

DETERMINANTS OF MALAYSIA HOUSING PRICE

BY

CHENG LI WEI
CHONG PEI SHIN
JOANE CHEONG PUI KEI
TIANG XUE HONG
WONG MUN YEE

A research project submitted in partial fulfillment of the
requirement for the degree of

BACHELOR OF FINANCE (HONS)

UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF BUSINESS AND FINANCE
DEPARTMENT OF FINANCE

APRIL 2016

Copyright @ 2016

ALL RIGHTS RESERVED. No part of this paper may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, graphic, electronic, mechanical, photocopying, recording, scanning, or otherwise, without the prior consent of the authors.

DECLARATION

We hereby declare that:

- (1) This undergraduate research project 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 research project 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 research project.
- (4) The word count of this research report is 18750 words.

Name of Student:	Student ID:	Signature:
1. CHENG LI WEI	12ABB03009	_____
2. CHONG PEI SHIN	12ABB03640	_____
3. JOANE CHEONG PUI KEI	12ABB03189	_____
4. TIANG XUE HONG	12ABB03290	_____
5. WONG MUN YEE	12ABB03289	_____

Date: 16th April 2016

ACKNOWLEDGEMENT

We would take this opportunity to express our gratitude and appreciation to all those who gave us the possibility to complete this report. A special gratitude we give to our final year project supervisor, Cik Nabihah Binti Aminaddin and Puan Siti Nur Amira who was abundantly helpful and offered invaluable assistance, support and guidance, as well as sharing his expertise and knowledge to us in order to enhance the research report quality.

Besides, we would like to thank UTAR in providing us sufficient facility in order to carry out the research. The database provided by the university enables us to obtain relevant data and materials while preparing this research project.

Furthermore, we would like to thank our project coordinator, Cik Nurfadhilah bt Abu Hasan for coordinating everything pertaining to be completion undergraduate project and keeping us updated with the latest information.

Last but not least, we would like to thank all of the group members for giving their best effort in completing this final year project.

DEDICATION

We would like to dedicate this final year project to:

Puan Siti Nur Amira Binti Othman

Our supervisor who has provided us with useful guidance, valuable supports, constructive feedbacks and precious encouragement to us.

Team Members

All the members who have played different roles while completing this research project and the full cooperation given at all times.

Thank You.

TABLE OF CONTENTS

	Page
Copyright Page	ii
Declaration	iii
Acknowledgement	iv
Dedication	v
Table of Contents	vi
List of Figures and Tables	ix
List of Abbreviations	x
Preface	xi
Abstract	xii
CHAPTER 1 INTRODUCTION	1
1.0 Research Background.....	1
1.1 Problem Statement	11
1.2 Objectives of the Study	12
1.2.1 General Objectives.....	12
1.2.2 Specific Objectives	12
1.3 Research Questions	12
1.4 Hypotheses of the Study	13
1.5 Significance of the Study	15
1.6 Chapter Layout	16

1.7 Conclusion	17
CHAPTER 2 LITERATURE REVIEW	18
2.0 Introduction	18
2.1 Review of Literature	18
2.2 Review of Relevant Theoretical Models	28
2.3 Conclusion	30
CHAPTER 3 METHODOLOGY	31
3.0 Introduction	31
3.1 Research Design	32
3.1.1 Data Collection Methods.....	32
3.2 Variables Specification Of Measurements.....	32
3.2.1 House Price Index	32
3.2.2 Consumer Price Index	33
3.2.3 Gross Domestic Product	34
3.2.4 Lending Interest Rate	34
3.2.5 Population	35
3.3 Flows of Methodology	36
3.4 Methodology	36
3.4.1 Unit Root Test	36
3.4.2 Johansen & Juselius Cointegration Test	39
3.4.3 Vector Error Correction Model(VECM)	41
3.4.4 Granger Causality Test	42
3.4.5 Variance Decomposition	44

3.4.6 Impulse Response Function	45
3.5 Conclusion.....	46
CHAPTER 4: DATA ANALYSIS	47
4.0 Introduction.....	47
4.1 Unit Root Test.....	47
4.2 Johansen & Juselius Cointegration Test	50
4.3 Vector Error Correction Model (VECM) & Granger Causality Test	52
4.4 Variance Decomposition	55
4.5 Impulse Response Function	60
4.6 Discussions of Major Findings	61
4.7 Conclusion	65
CHAPTER 5: CONCLUSION, IMPLICATIONS, LIMITATIONS & RECOMMENDATIONS.....	66
5.0 Summary of Statistical Analyses	66
5.1 Implications of Study	67
5.2 Limitations of Study	69
5.3 Recommendations for Future Research	70
5.4 Conclusion	71
References	72

LIST OF FIGURES AND TABLES

	Page
Figure 1.0 Broad Trend In Residential Prices	4
Figure 1.1 Lending Rate	6
Figure 1.2 Consumer Price Index	7
Figure 1.3 Gross Domestic Product	7
Figure 1.4 Population	8
Figure 2.2 Relationship Between The 6 Variables With Malaysia House Price Index	28
Figure 4.7 Generalized Impulse response functions	60
Table 4.1 Unit Root Test	48
Table 4.2.1 Johansen's Test for LNGDP	51
Table 4.2.2 Johansen's Test for LNCPI	51
Table 4.2.3 Johansen's Test for LEN	51
Table 4.2.4 Johansen's Test for POP	52
Table 4.3 Granger Causality Test and VECM	54
Table 4.4.1 Variance Decomposition of LNHPI in Malaysia	55
Table 4.4.2 Variance Decomposition of LNGDP in Malaysia	56
Table 4.4.3 Variance Decomposition of LNCPI in Malaysia	57
Table 4.4.4 Variance Decomposition of POP in Malaysia	58
Table 4.4.5 Variance Decomposition of LEN in Malaysia	59

LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller Test
CPI	Consumer Price Index
DV	Dependent Variable
GDP	Gross Domestic Product
HPI	House Price Index
IV	Independent Variable
LEN	Lending Rate
LN	natural logarithm
PP	Phillips-Perron Test
POP	Population
VAR	Vector Autoregressive Model
VECM	Vector Error Correction Model

PREFACE

The global house prices have been going up tremendously since year 2000. Most of the real estate investors invest in Asia Pacific countries, especially after the subprime mortgage crisis in year 2008. As Malaysian residential housing market represents one of the most important industries which significant affected the economics of Malaysia, it is important to pay an attention on it.

The Malaysian housing price has gradually kept increasing from 1990 until 2015. It is important to take note that the Malaysian housing price has experienced a rapid increased since year 2008 compared to year before. Economists believed that the rapid increased of housing price will lead to housing bubble which were consequently have destructive effect toward the Malaysia economics. Hence, the trend of house price must be concerned and the factors that lead to the increased of residential house price must be determined.

This research will investigate the relationship between the fluctuation of house price index in Malaysia with the macroeconomic determinants such as consumer price index (CPI), lending interest rate (LEN), population (POP) and gross domestic product (GDP). This research will provide a clearly picture and empirical results for readers, such as policy makers, investors, homebuyers and homeowners about the connection between these variables towards the house price index in Malaysia.

ABSTRACT

This study examines the relationship between macroeconomic determinants with residential housing price in Malaysia from period year 1998 first quarter to year 2015 fourth quarter, which consist of quarterly data of 68 observations. This study used the Time Series Econometrics to capture the effect of macroeconomic on the Malaysian residential housing price. Besides investigate the relationship, this study also examined the long run, short run, causality direction, dynamic stability and shocks of the empirical model of this study.

Determinants such as consumer price index (CPI), lending interest rate (LEN), population (POP) and gross domestic product (GDP) are significant toward the Malaysian residential housing price. Besides, consumer price index (CPI), population (POP) and gross domestic product (GDP) showed positive relationships with the house price index, whereas lending interest rate (LEN) showed a negative relationship with the house price index.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Research Background

Recently, the demand of housing had increase as the number of people of each country increased. Thus, there is plenty of real estate companies started launching new houses in different areas. Although the business market and structure of housing is almost the same with any other business, but in this housing market, it involves a large transactions amount in consumer's spending. The houses future market price is nearly to be expensive and it is going to increase significantly over the period. The reason behind that cause the housing price to increase is the inflation, population growth, and raw material costs used in the real estate industry. The demands and supplies of the houses in Malaysia are being influenced by the determinants stated above and some other different factors.

In term of GDP, Malaysia's house price is continued to increase gradually due to a slight GDP slowdown from 7.2% in year 2010 to 5.1% in year 2011. Besides, while excluding the period of recent surge, houses prices in Malaysia have also affected by inflation over the past 10 years.

Housing price is just similar with other type of goods and services in a market which are affected by the movement of demand and supply. The demand for owned a housing is basically influenced by housing price, population, lending interest rate, inflation rate and GDP.

Since the beginning of year 2012, Bank Negara Malaysia (BNM) has tightened the regulations and procedure on lending. A person who wants to obtain mortgage loan from bank will be harder because they have to pass the mortgage affordability test. It is an assessment to evaluate their performance based on their net income, Employees Provident Fund (EPF) contributions, statutory tax deductions and all other debt obligations. Moreover, in February 2012, the new rules and regulations have already impacted lending rate and lowered down the residential loan approvals.

As refer to CB Richard Ellis (CBRE-Malaysia), the approval rate was below 50% comparing to mid-2008 was over 62%. The outstanding mortgage loans had arrived MYR 222.2 billion (US\$69.9 billion) in year 2011 which is around 26.1% of GDP.

Based on Sutton (2002), the long term asset which gives consumption services is a house. Its implicit value is the expected service stream's discounted value. However Ooi and Le (2011) claimed that, the burden housing loan is the household's most expensive expenditure which leads to the problem of uneasy in buying a house. At the same time, most people think that the housing loan is the largest investment decisions in buying a house. Moreover, Datuk Chor Chee Heung, who is the Housing Minister, stated that government in Malaysia will not try to intervene in controlling the property prices as Malaysia is viewed as an economy freely country (Cagamas,2013). Consequently, Malaysia housing price is said to be in the mode of freely floating. In other words, the housing prices are changing according to its determinants.

The increase in residential housing demand within Malaysia urban areas has caused the country economic to develop rapidly in these recent years. From the Malaysia housing prices review, the housing prices have gone through a dramatically appreciation which depending on specific location no matter in cities or small towns. Based on iProperty.com Malaysia, Malaysians are not frighten by the fluctuation of the economy which disclosure by No.1 property portal in Malaysia. They remain steady and still confident with the housing market. Property demand is correlated to property price. Malaysia's property price has been on the rising trend since 15 years ago.

According to Asian Development Outlook Report 2011, Asian Development Bank depicted that Kuala Lumpur property prices are the second lowest in South East Asia, which was slightly more expensive than in Yangon, Myanmar. In terms of price per square feet, Kuala Lumpur property prices are lower than other capital cities in South East Asia such as Jakarta, Bangkok, Ho Chi Min City, Manila and even Phnom Penh. This means that Kuala Lumpur properties have a marked difference in prices compared to Singapore where properties are at least 10. 2 times

more expensive and have been recognized as one of the most expensive properties in Asia. Reading the report from Valuation and Property Services Department (JPPH) revealing that from year 2000 to year 2010, the average houses price has rising non-stop which contributed an increase of 45% between these years.

In the past few years, the Malaysia housing market has a significant price growth. In truth, Malaysia had encountered a rapid increase in housing prices. Based on Malaysia Deputy Finance Minister (2011), housing prices growing up around 20% average per year after year 2007. This is a distressing situation for lenders it had led to a huge problem. Many people think that their annual income increase still unable to cover the high annual increases in house prices in the general population. In reality, most of the residents are worrying that they not able to deal with the property which keeps rising in price.

The house value is predicted to undergo considerable growth in these future years as the economy is strong and domestic housing demand is expanding. Malaysia house prices are being driven by its economic growth. However, the housing price would still be affected by other macroeconomic determinants such as the Gross Domestic Product, interest rate, costs of construction, inflation rate and population. These determinants could contribute in helping relevant group to calm the housing prices and manage the condition before the situation becoming worse. The economic distortion condition could be reflected by current housing environment situation.

