regression	6.338486	Akaike info criterion	6.593498
Sum squared resid	1165.116	Schwarz criterion	6.686013
Log likelihood	-100.1992	Hannan-Quinn criter.	6.623656
F-statistic	13.42859	Durbin-Watson stat	0.158665
Prob(F-statistic)	0.000987		

Appendix 4.6: Exchange rate and RPGT

Dependent Variable: EXCHANGE_RATE_2010_100
Method: Least Squares
Date: 03/07/19 Time: 22:45
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RPGT_RATE	-0.499393	0.096072	-5.198108	0.0000
C	105.2981	2.134334	49.33533	0.0000

R-squared	0.482331	Mean dependent var	95.47129
Adjusted R-squared	0.464480	S.D. dependent var	7.537967
S.E. of regression	5.516226	Akaike info criterion	6.315606
Sum squared resid	882.4338	Schwarz criterion	6.408121
Log likelihood	-95.89189	Hannan-Quinn criter.	6.345764
F-statistic	27.02033	Durbin-Watson stat	0.283448
Prob(F-statistic)	0.000015		

Appendix 4.7: Exchange rate and Unemployment rate

Dependent Variable: EXCHANGE_RATE 2010 100
Method: Least Squares
Date: 03/07/19 Time: 22:47
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMPLOYMENT_RATE	-25.08583	4.534159	-5.532631	0.0000
C	174.8558	14.38053	12.15921	0.0000

R-squared	0.513505	Mean dependent var	95.47129
Adjusted R-squared	0.496729	S.D. dependent var	7.537967
S.E. of regression	5.347555	Akaike info criterion	6.253497
Sum squared resid	829.2941	Schwarz criterion	6.346012
Log likelihood	-94.92920	Hannan-Quinn criter.	6.283655
F-statistic	30.61001	Durbin-Watson stat	0.299505
Prob(F-statistic)	0.000006		

Appendix 4.8: GDP and Lending rate

Dependent Variable: GDP_GROWTH_RATE
Method: Least Squares
Date: 03/07/19 Time: 22:48
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LENDING_RATE	2.115111	1.268072	1.667973	0.1061
C	-4.485748	5.973646	-0.750923	0.4587

R-squared	0.087538	Mean dependent var	5.470968
Adjusted R-squared	0.056073	S.D. dependent var	1.298254
S.E. of regression	1.261330	Akaike info criterion	3.364551
Sum squared resid	46.13763	Schwarz criterion	3.457066
Log likelihood	-50.15054	Hannan-Quinn criter.	3.394709
F-statistic	2.782135	Durbin-Watson stat	0.760097
Prob(F-statistic)	0.106085		

Appendix 4.9: GDP and RPGT

Dependent Variable: GDP_GROWTH_RATE
Method: Least Squares
Date: 03/07/19 Time: 22:48
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RPGT_RATE	-0.036791	0.021959	-1.675417	0.1046
C	6.194912	0.487842	12.69861	0.0000

R-squared	0.088252	Mean dependent var	5.470968
Adjusted R-squared	0.056812	S.D. dependent var	1.298254
S.E. of regression	1.260836	Akaike info criterion	3.363768
Sum squared resid	46.10153	Schwarz criterion	3.456283
Log likelihood	-50.13841	Hannan-Quinn criter.	3.393926
F-statistic	2.807022	Durbin-Watson stat	0.681047
Prob(F-statistic)	0.104604		

Appendix 4.10: GDP and Unemployment rate

Dependent Variable: GDP_GROWTH_RATE
Method: Least Squares
Date: 03/07/19 Time: 22:49
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMPLOYMENT_RATE	0.897263	1.107132	0.810439	0.4243
C	2.631563	3.511377	0.749439	0.4596

R-squared	0.022147	Mean dependent var	5.470968
Adjusted R-squared	-0.011572	S.D. dependent var	1.298254
S.E. of regression	1.305744	Akaike info criterion	3.433763
Sum squared resid	49.44403	Schwarz criterion	3.526279
Log likelihood	-51.22333	Hannan-Quinn criter.	3.463921
F-statistic	0.656812	Durbin-Watson stat	0.605353
Prob(F-statistic)	0.424289		