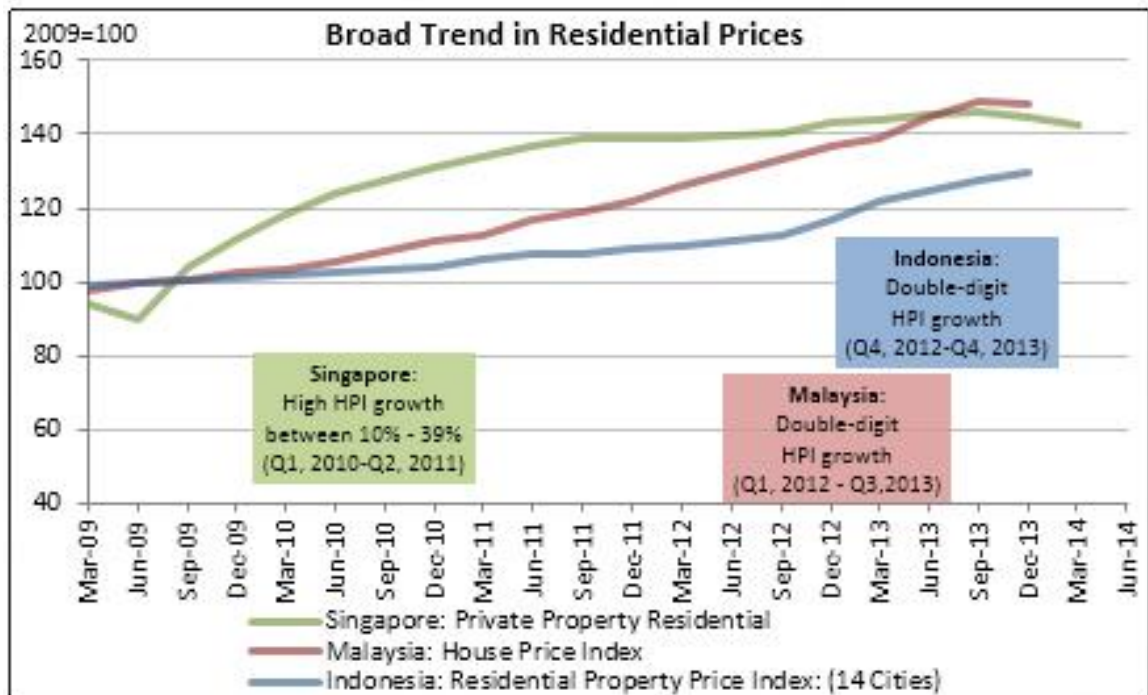


Figure 1: Data source: CEIC <http://www.ceicdata.com/en/blog/differing-house-price-trends-indonesia-malaysia-and-singapore>

Refer to Lim (2014), House Price Index (HPI) in Malaysia develop reduce to 8.1% year-on-year during the fourth quarter of 2013 after remain above 10% for the previous seven quarters. During the first quarter of 2009, there is robust HPI growth in Malaysia from its current pass event low of 0.7%

Huang, Leung and Qu (2015) identified that bank lending is bringing contribution in driving up the house prices after the Great Recession. Basically, Base Lending Rate in Malaysia is known as reference interest rate allows to charge by the bank on home loaning. The Overnight Policy Rate (OPR) which refers to the interest rate that charged by the bank for lending to each other had driven up the movement in Base Lending Rate. Bank Negara Malaysia is required to determine The Overnight Policy according to the global current economy condition and its objectives while the Base Lending Rate is determined by the commercial banks. Commonly, OPR increases when the currency grows. There is vice versa in the case of weakening in Ringgit Malaysia. Consequently, Base Lending Rate will influence by the movement of Overnight Policy Rate. The current BLR is at 6.6% for most of the Malaysia local banks. Banks offers mortgage loan rate which is BLR of - 2.4%,

therefore the actual interest rate for resident's home loan would be 4.2% (6.6% – 2.4%).

Bank Negara Malaysia (BNM) is expected by majority of the analyst and market players to raise Overnight Policy Rate in the following periods. The reasons behind is that Ringgit Malaysia is weakening against United States dollar plus the increasing in Malaysia's inflation. The base lending rate would be driven up by the increase in Overnight Policy Rate.

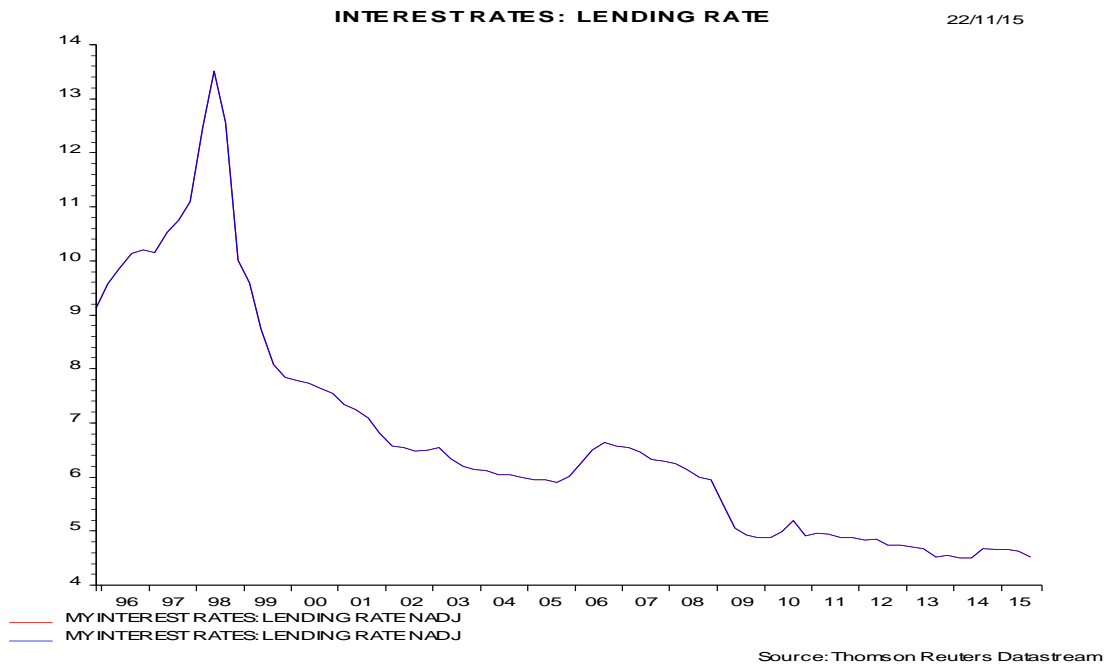
The question “How do the Base Lending Rate increases impact the residents?” has risen. The Lending Rate fluctuation would absolutely affect both of the current and new borrowers of mortgage loan. The Based Lending Rate movement could influence the movement changes on home loan interest charges rate as basically home loan packages of most of the local bank are pegged to Malaysia BLR rate (Chin, 2014). It will ultimately affect in the changes of the borrowers' installment payments for their mortgage loan.

Shi, Jou and Tripe (2014) examined that the impact on house price growth based on the interest for both floating and fixed rates is a strongly positively correlated on significant at the 1% level.

In the long run, inflation will affect the housing prices. The rising in housing prices could bring indication of the improvement in real estate market; however, the housing price increase affected by inflation is not really that beneficial for the economy. Appreciation in house value with time eventually remain similar when you consider the impact of inflation, explains by Phil Pustejovsky, author of “How to Be a Real Estate Investor,” in a guest post for RealEstate.com.

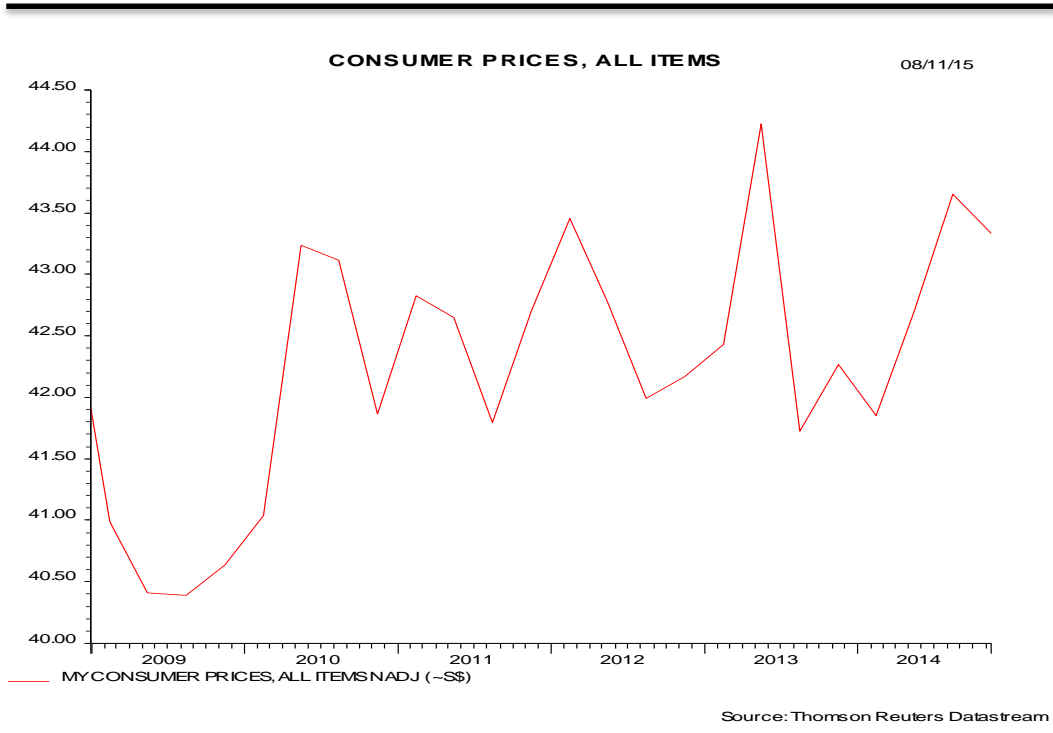
1.0.1 Lending Interest rate

Based on the graph below, from year 1996 to year 1998, the lending rate had dramatically increased from 9% to nearly 14%. On the other hand, from year 1998 to year 1999, the lending rate in Malaysia had drop sharply to 6% and then continue to drop slowly until year 2005. In the fourth quarter of year 2005, the lending rate rose to 7% and started to decrease in year 2007. Besides, the lending interest rate had stable in year 2009 until now which is around 4% to 5%.



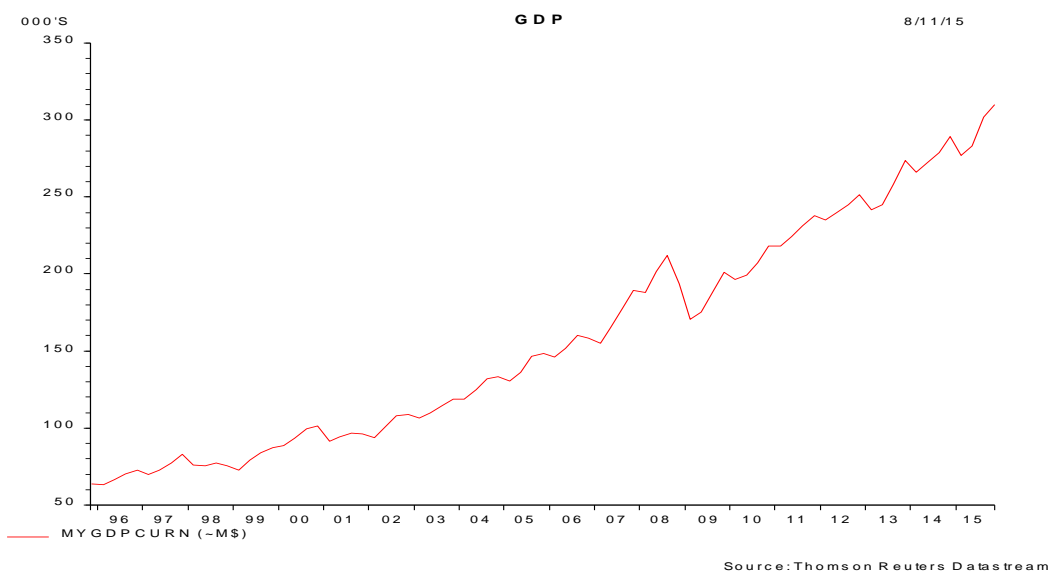
1.0.2 Inflation

The inflation in Malaysia has fluctuation throughout the years. Base on the data showed in the graph, the consumer price index (CPI) has a movement of going up and down across the year. The sharp dropped of consumer price index has occurred during the year 2009, this showed that deflation occurred. On the other hand, consumer price index peak has occurred in the year 2010. This indicate high inflation rose during the particular year.



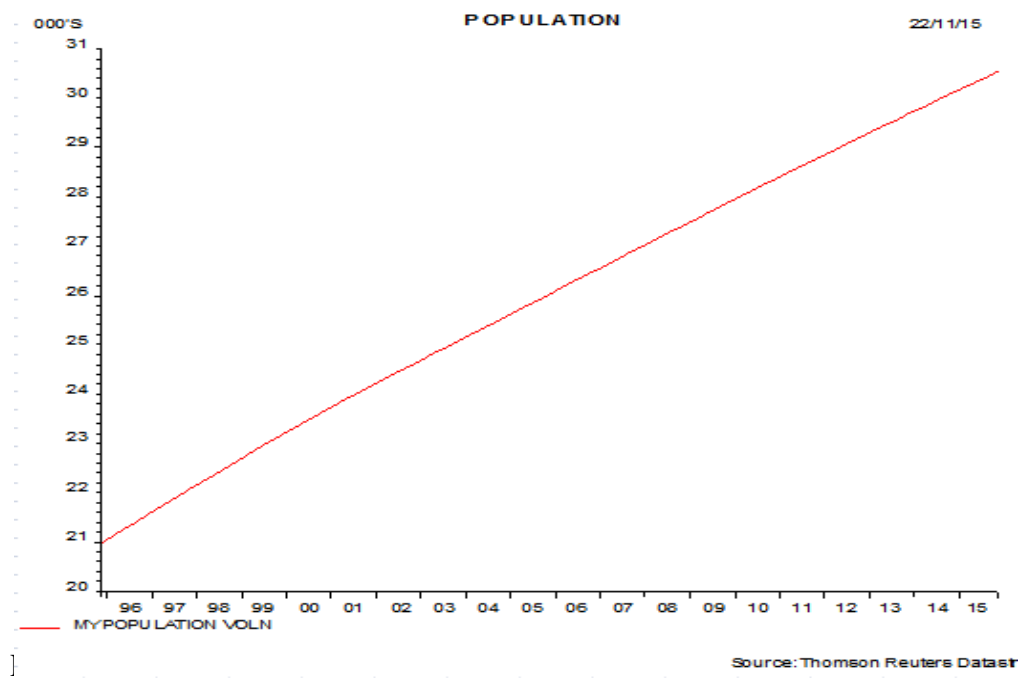
1.0.3 Gross Domestic Product (GDP)

According to the Thomson Reuters Datastream, Gross Domestic Product in Malaysia had increase significantly from year 1997 which is RM60000 to RM 300000 in year 2015. On the other hand, in year 2008 the financial crisis, the GDP had drop from RM 200,000 to RM 160,000 in the end of year 2008. After that, the GDP had started to rise from year 2009 until now.



1.0.4 Population

According to the graph generated of the data extracted from Thomson Reuters DataStream, we can observe that the population in Malaysia had increased steadily from year to year. There are directly proportional positively relationship between years and the population. Malaysia's population had incline of 10 thousands between the years 1996 to year 2015. On average, there is an approximately 667 of rise in population within Malaysia.



As refer to Greg McBride, senior financial analyst for Bankrate.com said that when there is a high inflation in the country, the cost and expenses of buying a house increases. If there is a rise in inflation, the dollar will loses some of its purchasing power which leads to any savings that you had put aside for a down payment loses value as well. When a person considering of buying a house in the situation where inflation rate is high, the chances that the person will be facing rising house prices and higher interest rates, which tend to increase the cost of borrowing of the person.

Effect of Supply and Demand

When the Federal lowers down the federal funds rate, which means the interest rates had decrease and it makes cheaper for consumers to borrow. A low interest rates will tends to decrease the cost of borrowing of a person to buy a home which means the person will be more affordable to own a house and indirectly it will attract more buyers. For instance, drop in interest rates will affect supply of housing market become limited, the housing price will increase significantly which had stated in 2013 Bloomberg report. On the other hand, when the houses are in a higher price; there will more sellers in the market selling out their properties, which cause the increasing of supply. Generally, while market inventory increases, the housing prices will tend to be level off and remain steady.

Inflationary Effects on New Construction

The major measure of the state of the nation's economy will be the construction of new houses, when there is an increase in inflation rate, the cost of new construction would be rather high. Inflation also have causes the cost of materials, labour cost to rise- notes executives at Leopardo Cos., one of the nation's largest construction firms, in a column for Commercial Property Executive. When the construction process started to slows, it will reduce the supply of house and it will push up the prices on existing properties which are houses.

In contrast, the supply of house has significant effect on the demand of house in the long run and the number of houses in an area will almost reflect the number of households. Jeanty, Partridge and Irwin (2010) found that if there is a change in population growth in both the own and neighboring tracts, the average of the housing price that within a census tract will be affected. Jeanty, Partridge and Irwin (2010) are suggesting that both researchers and policymakers should consider these spill overs in their deliberations.

According to Wen and Goodman (2013), in urban area, housing price is determined by economic fundamentals. In their research, the empirical studies are starting with

the main component which is the supply and demand, followed by exogenous macroeconomic factors, such as population, income and cost of construction to determine housing price. The changes on housing price are often forecasted due to the factors included in their studies are reflecting to the demand and supply of the local housing market. Besides, in urban economic elemental determinants would be significant and it could be explain differences between intercity housing prices.

Mankiw and Weil (1989) had observed the significant relationship on housing price in United States. Income is a strongly positive correlated with housing price (Fortura& Kushner, 1986). Besides that, Manning (1986) also described the intercity variation in increasing of housing price by using single equation to form equilibrium model. In their research, the empirical result had studies around sixteen independent variables of demand and supply of house, and also report for 68.8% of increasing in house price. In addition, based on Shen and Liu (2004) had also developed empirical research about the significant correlation between housing prices and economic variables by using panel data of 14 cities in China from 1995 to 2002. Besides, the logarithmic model describes that the four economic factors of urban households such as household income, unemployment rate, population and employment rate are significantly impact and can be clarify about 60% of the housing price.

According to Case and Shiller (1989, 1990) along with Hort (1998), they had revealed that the housing prices are serially correlated. Besides, Englund and Ioannides (1997) claim that during the development in year 1970 to 1992, the 15 member-countries of the Organization for Economic Co-operation had changes on the housing price. Quigley (1999) had used some other variables such as household income, number of households, employment rate, and construction permits for the research purposes. A very simple model shows that these variables can give an explanation for 10 to 40% of the housing price variation. According to Wen and Goodman (2013), the indicative power of the combined models will become better and the fitness coefficients of regression equations were all greater than 0.95 which associated with lagged housing price. Therefore, lagged housing prices are significant indicator of housing price in the current economic condition.

1.1 Problem Statements

The researcher, Ong (2013) said that the rapid increasing of housing price had brought difficulties to Malaysian in purchasing a house. According to Tawil, Suhaida, Hamzah, Che-Ani, Basri and Yuzainee (2011), housing is the basic needs for a human and it is also the important components in this urban economy. Besides, development and socioeconomic stability of one country can be viewed through housing affordability. Hashim (2010) explained that people tend to have the perception that house price will keep burst and unable to afford during the strong economic growth. However, the household will think that the housing will remains to be a primary essential of family desire and consider an expensive investment.

According to Williams (2003), the phenomenon of the affordable housing crisis happened for many years and seriously causes the owners in lower income group facing affordability problems. Especially for the elderly homeowners with their increasing health care costs, it is also a burden as they have to pay higher cost for housing.

Housing can be considered as the largest expenditure item in the budgets of most families and individuals. The high proportions suggested that little changes in housing prices will have large impacts on the citizens. In this twentieth century, one of the most significant social changes in global was the growth of home-ownership difficulties which caused many citizens of most countries facing difficulties to own a house (Quigley & Raphael, 2004).

So, this paper will carry out to determine the impact of macroeconomic factors on housing price. Interest rate, gross domestic product (GDP), inflation and population will be used as the macroeconomic factors to influence the housing price. This has supported by the past researchers (Min & Kim, 2011; Frappa & Mesonnier, 2010; Beltratti & Morana, 2010; Agnello & Schuknecht, 2011).

1.2 Objective of the study

1.2.1 General objective

To investigate the relationship between the macroeconomic factors namely lending interest rate, inflation, Gross Domestic Product (GDP) and population and housing price in Malaysia.

1.2.2 Specific Objectives

1. To identify long run relationship between housing prices and macroeconomic factors namely lending interest rate, inflation, Gross Domestic Product (GDP) and population.
2. To examine the causality among the housing prices and macroeconomic factors namely lending interest rate, inflation, Gross Domestic Product (GDP) and population.
3. To measure the dynamic interaction among housing price and macroeconomic factors namely lending interest rate, inflation, Gross Domestic Product (GDP) and population.

1.3 Research question

1. Does macroeconomic factors namely lending interest rate, inflation, Gross Domestic Product (GDP) and population have long run relationship on housing prices in Malaysia?
2. Does macroeconomic factors namely lending interest rate, inflation, Gross Domestic Product (GDP) and population have causality on housing prices in Malaysia?
3. Does macroeconomic factors namely lending interest rate, inflation, Gross Domestic Product (GDP) and population have dynamic interaction on housing prices in Malaysia?

1.4 Hypothesis of study

Based on this study, there are four hypotheses to identify the relationship between the macroeconomic variables and the housing price in the Malaysia.

1.4.1 Lending Interest rate

Based on the finding obtained from Tang and Tan (2015), interest rate has a negative impact on housing price in Malaysia. This statement explained that monthly payment of mortgage is influenced by interest rates. The higher the interest rates, it will tend to increase the cost of mortgage payments and hence it will lead to lower demand for purchase a house. Increase in interest rates make less attractive to own a house. Lower demand for buying a house eventually will lead to decreasing the housing price.

H_0 : There is no significant relationship between interest rate and housing price in Malaysia.

H_1 : There is a significant relationship between interest rate and housing price in Malaysia.

1.4.2 Inflation Rate

Piazzesi and Schneider (2009) mentioned that there has a significant correlation between inflation and housing price and they are also mentioned that higher expected inflation tends to an increase in the price of houses. In others word, when inflation rate getting higher, the price of raw material needed for house construction will getting expensive. Hence, it will cause the housing price goes up as inflation rate increases.

H_0 : There is no significant relationship between inflation rate and housing price in Malaysia.

H_1 : There is a significant relationship between inflation rate and housing price in Malaysia

1.4.3 Gross Domestic Product (GDP)

Guo and Wu (2013) stated the relationship between GDP and housing price is positive. The reason behind is that there is a high GDP growth rate as well as a good economic development condition which tend to push the rising of housing price. In other words, the increases in demand of property, with the limited of the housing supply, it makes housing price to boost. GDP will affect the housing price indirectly through several details and variables and a large degree, thus it becomes one of the significant factors affecting housing prices.

H_0 : There is no significant relationship between Gross Domestic Product (GDP) and housing price in Malaysia.

H_1 : There is a significant relationship between Gross Domestic Product (GDP) and housing price in Malaysia.

1.4.4 Population Growth

Miles (2012) stated that there has a positive correlation between population and housing price. When population trend is moving upward, incomes will increase and generate the demand for housing. Rises in population density make will cause the housing price increases.

H_0 : There is no significant relationship between population and housing price in Malaysia.

H_1 : There is a significant relationship between population and housing price in Malaysia.

1.5 Significance of the study

The major objective for this study is to discover the factors which contribute to the risen in housing price. In this study, reference will be taken from the previous researchers' idea. We have updated the data to the latest in order to obtain more accurate and better result in this study.

First of foremost, this study would be able to provide people of the idea on how the factors such as lending interest rate, inflation rate, gross domestic product(GDP) and population growth will influence the housing price. Consumers will have the knowledge about what actually causing the housing bubble to happen.

Besides, this study would contribute benefit in the area of the financial economic system on how the housing prices influence the consumers. Currently most of the citizens are facing the difficulties in purchasing a house. By doing this research, we can reveal more about what causing the generation nowadays having low house affordability.

Moreover, this study may able to give signals to the governments. By viewing this research, the authorities may have awareness on this issue hence create alternatives to solve this problem. As to the policy maker or financial minister, they could get some ideas from this study in designing the problem solving scheme, in order to deal with the hash rising in house price.