Appendix 4.11: Lending rate and RPGT

Dependent Variable: LENDING_RATE
Method: Least Squares
Date: 03/07/19 Time: 22:50
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RPGT_RATE	-0.014143	0.001858	-7.612768	0.0000
C	4.985714	0.041272	120.8003	0.0000

R-squared	0.666491	Mean dependent var	4.707419
Adjusted R-squared	0.654991	S.D. dependent var	0.181603
S.E. of regression	0.106669	Akaike info criterion	-1.575827
Sum squared resid	0.329971	Schwarz criterion	-1.483312
Log likelihood	26.42532	Hannan-Quinn criter.	-1.545669
F-statistic	57.95423	Durbin-Watson stat	0.846714
Prob(F-statistic)	0.000000		

Appendix 4.12: Lending rate and Unemployment rate

Dependent Variable: LENDING_RATE
Method: Least Squares
Date: 03/07/19 Time: 22:51
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMPLOYMENT_RATE	-0.137199	0.154527	-0.887864	0.3819
C	5.141586	0.490096	10.49098	0.0000

R-squared	0.026463	Mean dependent var	4.707419
Adjusted R-squared	-0.007107	S.D. dependent var	0.181603
S.E. of regression	0.182248	Akaike info criterion	-0.504561
Sum squared resid	0.963211	Schwarz criterion	-0.412046
Log likelihood	9.820694	Hannan-Quinn criter.	-0.474403
F-statistic	0.788302	Durbin-Watson stat	0.237655
Prob(F-statistic)	0.381919		

Appendix 4.13: RPGT and Unemployment rate

Dependent Variable: RPGT_RATE
Method: Least Squares
Date: 03/07/19 Time: 22:51
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMPLOYMENT_RATE	7.653061	8.927989	0.857199	0.3984
C	-4.540816	28.31599	-0.160362	0.8737

R-squared	0.024711	Mean dependent var	19.67742
Adjusted R-squared	-0.008919	S.D. dependent var	10.48296
S.E. of regression	10.52961	Akaike info criterion	7.608600
Sum squared resid	3215.306	Schwarz criterion	7.701115
Log likelihood	-115.9333	Hannan-Quinn criter.	7.638758
F-statistic	0.734790	Durbin-Watson stat	0.100684
Prob(F-statistic)	0.398364		

Appendix 4.14: Heteroscedasticity (ARCH) Test

Heteroskedasticity Test: ARCH

F-statistic	0.218659	Prob. F(1,28)	0.6437
Obs*R-squared	0.232462	Prob. Chi-Square(1)	0.6297

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/07/19 Time: 22:54
Sample (adjusted): 2 31
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	42.20826	13.72998	3.074168	0.0047
RESID^2(-1)	0.099792	0.213409	0.467609	0.6437

R-squared	0.007749	Mean dependent var	46.49114
Adjusted R-squared	-0.027689	S.D. dependent var	55.26421
S.E. of regression	56.02409	Akaike info criterion	10.95378
Sum squared resid	87883.56	Schwarz criterion	11.04719
Log likelihood	-162.3067	Hannan-Quinn criter.	10.98366
F-statistic	0.218659	Durbin-Watson stat	1.690352
Prob(F-statistic)	0.643683		

Appendix 4.15: Autocorrelation (Breusch Godfrey Serial Correlation LM Test)