Other than that, this study could provide information to those house industry marketers. When they understand well what factors actually affecting the house prices which influence the house consumption, they could come out with more effective marketing strategy. The marketing maker could change the consumer's prior concerns for example house price to another, by emphasizing on other factors.

From the speculators or investors perspectives, this study may be contributed to them. If they know well what actually affecting the house price, they could have come out with more accurate house price estimation. Hence, they would have higher possibility in getting large capital gain.

Last but not least, for the undergraduates and researchers in the area of financial economic, they would benefit from this study as well. The students could take this as references for their school assignment which related to housing. The researchers who interested in this housing issue could also refer to this paper in their further research.

1.6 Chapter Layout

Chapter 1 explains the detail of the research background and the research problem. This chapter discussed about the research objectives, hypotheses, research questions, and the significance of the study. Lastly, this chapter will be concluded with a brief summary of this study.

Chapter 2 provides the review of literature in this study. The review of literature presents clear and relevant theoretical models or conceptual framework, proposed theoretical or conceptual framework, hypotheses development, and concludes with a summary of the literature review.

Chapter 3 displays the overview of methodology used in this study. For instance, this chapter explains the method of the study been carried out which is in terms of research design, data collection methods, sampling design, research instrument and method of data analysis, and concludes with a summary of the chapter.

Chapter 4 presents the significance of independent variables, the statistical outcome of the model specification test, as well as the diagnostic checking results. Apart from that, some suggestions are given in solving the econometric problems found in this paper. Lastly, this chapter will be concluded with a short summary of the study.

Chapter 5 consists of conclusion and policy implication chapter. It is to summarize all findings from chapter 4 and interpret the results consistent with the objective of

this study. In addition, some recommendations which may be useful for policy makers or investors will be explained in this chapter. Lastly, we will discuss about the limitation and future study of this research.

1.7 Conclusion

This study are mainly describes on the housing market in Malaysia with various significant macroeconomic variables. According to the empirical study, it is important to analysis how the factors such as lending interest rate, inflation, gross domestic product, and population are significant relationship towards factor of house price index of Malaysia. Therefore, in the end of the studies, it will be able to help to determine the cause behind the irrational rise of house price index in Malaysia in recent years.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

There are many different viewpoints on the relationship between macroeconomic and financial variables towards the housing prices in Malaysia. Therefore, in this chapter the literature review regarding the relationship between dependent variable (HPI) and independent variables namely the Lending Interest Rate (LEN), Inflation Rate (CPI) Gross Domestic Product (GDP), and Population (POP) will be discussed in detail. Initially, this chapter will review past researcher's literature and identify the relationship between dependent variable and independent variables. After that, this chapter will discussed the relevant theoretical framework of house price index with the macroeconomic and financial factors. The last part of this chapter will be the proposal of the theoretical model of this study and the brief summary of this chapter.

2.1 Literature Review

2.1.1 The relationship between inflation and house price index

Inflation refers to an increase in general price level of goods and services in the host country of an economy (Labonte, 2011). It used to determine the economic stability of a country. Some economist stated that inflation occur in the country is depends on the purchasing power of consumers on goods and services (Badar&Javid, 2013). In this study, proxy for inflation was the consumer price index. The level of inflation rate will directly affect the country economy condition therefore it is very important to be control by the government and central bank. Increase in economic growth will

lead to high inflation rate whereas decrease in economic growth will bring to a low inflation rate.

There are two categories of inflation are involved such as demand pull inflation and cost push inflation (Hussain & Malik, 2011). Demand-pull inflation occurred due to the increase in demand for services and goods as well. It means that the aggregate demand is greater than aggregate supply. As increase in goods and services 'demand, supplier will tend to mark up the price of goods and services since they unable to produce more to meet the consumer need. This statement has supported by the Tsatsaronis and Zhu (2004) and Liew and Haron (2013). On the other hand, cost-push inflation refers to the cost of materials increase will lead to the cost of finished goods increase (Hussain & Malik, 2011). These two factors draw the prices of goods and services rise, and eventually inflation will happen.

The next explanation is relationship between the impact of inflation and the real payments on long-term fixed-rate mortgage (Frappa & Mesonnier, 2010). If the inflation happens, the financing mortgage will decrease then rise shall happen to the housing price. If one would expect housing demand, and thus real house prices will respond to changes in inflation (Beltratti & Morana, 2010). More specifically, mortgage rates will follow a case which low mortgage rates contributing to greater real housing prices, while higher mortgage leading to low real housing prices (Apergis, 2003). Besides that, inflation will influence by the current financing conditions, which have the directly impact on the housing demand. The theory behind this statement is common for households to reduce their risk by investing in residential real estate other than other financial instrument. Such high inflation condition able to attract investors by high level of uncertainty and hence will bring to increase in house price. Thus, inflation is positively related to the price of houses.

Besides, researcher revealed that price level and inflation rate in Europe in year 1999 were negative correlated (Rogers, 2001). It mentioned that inflation will happen in certain country to have low price initially when levels of price are not similar across the euro area. Therefore, different level in inflation is quite important economically explained by the price level coverage. Besides, Tsatsaronis and Zhu (2004) have supported the negative impact hypothesis. Journal explained two

factors affect the negative relationship. First, when high inflation happens the economy may show a risk signal due to uncertainty risk may face by house agent. In order to reduce the risk, housing agents tend to lower the housing price by mark up the risk premium to attract the buyers. Next explanation is high inflation rate may draw an economic downturn sign that will eventually lower the house price due to buyers do not dare to invest (Brunnermeier& Julliard, 2007).

However, some researchers mentioned that inflation has no relationship with the housing price. According to Tan (2011), it stated that the finding results mean that inflation rate brought a lagged effect towards house price. The output is derives from multiple regression analysis, named hedonic pricing model, to compare the variations of the economic variables. Moreover, Ong (2013) analyzed the macroeconomic factors of houses in Malaysia during a certain periods and the outcome was found that inflation rate is not significantly determining the house price.

In a conclusion, inflation rate may have negative or positive affect and significant or insignificant toward house price. Even though there are still a lot of discovered and undiscovered factors, one thing that is undeniable is inflation rate is one of the main factors for housing price movement.

2.1.2 The relationship between population and house price index

Datuk Seri Michael Yam, the Real Estate and Housing Developers' Association (Rehda) president mentioned that Malaysia residential market was facing shortage problem since year 2009 (The Sun Daily, 2013). Datuk Seri NajibRazak, Prime Minister of Malaysia announced to build 123, 000 units of 123,000 units inexpensive and affordable houses around the country in order to reduce the housing shortage problem in Malaysia.

Increasing in household number is higher than the rise in population due to there is greater growth on single occupancy households. However, an increase in population

will put even more pressure on housing price (Pettinger, 2013). Hence, willingness to build is slower than rising in demand of households. This shortage causes an increase in long-term house prices and reducing affordable homes. In a situation where Malaysia population keeps on to grow will increase the housing price. There will involve a big housing policy adjustment and could necessitate more new housing areas to keep up with the shortfall.

Besides, when increase in the population the increase in housing demand drive the housing price upward. It is a positive relationship. There are few circumstances to determine the relationship between population and price of houses. Firstly, when demand greater than housing supply, housing price will increase in order to reduce demand of house. Secondly, when there is less supply within housing market, people will spend extra money in purchasing house which in turn causing house price to rise (Ong, 2013). Thirdly, if housing supply fails to come across the growing in the households number, the cost of living will rise. Hence, housing prices will follow to increase which caused the renting cost to continue rising as well (Pettinger, 2013).

As of 1 January 2015, the population clock published on the Malaysia Statistics Department website, the population of Malaysia was forecasted to be 30 644 293 people and expected grow rate is 2.5 percent per annum. Malaysia has around 65% citizens are below age 35 and it might be create a strong demand in housing market. Based on research, these people who willing to have their own sweet home with pricing around RM 200,000 to RM 300,000, and less than 5 percent peoples who are not affordable or unwilling to have their own home. There is only 25 percent or less people is willing to purchase a home which cost them around RM 500,000 and above. Other than that, if the pricing was set as RM100, 000 up and down, there will be a strong demand for a new housing or home. But in this category, it will lead to unbalance of housing market and high shortage of housing in the market.

On the other hand, the relationship between population and housing is obvious as people live in households and households absolutely need housing (Mulder, 2006). However, there have two sided of the relationship between population and housing. First, changes in population lead to changes in demand for houses. Besides,

population growth which means growth in the household's number causes an increase housing demand (United Nations, 2009). More People exist in households and require more housing.

Nowadays, there are continuing rises of population in Malaysia. However, many laws, rules and regulations are implemented related to the houses and consequently causes productivity of housing is slow (Paz, 2003). In addition the consumers will be taken advantage by the developer since they realize that household desire to own a house as their mainly shelter. Undoubtedly the cost of the construction and the land price are high, besides increase in population cause the developer to take advantages on consumer. Another factor of housing price is the area of house that being develops. It would reflect that the behavior of house prices in Malaysia also being follow by a broad fluctuation in aggregate house price (Hui, 2010).

In contrast, Chen, Gibb, Leishman and Wright (2012) suggest that population ageing puts downward pressure on house prices because the correlation between house prices changes and the average on age of the population changes is negative.

In a nutshell, there will be more individual who want to own a house with the growing numbers of population which contributed to the growing in cities. When the city grows, more houses are demanded. Thus, the developers tend to develop more houses in order to satisfy the needs of household. Conclusively, housing price rose due to the high demand for houses. Therefore, population with the house price is apparently has a positive relationship.

2.1.3 The relationship between lending interest rates and house price index

China housing price are largely affected by the macroeconomic factors, but real interest rates are statistically significant and small negative impact on housing price (Li & Chand, 2013). Although there is a rapid growth in housing price in New Zealand during period 2001 - 2007 which are the real interest rates were positively relationship with the real house price growth, but is expected negative relationships (Shi, Jou & Tripe, 2014). According to Shi et al. (2014), they found that there is still a question on how effective and how strong the interest rates to effect are the rising of housing price. This is because they only found that 20% of the increasing housing price could only explain by the decreases in interest rates.

On the other hand, Agnello and Schukneht (2011), they used real housing prices data annually that contributed by the bank of international settlement (BIS) to do their analysis, using years 1970 to 2007 for the 18 industrialized countries. A simple statistical approach was used and explains boosts in real housing prices as major. Their findings on the variables (interest rate, money and credit supply) has the opposite impact on the chances of occurring of housing burst, therefore they can conclude that if there is a decrease in interest rates, there will be a higher chance that the housing price will boom. Besides, Agnello and Schukneht (2011) also conclude that among the determinants of housing price, domestic liquidity and short- term interest rates have strong effects on the chances of housing booms and bursts will occur.

Adams and Fuss (2010) claims long term interest rates are one of the macroeconomic effects towards the housing market. They found that if there is a rise in the long term interest rates, will influence the demand to own a house. This means that a higher long term interest rates, it will increase the return of other fixed-income assets which relative to return of real estate, therefore it will shift the demand from real estate into other assets (Adam & Fuss, 2010). In other words, higher long term interest rates caused other fixes -income assets becomes

attractively, reducing the demand on this investment will cause the housing price to reduce in the long run. In their research, the demand and housing price eventually decrease due to a greater long term interest rate that reflected in higher mortgage rates.

Other than that, according to Fitwi, Hein and Mercer (2015), they found out that the Federal Reserve policymakers are partially responsible for the housing price increase due to maintaining a low interest rate for too long. They claim that housing demand will affect the housing price. Fitwi et al. (2015) stated if there is decrease in short term interest rates, the cost of housing purchases will also decrease which will drive the demand for housing to increase and it cause the increasing of the housing price. Due to the short term interest rates will affect the interest rates in long term. According to Wadud, Bashar and Ahmed (2012), when the short- term interest rate increases, long term interest rates will also tends to increase which is affected by future expected. It also causes the average mortgage rate higher and leads to more user cost of capital on housing.

Korea has experienced a large increase in housing price due to the interest rate decreases since 1998. According to Kim and Min (2011), this phenomena is caused by the rapid increase in lease prices and driven the interest rate to increase. During 1997 – 1998, the housing price in Korea declined due to the interest rate increases the caused by financial crisis. Besides, Kim and Min (2011) claims that the drop in interest rates during the financial crisis led to excess liquidity, which increased the housing price. In their research, they stated that if there is high interest rate, it will encourage household to save more and this will increase the trend of “buying a house by saving”. On the other hand, Kim and Min (2011) also stated that the favorable monetary policy will also encourage household borrowing due to the lower interest rates and tend to increase “owning a house by borrowing”. Usually, owning a house by borrowing will cause the housing price increase significantly.

According to Wadud, Bashar and Ahmed (2012), the increasing housing price during year 2002 – 2008 periods had made the housing affordability problem worsen in Australia. Wadud et al. (2012) claims that if there is an increase in interest rates, mortgage repayments will eventually been reduce the credit constrained

household's cash flow which will in turn reducing the housing demand and price, vice versa. Tan (2010) found if there is a falling interest rates, it will lead many homeowners refinance their mortgages and leaving additional spending money to purchase another house. Besides, higher interest and inflation rates will have positive and adverse effects on the housing price (Wadud et al., 2012). In other words, if there is increase in interest rates, householders will postpone moving to a new house which is they will generate negative relationship between interest rates and housing transactions (Tan, 2010). Throughout Tan (2010) findings, household will have incentive to buy house by borrowing money in the periods of low interest rates. The main contributor to the United Kingdom and United States of America in rising house price will be the historically low interest rates in the late 1990s and early 2000s.

Zhang, Hua, and Zhao (2012), they mentioned that liquidity and interest rates were the most significant variables in driving the housing price high in United States housing market. According to Zhang et al. (2012) theproved and descriptions for the boom in Chinese house market is the monetary policy push. In their empirical results shows that the lower interest rates will cause a rapidgrowth in money supply and relaxing requirement of mortgage down payment that will increase the housing price, vice versa. In Finland, Germany, Norway and United Kingdom, the housing price response to interest rate is larger and more persistent in periods by liberalized financial markets.

Tse, Rodgers, and Niklewski (2014), they applies a dynamic conditional correlation based on methodology to examine the impact of the 2007 financial crisis on the impact of real mortgage interest rates towards the real house prices. The findings suggested the monetary policy's interest rate held a vital role in the housing market. Therefore, the relationships between the mortgage interest rates and house price should not be neglected because their relationship is remains significant. To support this statement, Wang and Zhang (2014) stated that interest rate is also the important determinants that will influence housing price.

2.1.4 The relationship between Gross Domestic Product (GDP) and house price index

Gross Domestic Products (GDP) can be defined as the produced final goods and services' market value in a country within a given period (Abbas, Akbar, Nasir, Ullah & Naseem, 2011). According to Abbas and the other researchers (2011), stated that GDP consists of all goods and services that are produce to fulfill consumer demand, at the same time it could improve the economic revenue through several sections such as personal consumption expenditures (C), investment (I), net exports (NX) and government securities(G).

$$GDP = C + G + I + NX$$

GDP is the most broadly measure of economic performance. Based on Wheeler and Chowdhury (1993) mentioned that GDP is a famous indictor due to there has existing relationship between the macroeconomic variable and housing price. There have various inputs in a country GDP which are inflation rate, unemployment, import and export, foreign direct investment and others. For instance, electronic equipment, petroleum and wood products are the major export in Malaysia whereas the major import was steel products, vehicles and iron machinery from foreign countries (Property Frontier, 2010).

Recently, house prices continuously rising plus the correlation between the economic variable with housing price fluctuation that bring more than 50 percent large impact to the house market (Chen, 2004). According Paz (2013) said the house price will be influenced when Gross Domestic Product GDP level occurs. In addition, the housing demand is having close relation with income. Because of greater GDP in a country lead to higher economic growth and consequently income level will increase also, people has the ability on spending more to buy a house therefore demand of the house will raise and follow by the housing price will increase as well. Indeed, demand for housing is considered as income elastic, the more incomes people earns cause a large proportion of income spending on housing

(Pettinger, 2013). At last, Gross Domestic Product has a significant positive relationship with the housing price.

Regarding to Coulson and Kim (2000), consumption contributes a large portion to GDP, so it is reasonable to determine that housing prices will have a leading relationship to GDP. At the same time, residential price affected GDP in an economy (Hui and Yiu 2003). From the other research prepare by Chau and Lam (2001) stated that they speculated the property prices in Hong Kong shows that nominal GDP is a leading indicator of housing price. There has a direct effect from housing prices found in consumption, housing prices, and collateral constraints by using the Euler equation for consumption (Iacoviello, 2003).

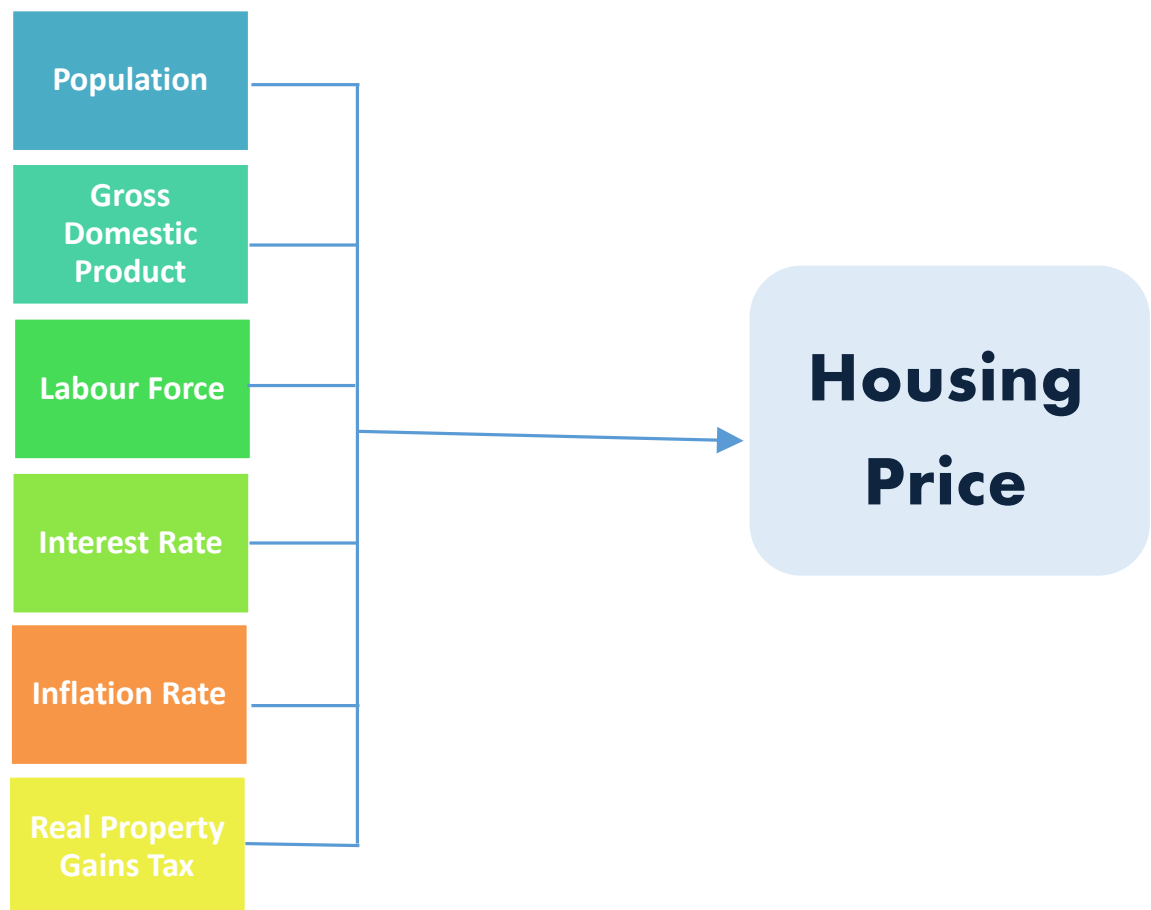
In the literature, the strong relationship between GDP and the housing market has been determined. Iacoviello and Neri (2008) identify the response of GDP to housing market movements and Mikhed and Zemcik (2009) explained that in USA a decline in home prices affected by the negatively the consumption and GDP. Besides, et al (2010) concluded that the Gross Domestic Product growth has impacted the housing market. Many studies (Davis and Heathcote, 2003; Goodhart and Hofmann, 2008; Madsen, 2012) agreed that a strong positive short-term relationship exist between housing market and GDP. While Madsen (2012) indicates that in the long term this nexus becomes weak. Merikas et al (2010) found a directional causality with a strong positive impact of housing investment on the GDP. As a result, GDP of a country is an important indicator to identify the movement of house price.

2.2 Review of Relevant Theoretical Models

Figure 2.2 shows the relationship between the six selected variables with house price index in Malaysia.

Independent Variables:

Dependent Variable:



Adopted from: 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.

It cannot be denied that population growth have impact on the global housing price. Within this urbanization world, the population in countries is kept rising which indicated that more houses are needed by people to live. A rising population has put pressure on the housing; it has worse the existing problem of long standing housing crisis and shortage of supply hence reducing the housing affordability. Numerous

regulations, laws, and policy relating to the house building brought the issue of slow housing production (Ong, 2013).

Gross domestic product (GDP) is refer total value of a country's finished goods and products, has been considered as a vital indicator as it has significant relationship with the housing price. GDP included few elements such as expenditure and investment, which will affect the economy significantly. As illustration when consumption on house increases, this will increase the house price as well. According to Ong (2013), the amount of terraced, semi-detached houses is fluctuated along with the Gross domestic product. The number of terrace houses built is found to be increased when the GDP is growing. On the other hand, the researcher proved that the increase in house price and housing demand also contributed in the growing of GDP.

Ong (2013) had did research on how the labour force supplied will affect the housing price. The researcher examined that the cost of housing will rise if a larger number labour force involved in the house construction. Other than that, there is a fact stated that when the house construction involved many high level educated professional workers, will lead to increase in the cost of building. Ended up, the burden of high cost will be bear by the consumers as the constructor will charged higher price on them. Therefore, researcher claimed that the house building activity is motivated by high growth inemployment. By the way, there is also argument against regarding the relationship between labour forced and housing price.

Based on Ong (2013), it stated that interest rate has no significant impact on the housing price. One of the reasons behind is that the demand and supply are not balanced during healthy economy. This is a situation where the investors are too confident and optimistic about the housing market. According to Ong (2013), the speculators may not want to hold houses for the long period and sell it in short period while the buyers will pay extra to satisfy the desired type of house. For homeowners, they are focusing on changing interest rates because it will influence the real estate price which will also influence the availability of capital and the demand of investment. These capital flows will directly affect the demand supply

for house that will influence the property price. Therefore, Ong (2013) concluded that there is strong proved that the price of the houses will rise.

In economics, inflation means general level of price of the goods and services is raising, which drive the purchasing power of currency falling. According to Ong (2013), during the inflation period, it is also to be told that the cost of raw materials for building a house will also be increased. On the other hand, Ong (2013) mentioned that there are only Gross Domestic Product, population and RPGT were revealed to have significant positive relationship with housing price.

Based on Ong (2013), the reposition of the real property gain tax by the government in year 2010 is negative impact and show significant relationship with the housing price which the findings are deny in the previous study. This real property gain tax refers to that payment of 5% tax will be subjected with any given arising from property disposal within five years. According to Ong (2013), the RPGT reposition has no influence in Malaysia housing price due to the 5% RPGT imposed is too less for high-income citizens or speculators whereas that are willing to pay when they realize the earning from increase in house price to be sufficient to offset the RPGT and still contribute them with an eye-catching earning.

2.3 Conclusion

In brief, this chapter has explained the relationship of the house price index and macroeconomic and financial factors based on the literature from previous researchers. Throughout the discussion above, those studies have stated the strong correlation among dependent variable (HPI) and independent variables namely the Lending Interest Rate (LEN), Population (POP), Gross Domestic Product (GDP), and Inflation Rate (CPI) do exist. This chapter also reviewed the theoretical framework between house price index and its determinants. For the next chapter, this study will discuss the methodology and technique used for the estimation of the relationship of HPI and other variables in Malaysia.

CHAPTER 3: METHODOLOGY

3.0 Introduction

In chapter 3, this study discusses on the research methodologies. This study primarily tends to investigate the relationship between the housing price in the Malaysia and its macroeconomic variables, namely GDP, CPI, LEN and POP. It is very important to have a well-designed research methodology that includes macroeconomic variables in order to help determine how accurate the results of a research method are.