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

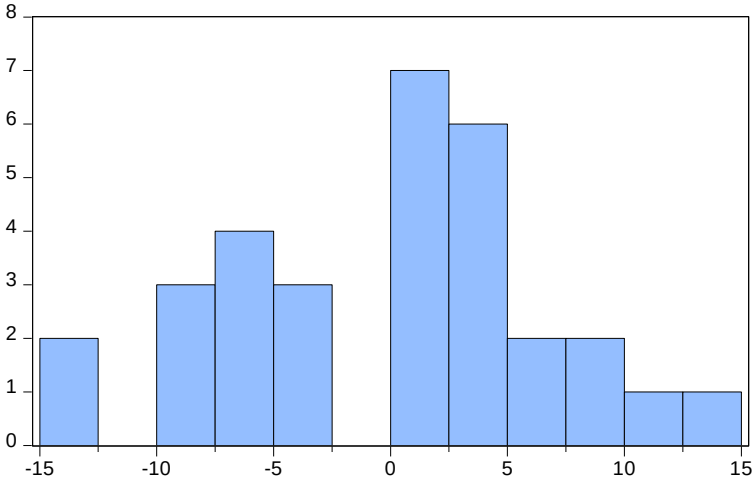
F-statistic	2.431331	Prob. F(2,23)	0.1102
Obs*R-squared	5.410198	Prob. Chi-Square(2)	0.0669

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/07/19 Time: 22:55
Sample: 1 31
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LENDING_RATE	6.437796	15.24722	0.422228	0.6768
GDP_GROWTH_RATE	0.302416	1.181012	0.256065	0.8002
EXCHANGE_RATE_2010_100	-0.145685	0.497302	-0.292952	0.7722
RPGT_RATE	0.045223	0.331107	0.136580	0.8926
UNEMPLOYMENT_RATE	-4.274290	13.02165	-0.328245	0.7457
C	-5.238838	121.5505	-0.043100	0.9660
RESID(-1)	0.483564	0.221506	2.183074	0.0395
RESID(-2)	-0.051135	0.259782	-0.196839	0.8457

R-squared	0.174523	Mean dependent var	-9.74E-14
Adjusted R-squared	-0.076710	S.D. dependent var	7.017864
S.E. of regression	7.282061	Akaike info criterion	7.026341
Sum squared resid	1219.653	Schwarz criterion	7.396402
Log likelihood	-100.9083	Hannan-Quinn criter.	7.146972
F-statistic	0.694666	Durbin-Watson stat	1.880400
Prob(F-statistic)	0.675955		

Appendix 4.16: Jarque-Bera test



Series: Residuals
Sample 1 31
Observations 31

Mean	-1.14e-13
Median	1.592854
Maximum	13.78309
Minimum	-13.46670
Std. Dev.	7.017864
Skewness	-0.116418
Kurtosis	2.275819
Jarque-Bera	0.747424
Probability	0.688175

Appendix 4.17: Ramsey RESET Test

Ramsey RESET Test
Equation: UNTITLED
Specification: MHPI_2010_100 LENDING_RATE GDP_GROWTH_RATE EXCHANGE_RATE_2010_100 RPGT_RATE UNEMPLOYMENT_RATE C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.971735	24	0.3409
F-statistic	0.944270	(1, 24)	0.3409
Likelihood ratio	1.196299	1	0.2741

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	55.93149	1	55.93149
Restricted SSR	1477.513	25	59.10050
Unrestricted SSR	1421.581	24	59.23254

LR test summary:

	Value
Restricted LogL	-103.8811
Unrestricted LogL	-103.2829

Unrestricted Test Equation:
Dependent Variable: MHPI_2010_100
Method: Least Squares
Date: 03/07/19 Time: 22:58
Sample: 1 31
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LENDING_RATE	-84.49063	46.61559	-1.812497	0.0824
GDP_GROWTH_RATE	-4.097134	2.648347	-1.547054	0.1349
EXCHANGE_RATE_2010_100	-3.505600	2.227256	-1.573955	0.1286
RPGT_RATE	2.936618	1.783893	1.646185	0.1128
UNEMPLOYMENT_RATE	-9.340882	14.07135	-0.663823	0.5131
C	970.8315	524.6701	1.850365	0.0766
FITTED^2	-0.004729	0.004867	-0.971735	0.3409

R-squared	0.943471	Mean dependent var	143.3839
Adjusted R-squared	0.929338	S.D. dependent var	28.95265
S.E. of regression	7.696268	Akaike info criterion	7.115028
Sum squared resid	1421.581	Schwarz criterion	7.438831
Log likelihood	-103.2829	Hannan-Quinn criter.	7.220580
F-statistic	66.75975	Durbin-Watson stat	1.167589
Prob(F-statistic)	0.000000		