Basically, this study was to identify the determinants of residential housing price with four independent variables includes gross domestic product, consumer price index, interest rate, and population volume. The frequency of the data in this study is quarterly data for 16 years from 1998Q1 to 2014Q3, a total of 64 observations. This study applied time series econometric models for interpreting, analyzing and testing hypothesis concerning with the data used in this research.

3.1 Research Design

As this study is to identify the relationship between the fluctuations of housing price in the Malaysia and its macroeconomic variables, the literature review places emphasis on the dependent variable (Housing Price) and independent variables (GDP, CPI, LEN, and POP). The empirical model of this study can be specified as below:

$$\ln HPI_t = \beta_0 + \beta_1 \ln GDP_t + \beta_2 \ln CPI_t + \beta_3 LEN_t + \beta_4 POP_t + u_t$$

Where,

HPI = House price index in Malaysia (index, 2000=100)

GDP = Gross domestic product by expenditure in Malaysia (millions Malaysia Ringgit)

CPI = Consumer price index in Malaysia (index, 2010=100)

LEN = Interest Rate (percentage)

POP = Population (thousands of citizen)

3.2 Variables Specifications of Measurements

3.2.1 House Price Index

In reality, housing price is the main concern by the citizens in the country. Besides, it shows the overall condition of economy in a country. Thus, to study the determination of housing price, HPI is used as a proxy to measure the price of housing in the country. According to researcher Tse, Ho and Gansesan (1999), they stated that unstable housing price has significant influence towards the economic state regarding GDP and demographic changes. Recently, demand of housing is increasing over the years. Therefore, the housing price is expected to increase when the housing market have more home buyers than sellers there and it will causes imbalance between home buyers and sellers.

In Malaysia, HPI is a broad measure of fluctuation of single-family house price and it is measuring the weighted average price change in repeat sales (Department of Statistics of Malaysia, 2015). According to McQuinn and O'Reilly (2005), they conducted the study about theoretical of model in house price determination by using HPI as their proxy. In addition, past researcher took HPI to capture the relationship between macroeconomic activity and housing prices (Hott, 2009). The researchers came out with similar conclusion, they claimed that independent variables such as GDP, exchange rates, employment rate, personal income and inflation have positive and significant relationship against HPI, however, interest rate shows negative relationship towards HPI. In this study, GDP, population and inflation are expected to have positive relationship with HPI and base lending rate to have negative relationship against HPI.

3.2.2 Consumer Price Index

Normally, inflation rate is measured by CPI (Consumer Price Index). CPI can be defined as the measurement of price of change of services and goods that household consumed in index form. However, CPI only refers to the average measurement of goods because not all of them are changed at the same velocity. It is closely linked to real purchasing power. This is because real purchasing power links the strength of a currency with the price of services and goods. As we know, an increase in CPI will decrease the intensity of consumers' real purchasing power. Department of Statistics Malaysia had applied the internationally accepted statistical methodologies for computation of inflation rate from the International Monetary Fund. The formula of CPI for multiple items provided below:

$$CPI = \sum_{i=1}^n CPI_i * weight_i$$

The expected sign of inflation rate in this research is positive sign

3.3.3 Gross Domestic Product (GDP)

Gross domestic product (GDP) was described as the market value of the entire authoritatively recognized final goods and services which were supplied by a nation in a specified period. In other hand, GDP per expenditure is commonly measured as an indicator of a country's standard of living and a country's GDP will reflect their economic condition. According to Pour et al. (2013), he claimed that economic performance of a country plays an important role to affect the housing market.

When a country is an export dominant country such as Malaysia, the depreciation of a country's currency might be a good news for the country because when then currency of the country becomes weaker as compared with other countries such as United State. Foreign currencies that were not affected by depreciation of its value will be attracted by cheaper price of goods in Malaysia. Thus, the exporting country will get higher amount of Balance of Payment (BOP) than previous year

due to the increased number of exports to other countries. In a nutshell, positive balance of payment will stimulate the country's economic condition since exports is more than imports, which is highly influence the GDP of a country. Based on the result from Adam and Fuss (2010), he found that GDP per expenditure is negative and has significant influence toward residential housing price in their country. Thus, in this study, GDP per expenditure is used as the proxy for GDP and the expected sign for GDP per expenditure would be negatively toward housing price.

3.2.4 Lending Interest Rate

In this study, base lending rate (BLR) in Malaysia is used as the proxy for interest rate. In Malaysia, BLR is the lowest interest rate that is computed by financial institutions in terms of a designated formula. The institutions cost of funds and other administrative costs will be counted in the fixed formula in order to construct BLR. However, throughout Monetary Policy Meeting, the BLR is practically determined by Bank Negara Malaysia (BNM). In such cases, after monetary policy was adjusted, the availability of credit of banks is increased; those banks are able to offer lower bank lending rates, as a result of encouraging more people to participate in current and future housing market (Ong, 2013; Zainuddin, 2010). Therefore, any variation toward BLR will significantly influence the pricing of both existing and latest floating interest rate home borrowings. As well, this study will forecast if there is a negative significant relationship between interest rate and housing prices.

The formula to compute the BLR would be revised as follows:

$$\frac{\textit{Intervention rate} \times 0.8 + 2.25\%}{1 - \textit{Statutory Reserve Requirement}}$$

3.2.5 Population

The proxy used in this study is that the number of people living in Malaysia expressed in thousands. Cvijanovic (2012) found that population growth drives house price appreciation. The world is becoming much more populated compare to before and it would create more demands for assets. Hence, the expected sign of population in this research is positive sign. We can forecast the average population growth by apply the following formula and solve for r.

$$P_t = P_0 \times e^{rt}$$

P_t is the population # at the last year for which there is data

P_0 is the population # at the first year for which there is data

e is the natural logarithmic constant

r is the unknown annual rate of growth

t is the number of years between P_t and P_0

3.3 Methodology

3.3.1 Unit Root Tests

Throughout this study, unit root test is conducted to analyze whether the series in the group (or it is first or second difference) are stationary. The purpose of this test is to prevent the any biased and invalid results.

Three probable cases as below,

1st - $|\phi| < 1$ and therefore the series are stationary.

2nd - $|\phi| > 1$ where in this case the series explodes.

3rd - $|\phi| = 1$ where in this case the series contains a unit root and is non- stationary.

At level,

$$Y_t = \phi Y_{t-1} + u_t$$

At 1st difference, having $\phi = 1$ and subtracting Y_{t-1} from both side equation,

$$y_t - y_{t-1} = y_t - y_{t-1} + e_t$$

$$\Delta y_t = e_t$$

Since e_t is a white noise error term, hence Δy_t is a stationary series. After differencing y_t can obtain stationary.

Hypotheses:

H₀: There is a unit root (Non-stationary)

H₁: There is no unit root (Stationary)

Decision rule: Reject null hypothesis if the result in P-value is less than the significant level, otherwise, do not reject null hypothesis.

In general, Unit root test is applied to determine whether there are stationary or non-stationary trend of time series data for all variables. Also, an order of each of the variables integration is used to examine in this test. Gujarati and Porter (2009) mentioned that the mean, variance, covariance of series are persistent across different periods are known as stationary trend. On the other hand, non-stationary trend will show vary or non-constant mean, variance and covariance across different periods. The results will show spurious and invalid problem if non-stationary model occur in the research. It will cause the normal assumptions of the analysis become not precise and inaccurate as well as spurious regression. In such situation, researchers should determine whether a time series is stationary or non-stationary by using unit root test (Hill, Griffiths & Lim, 2007).

In addition, most of the macroeconomic variables are non-stationary and seemed to be varied over time (Asteriou& Hall, 2007). Based on Ray (2012), in order to prevent such econometric problems and invalid results, unit root test must be carried out to make sure there is stationary model and robustness of results. In this study, both Augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) test which are under the category of unit root test will be conducted to test whether there is stationary or non-stationary in time series data.

Augmented Dickey-Fuller test (ADF)

Based on a statistics and econometrics, Augmented Dickey–Fuller test (ADF) is a test for a unit root in a larger and more complicated set of time series models.

Three probable modulus of ADF:

$$\Delta y_t = \gamma y_{t-1} + \sum_{i=0}^n \beta_i \Delta y_{t-1} + ut$$

$$\Delta y_t = \alpha_0 + \gamma y_{t-1} + \sum_{i=0}^n \beta_i \Delta y_{t-1} + ut$$

$$\Delta y_t = \alpha_0 + \gamma y_{t-1} + \alpha_2 t + \sum_{i=0}^n \beta_i \Delta y_{t-1} + ut$$

Hypotheses:

H₀: There is a unit root (Non-stationary)

H₁: There is no unit root (Stationary)

In statically, Augmented Dickey-Fuller test (ADF) is a parametric test used in time series data for unit root. It can refer to an augmented version of simple Dickey-Fuller test for complicated and larger set of time series models (Dickey & Fuller, 1979). Regarding to Asteriou and Hall (2007), ADF assumes normal distribution and includes extra lagged terms of the dependent variable to remove autocorrelation effect. The lag length on the extra terms can be determined by Akaike Information Criterion (AIC) or Schwartz Bayesian Criterion (SBC). In this study, SBC also called Schwarz Information Criterion (SIC) will bring into the lag length selection in this test due to it is most common and suitable lag length selection in ADF test (Asghar&Abid, 2007; Cheung & Lai, 1997).

There are two types of model in the ADF test which the first is the model with constant and without trend and second is the model with constant and with trend. According to the rule of thumb, it states that there will always be a negative numerated value of Augmented Dickey–Fuller (ADF) statistic in the test. The smaller the negative values, the more likely the null hypothesis being rejected and hence it can be concluded that there is no exist of unit root in this study’s estimated model (Asteriou& Hall, 2007; Hill, Griffiths & Lim, 2007).

Phillips-Perron test (PP)

PP test is roughly similar with the ADF test, but it integrates an automatic correction to the DF technique to allow for auto correlated residuals. Thus, PP test can be useful test for a unit root in time series models, as well as strengthen the evidence of stationarity of the series in this study.

Test regression for PP as below,

$$\Delta y_{t-1} = \alpha_0 + \gamma y_{t-1} + u_t$$

Hypotheses:

H0: There is a unit root (Non-stationary)

H1: There is no unit root (Stationary)

Phillips-Perron test (PP) is non-parametric test carry out in time series data for test unit root, but it also similar to Augmented Dickey-Fuller test (ADF). Whereas, the PP does not take into account of lagged difference terms as ADF, but it makes a correction to the t statistic of the coefficient to control serial correlation. The PP statistics are modifications of the ADF's t statistics that take into account the less restrictive nature of error process, as well as investigate any serial correlation and heteroscedasticity error (Gujarati & Porter, 2009). The PP is carried out with the inclusion of a constant and linear trend, or neither in the test regression model (Asteriou & Hall, 2007). Besides, this study will follow the most researchers that tend to choose (Newey-West automatic) using Bartlett kernel in Phillips- Perron test (Çağlayan & Saçıldo, 2010; Cheung & Lai, 1997; Dritsaki, C., & Dritsaki, M., 2010).

3.4.2 Johansen & Juselius Cointegration Test

First of all, Johansen Cointegration test is very sensitive towards the lag length. One of the most difficult cases is to determine the lag length. Therefore an optimal lag length must be chosen. There is different type of information criteria were measured for different time lags such as Likelihood Ratio (LR), Akaike Information Criteria (AIC), Schwarz Information Criteria (SC), and Hannan-Quinn information criteria (HQ) (Gutiérrez, 2007). The number of lags required in the Cointegration test is set to follow the appropriate lag from criteria.

In this study, SIC is used to find the lag length because it found to be the suitable for large samples and criteria is useful for selecting true lag length in presence of shocks to the system.

According to Asghar and Abid (2007), possible results are as follows in order to identify the probability of correct estimation for each of these criteria:

- 1) If this probability equal to 1 then it is an excellent criteria because the criterion picks up the true lag length in all the cases
- 2) If the probability is close to 1 or greater than 0.5 then it is good criteria because the criterion manages to pick up the true lag length in most of the cases

- 3) If the probability is close to zero or less than 0.5 then it is not a good criteria because the criterion fails to select the true lag length in most of the cases.
- 4) If this probability is zero it is poor criteria because the criterion fails to pick up the true lag length in all the cases.

After the optimum lag length is determined, following by cointegration test. The idea of cointegration refers to the stochastic drift of error terms when more than one individual time series are integrated. Cointegration test is commonly used to test whether there is statistically significant between independent variables and dependent variable. In order to examine the significant or equilibrium model, it is important to carry out the cointegration test in regression model. If variables do not cointegrated, it will lead to the problem of spurious regression.

Typically, there is involved of three methods in the cointegration tests which is Engle-Granger two-step method, Johansen test and Philips-Quliar is cointegration test. In this research, Johansen test was suggested due to its multivariate tests natural, for example consist of two or more variable quantities in our sample size (Alexander, 1999). The reason Engle-Granger two-step method do not indicated in this research is because this method is more preferable on single equation model (bivariate). Furthermore, Lee et al. (2005) had stated that x_t and y_t must be in nature random walk in order to carry out Johansen test to avoid spurious regression problem. Also, cointegration has strong relationship to vector error correction model (Asteriou & Hall, 2007).

H_0 = There is no cointegrating vector ($r=0$)

H_1 = There is cointegrating vector ($r>0$)

When test statistic value is less than critical value, null hypothesis will be rejected. If there is a case of do not reject the null hypothesis, the cointegrating vector can be analyzed until the last value of the number. Next, once the cointegration test estimate is being determined, the model can proceed to the Vector Error Correction model (VECM) or Vector Autoregressive Model (VAR). If the results found any cointegrating vector, Vector Error Correction Model (VECM) is applied to analyze the long-run relationship between residential housing price and independent variables. In contrast,

Vector Autoregressive Model (VAR) is performed to analyze the short run relationship if there is no cointegrating vector in cointegration test.

3.4.3 Vector Error Correction Model

Based on Johansen (1991), it stated that Vector Error Correction Model (VECM) is applied on response variable as estimation in returns to equilibrium once there is a change in an estimate variable by using multiple time series model. In another word, the purpose of Vector Error Correction Model is to determine whether response variables and explanatory variables have long run relationship or short run relationship after co-integration happened in between (Asari, Baharuddin, Jusoh, Mohamad, & Jusoff, 2011). The inclusion of long-run equilibrium ($[Y_{t-1} - \alpha - \beta X_{t-1}]$) and short-run which represented by difference term have provided VECM the ability to examine the long run and short run relationship.

In general, a few advantages is determined when carry out the VECM test. First, when all the error terms in VECM model are found stationary, standard OLS estimation will be valid. Next, it is a useful and appropriate method when come to determine the correction term from non-equilibrium comparing to others. If exist cointegrated in the model, VECM have to ability to solve the spurious regression problem by formulate in first difference. Last but not least, Asteriou and Hall (2007) mentioned that disequilibrium error terms in VECM are known as stationary variable. It naturally to prevent errors become complex in long-run relationship. Other than that, it provides a clearer context on long term estimating and any non-stationary series by using the test. Theoretical equation provided as below:

$$\Delta y_t = a_0 + b_1 \Delta x_t - \pi \hat{u}_{t-1} + y_t$$

B1= impact multiplier (measures immediate impact when a change in x will cause a change in y)

Π= feedback effect (show how much of disequilibrium being corrected)

Based on this study, there is a determination in the effect of independent variables on house price in long run relationship. Thus, Vector Error Correction Model was performed to analyze the important of explanatory variables which are interest rate, GDP, population and inflation rate on response variable which is residential house price. As per Mahalik and Mallick (2011) past account, they applied Vector Error Correction Model by using quarterly data of independent variables and house price shown co-integrated and significant result in long run relationship.

3.4.4 Granger causality test

Granger causality test naturally is run to test for the dynamic movement of causality relationship between all stationary variables in this study.

Below is the estimation of the following VAR model,

$$\Delta y_t = \alpha_1 + \sum_{i=1}^n \beta_1 \Delta x_{t-i} + \sum_{i=1}^n \beta_2 \Delta y_{t-1} + \varepsilon_{1t}$$

$$\Delta x_t = \alpha_2 + \sum_{i=1}^n \beta_3 \Delta x_{t-i} + \sum_{i=1}^n \beta_4 \Delta y_{t-1} + \varepsilon_{2t}$$

Four probable results as below:

a) y_t causes x_t

-the lagged y terms in eq2 may be statistically vary from zero as a group, and the lagged x terms in eq1 not statistically vary from zero.

b) x_t causes y_t

-the lagged x terms in eq1 may be statistically vary from zero as a group, and the lagged y terms in eq2 not statistically vary from zero.

c) There is a bi-directional feedback (causality among the variables)

-both sets of x and y terms are statistically vary from zero in eq1 and eq2.

d) The 2 variables are independent

-both sets of x and y terms are not statistically vary from zero in eq1 and eq2.

Hypotheses:

H₀: X does not Granger cause on Y

H₁: X does Granger cause on Y

And

H₀: Y does not Granger cause on X

H₁: Y does Granger cause on X

Decision rule: null hypothesis will be rejected if Chi-square test is greater than critical value at 1%, 5% or 10% level of significance.

Granger (1969) had proposed Granger Causality Test to execute in 1969 in order to test for the causality relationship between two time series. A brief explanation by Harasheh and Abu-Libdeh (2011) is the test applied to determine the causality relationship between variables in time series as well as to identify whether one variable can be applied in estimating another variable.

In this study, Granger Causality Test is conducted to achieve the objective of study which is to examine whether there is causality relationship between our variables. Granger Causality Test is one of the common tests applied by past researchers to determine causality relationship between house price and its determinants (Chen & Patel, 1998; Chui & Chau, 2005; Lee, 2009; Leo, Liu & Picken, 2007; Mahalik & Mallick, 2011).

In a nutshell, VEC Granger Causality / Block Exogeneity Wald Tests will be carried out in this study to analyze whether the presence of causality relationship between all variables. Besides, this test is competent to indicate the direction of causality between all variables, as well as detects whether the variables are having unidirectional causality, bi-directional causality or independent (Asteriou & Hall, 2007).

3.4.5 Variance Decomposition

Variance decomposition also known as forecast error variance decomposition is used to examine the response of dependent variables that explained by the shock that caused by its 'own' shock and also shocks that transmitted from other variables in the model either in short run or in long run dynamics between the variable in the system (Brooks, 2008). Besides that, variance decomposition is also used to measure the amount of shocks of macroeconomic and financial variables towards the fluctuation of HPI in the form of a proportion of movement accordingly by percentages. By this way, the researchers are able to figure out how's the macroeconomic and financial variable individually shocked each other in the vector autoregressive (VAR) model.

The benefit of variance decomposition can show the movement of dependents variables due to their own shocks and also shocks from other variables at the meantime. In general, variance decomposition and impulse response give almost similar statistic (Brooks, 2008). According to Runkle (1987), he argue that for both variance decomposition and impulse response are extremely hard to differentiate exactly between each other and the confidence bands around variance decomposition and impulse response should be created in all the time. Thus, this paper applied variance decomposition with following hypotheses.

Hypotheses:

H₀: LNCPI/ LNGDP/ POP/ BLR do not have an impact on LNHPI

H₁: LNCPI/ LNGDP/ POP/ BLR have an impact on LNHPI

Note:

LNHPI= Natural Log of Housing Price Index

LNCPI = Natural Log of Consumer Price index

LNGDP = Natural Log of Gross Domestic Product

POP = Population

BLR = Base Lending Rate

3.4.6 Impulse Response Function

The impulse response function is used to identify the responsiveness of the dependent variables in VAR system towards macroeconomic shocks (Brooks, 2008). Furthermore, the impulse response function is said to be reliable only when the time series data become stationary after passing through second difference. It acts as an economic function which has been used to identify the impact caused to all variable in VAR model when the variable faces some impulses (Elder, 2003). In Addition, the impulse response function can detect the impact of any variable towards the all other variables in the system (Lin, 2006).

Moreover, the ordering for variables is very important to identify the impulse response function, because it may affect outcome from the test even though same data set has been used. The different between standard impulse response function and generalized impulse response function is that standard impulse response is sensitive to the ordering of variables, however the later does not. Besides that, generalized impulse response function does not assume that when one variable is shocked, all other variables are switched off. According to Masih and Masih (2001), he said that generalized impulse response function does not require or thogonalization in the VAR system. So, in order to avoid this problem, this paper will apply the generalized impulse response analysis which recommended by Pesaran and Shin (1997) and Borok et al. (2005).

Next, the use of generalized impulse response function describes the reaction of the endogenous variable which in this case refers to the macroeconomic variables through the time when there is a shock. Hence, each changes of the macroeconomic variable can be detected separately according to period with the existence of shock that occur in a specific period. However, the level of affecting housing prices by this shock may or may not affect the macroeconomic variables. The previous researcher Engsted, Hviid and Pedersen (2015) used the impulse response function to investigate the housing market volatility in OECD countries.

3.5 Conclusion

In a conclusion, this chapter discusses about the data sources and methodology has been used to test for the result. This study has clearly described the proxy used for each of the variables. The research collection method included in this study has also been clearly determined and explained in this chapter. All of the data are collected from DataStream. The Eviews 9 software is carried out in this study to conduct the data analysis. The next following chapter will be further explored about the empirical result and output of each methodology.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In Chapter 4, this paper will focus on examining, interpreting and reporting the empirical result from previous methodology. Chapter 4.1 presents the Unit Root Test by using Augmented Dickey Fuller (ADF) test and Philips Perron (PP) test. From chapter 4.2 to chapter 4.5 will discuss the empirical results based on Johansen & Juselius Cointegration test, Vector Error Correction Model, Variance Autoregression model, Granger Causality test, Variance Decomposition and Impulse Response. We have attached through detail of explanation after each of the empirical test's results. While brief conclusion of the test results is concluded in final section.

4.1 Unit Root Test

The table 4.1 shows the result generated from Augmented Dickey Fuller (ADF) and Philips Perron (PP) unit root test. The table below shows that all of the variables (housing price index - LNHPI, gross domestic products - LNGDP, consumer price index - LNCPI, population growth - POP, lending rate - LEN) in Augmented Dickey Fuller (ADF) unit root test conducted are unable to reject null hypothesis. Because the p-value of all the variables is more than 0.05 significant levels, which illustrates that all the variables are not stationary and contain of unit root in the level form. On the other hand, Philips Perron (PP) unit root test, the variables that are unable to reject null hypothesis were the housing price index (LNHPI), consumer price index (LNCPI), and lending rate (LEN) because the p-value is larger than 0.05 significant level. Philips Perron (PP) unit root test are able to reject the null hypothesis of the gross domestic product (GDP) and population growth (POP). This is because the p-value is less than

0.05 significant level, which means that these two variables are stationary and do not contain of unit root at level form.

Variable	Augmented Dickey Fuller (ADF)		Phillips Perron (PP)	
	Constant Without Trend	Constant With Trend	Constant Without Trend	Constant With Trend
	Level			
	t-statistic	t-statistic	t-statistic	t-statistic
LNHPI	3.602855	0.229164	3.602855	-7.128541
GDP	-0.438629	-2.939013	-0.121406	-13.95726***
LNCPI	-0.538665	-3.025443	-0.538747	-6.733446
POP	-2.007625	-2.843242	-4.697009***	-4.634935**
LEN	-2.385955	-3.202891	-2.564952	-4.733399
	First Difference			
LNHPI	-6.853155***	-8.012532***	0.196132***	-8.014846***
LNGDP	-5.146057***	-5.105924***	-5.173280***	-13.76474***
LNCPI	-6.889999***	-6.827790***	-2.504194***	-6.643683***
POP	-4.067452***	-4.132624***	-3.478581***	-6.028948***
LEN	-5.867218***	-6.012457***	-2.021678***	-4.809736***

Note: *, ** and * denotes significant at 1%, 5% and 10% significance level, respectively.**

Table 4.1: Unit Root Test

When proceed to the first difference of the Augmented Dickey Fuller (ADF) and Philips Perron (PP) unit root test, all variables are able to reject the null hypothesis. This shows that all the p-values are less than 0.05 significant levels. In conclusion, all the variables are stationary and do not contain of unit root in the first difference in Augmented Dickey Fuller (ADF) and Philips Perron (PP) unit root test.

Therefore, this study must ensure that all the variables are able to reject the null hypothesis at the level form. However, the results are only being rejected after the first difference and hence the results are unable to provide valuable long-run information. To examine the long-run equilibrium relationship, Johansen & Julselius Cointegration test had used to test in order to capture both short run and long run effects. All the variables are able to perform Johansen & Julselius Cointegration test because the criteria to perform this test had fulfill which where the variables must be stationary only at the first difference.

4.2 Johansen & Juselius Cointegration Test

VAR method was applied to determine the optimum lags. VAR is run in level model with the lag length of 6. The result lead to choosing the lag length that SIC was minimized in the VAR model. Based on the table of VAR Lag Order Selection Criteria, the lag of 2 was chosen due to the minimum result of Schwarz information criterion (SIC). In order to get the optimum lag to proceed in the Johansen and Juselius test, the lag number chosen through the VAR Lag Order Selection Criteria need to be added one additional lag. So the optimum 3 lag lengths were achieved in this case.

Johansen and Juselius Cointegration test was applied to determine whether there is a co-integrating relationship and how many of the co-integrating vector between the macroeconomic variables (Johansen & Juselius, 1990). In order to determine the number of co-integrating relations by referring to co-integrating vector, there are two statistics can refer to which is maximal eigenvalue statistic and trace statistic. According to Onay and Unal (2012), maximum eigenvalue statistic and trace statistic were used to compare with critical values under 5% significance level in order to make decision order on hypothesis.

Based on tables, result shown trace statistics and maximal eigenvalue statistic indicated same co-integrating relationship or co-integrating vector in this model which is two co-integrating vectors in this model. In addition, based on Dao and Wolters (2008), trace statistics is superior to maximum eigenvalue in term of smallest value. Moreover, Lutkepohl et al. (1991) supported that trace statistics is better than maximum eigenvalue in term of power.

Therefore, in this model two co-integrating relationship were determined between the variables after applied Johansen and Juselius cointegration test. The test was performed at 5% level of significant, and the null hypothesis of no cointegration vector between all variables was rejected.

Table 4.2.1: Johansen's Test for LNGDP

Order of cointegration	Critical value (trace)		Critical value (Max eigenvalue)	
	Trace	95%	λ	95%
Null				
(Alternative)				
Hypothesis				
$r = 0$ ($r > 0$)	11.60391*	15.49471	6.066012	14.26460
$r \leq 1$ ($r > 1$)	5.030211**	3.841466	5.030211**	3.841466

Note: ***, ** and * denotes significant at 1%, 5% and 10% significance level, respectively.

Table 4.2.2: Johansen's Test for LNCPI

Order of cointegration	Critical value (trace)		Critical value (Max eigenvalue)	
	Trace	95%	λ	95%
Null				
(Alternative)				
Hypothesis				
$r = 0$ ($r > 0$)	12.90295*	15.49471	6.019313	14.26460
$r \leq 1$ ($r > 1$)	4.190039**	3.841466	4.985081**	3.841466

Note: ***, ** and * denotes significant at 1%, 5% and 10% significance level, respectively.

Table 4.2.3: Johansen's Test for LEN

Order of cointegration	Critical value (trace)		Critical value (Max eigenvalue)	
	Trace	95%	λ	95%
Null				
(Alternative)				
Hypothesis				
$r = 0$ ($r > 0$)	14.57933*	15.49471	9.295931	14.26460
$r \leq 1$ ($r > 1$)	5.283396**	3.841466	5.283396**	3.841466

Note: ***, ** and * denotes significant at 1%, 5% and 10% significance level, respectively.

Table 4.2.4: Johansen's Test for POP

Order of cointegration Null (Alternative) Hypothesis	Critical value (trace)		Critical value (Max eigenvalue)	
	Trace	95%	λ	95%
$r = 0$ ($r > 0$)	24.62448***	15.49471	21.05732***	14.26460
$r \leq 1$ ($r > 1$)	3.567159*	3.841466	3.567159*	3.841466

Note: ***, ** and * denotes significant at 1%, 5% and 10% significance level, respectively.

4.3 Vector Error Correction Model & Granger Causality Test

The function of Vector Error Correction Model (VECM) is to determine the long run co-integrating relationship in this model (Asari, Baharuddin, Jusoh, Mohamad, & Jusoff, 2011). The VECM equation constructed below:

The value of estimator of the intercept, -6.550010 is the intercept line which shows the average level of house price index when the level of lending interest rate and population growth are zero.

For lending interest rate, the t-statistic is 4.03615, which was significant at 5% level. The coefficient result of lending rate is -0.266279, which means that while holding other variables constant, if lending rate increased by 1%, on average, housing price index will increased by 0.266279%.

For population growth rate, it t-statistic is 7.88910, which was significant at 5% level of significance. The coefficient result of population is 5.715575, which means that while holding other variables constant, population growth rate increased by 1%, on average, housing price index will increased by 5.715575%.

For consumer price index, the t-statistic is 6.83710, which was significant at 5% level. The coefficient result of consumer price index is 0.361445, which means that while holding other variables constant, if consumer price index increased by 1%, on average, housing price index will increased by 0.361445%.

For gross domestic product, the t-statistic is 5.91033, which was significant at 5% level. The coefficient result of gross domestic product is 0.452813, which means that while holding other variables constant, if gross domestic product increased by 1%, on average, housing price index will increased by 0.452813%.

Short – term granger causality test result:

H_0 = The dependent variable has no Granger cause relationship on independent variables in short run.

H_1 =The dependent variable has Granger cause relationship on independent variable in short run.

Table below illustrate the Granger Causality results for the research model. The null hypothesis refers to no causality of explanatory variables towards response variables. The null hypothesis of POP and LEN does not granger cause on LNHPI is rejected. It is because the p-value of POP and LEN are 0.0438 and 0.0212 respectively which are less than 5% significant level. Hence, there is enough evidence to conclude that uni-directional granger causality is happening from POP to LNHPI or LEN to LNHPI in the short run at 5% significant level. On the other hand, LNGDP and LNCPI are not granger cause LNHPI at 5% significant level.

Others than that, the null hypothesis of LNGDP does not granger cause on POP and LEN are rejected due to the p-value is less than 5% significant level. There is sufficient evidence to conclude that enough evidence to conclude that uni-directional granger causality is occurring from LNGDP to POP and LNGDP to LEN. Moreover, null hypothesis of POP does not granger cause on LNGDP is rejected since the p-value is less than 5% significant level. This means that the POP has short run dynamic granger cause on LNGDP. Lastly, the null hypothesis of LEN does not granger cause on LNHPI,

LNGDP, LNCPI and POP are rejected since the p-value are all less than 5% significant level. This means that all variables have short run dynamic granger cause on LEN.

In conclusion, all the dynamic causal interactions among the variables are figured out and reported. Otherwise, the rest of the variables do not have any granger cause relationship among the variables due to the null hypothesis cannot be rejected since the p-value are all less than 5% significant level.

Table 4.3: Granger Causality Test and VECM

Dependent Variable	Independent Variables					ECT_{t-1} coefficient variable (t-stat)
	Granger Causality Test lagged coefficients p-value					
	Δ LNHPI	Δ LNGDP	Δ LNCPI	Δ POP	Δ LEN	
LNHPI	-	1.415682	7.125810	8.107383**	9.705126**	0.028659** [2.20536]
LNGDP	2.110359	-	2.110359	46.44895***	9.839724**	0.012202 [0.67496]
LNCPI	1.098828	1.386247	-	0.863270	3.323729	-0.013785 [-1.55542]
POP	3.617072	95.76587***	4.461314	-	5.149091	-0.003818** [-3.79183]
LEN	10.10620**	28.38477***	10.43126**	19.59895***	-	0.387205** [3.44939]

Note: *, ** and * denotes significant at 1%, 5% and 10% significance level, respectively. The figure in the squared brackets [...] represent as p-value**

4.4 Variance Decomposition

To consider the dynamic interaction of the variables which is beyond the sample period, the Forecast Error Variance Decomposition is implied. The variance decomposition is a tool that used to define how the housing price index is affected by the shock of macroeconomic and financial variable in using percentage form. The aim of using this test is to detect how important is the LNCPI shocks, LNGDP shocks, LEN shocks, and POP shocks that accounting for observed fluctuation in LNHPI in Malaysia.

Table 4.4.1: Variance Decomposition of LNHPI in Malaysia

Percentage of Forecast Variance explained by Innovations					
Period	LNHPI	LNGDP	LNCPI	LEN	POP
1	100.0000	0.000000	0.000000	0.000000	0.000000
2	96.88062	0.150532	1.762260	1.121026	0.085560
3	95.12985	0.738039	3.006564	1.069314	0.056236
4	94.58991	0.874556	3.489590	1.005787	0.040161
5	94.43336	0.735407	3.789328	1.008339	0.033563
6	94.09928	0.656828	4.188404	1.021011	0.034477
7	93.53440	0.704653	4.745808	0.986748	0.028392
8	93.02977	0.744572	5.247952	0.953440	0.024266
9	92.68202	0.711129	5.649239	0.936196	0.021416
10	92.37096	0.677600	6.007840	0.924698	0.018904

Table 4.4.1 tabulates the variance decomposition of each variable for ten periods, and then the results were reported based on short run towards long runs. From the table, we can see that, in the first period, all the independent variables do not transmit any shocks from each of them to LNHPI. Starting from the second period, shock to LNHPI account for 96.88 percent variation of the fluctuation of LNHPI, in the other word, which is called as own shock. Next, in quarter two, the percentage of LNGDP to the variation LNHPI is 0.15 percent; shock to LNCPI can cause 1.76 percent of fluctuation in LNHPI; impulse to LEN can cause 1.12 percent of fluctuation towards LNHPI which

is considering as low impact; impulse to POP account for 0.08556 percent variation of the fluctuation in LNHPI

Table 4.4.2: Variance Decomposition of LNGDP in Malaysia

Percentage of Forecast Variance explained by Innovations					
Period	LNHPI	LNGDP	LNCPI	LEN	POP
1	5.133827	94.86617	0.000000	0.000000	0.000000
2	10.97489	82.13982	0.015396	1.970821	4.899064
3	13.13242	74.78635	5.867453	1.800289	4.413481
4	12.79489	72.39800	8.567141	1.880004	4.359968
5	11.51064	75.53277	7.501136	1.673103	3.782354
6	11.58562	76.64930	5.873169	1.967724	3.924184
7	12.56157	74.71675	7.142695	1.885049	3.693933
8	12.52507	73.53054	8.473828	1.842271	3.628289
9	12.08240	74.16407	8.503159	1.746708	3.503663
10	11.96007	75.27145	7.593809	1.830706	3.343958

From the table 4.4.2, we can see that in period 3, LNHPI, LNCPI, and LEN in explaining the variability of LNGDP has increase significantly in the long run. However, shock to LEN provides smallest percentage of impact towards LNGDP compare with remaining independent variables, which is not achieving 1.8 percent in long run. Then, Shock to LNHPI can contribute 13.13 percent fluctuation in the variance of LNGDP in period 3. Furthermore, impulse to LNCPI can cause 5.87 percent fluctuation in LNGDP in the long run.

Table 4.4.3: Variance Decomposition of LNCPI in Malaysia

Percentage of Forecast Variance explained by Innovations					
Period	LNHPI	LNGDP	LNCPI	LEN	POP
1	0.000765	8.844378	91.15486	0.000000	0.000000
2	0.000569	7.939089	91.51171	0.308966	0.239663
3	0.073214	7.930358	91.29924	0.270144	0.427042
4	0.212774	8.190666	90.79541	0.220733	0.580418
5	0.307638	8.204251	90.56655	0.189906	0.731655
6	0.339522	8.161389	90.34690	0.179372	0.972818
7	0.357667	8.261363	90.03496	0.166044	1.179964
8	0.377118	8.444253	89.62986	0.154539	1.394229
9	0.384138	8.546541	89.32346	0.147843	1.598015
10	0.378973	8.610852	89.01762	0.146313	1.846246

From table 4.4.3 above, we can explain that the influence of LNGDP to LNCPI is the most significant, which is from 8.844378 percent at the first period to 8.610852 percent in tenth period. In overall point of view, the volatility of LNCPI is mainly affected by its own discrepancy.

Table 4.4.4: Variance Decomposition of POP in Malaysia

Percentage of Forecast Variance explained by Innovations					
Period	LNHPI	LNGDP	LNCPI	LEN	POP
1	4.644898	16.11326	2.044590	0.000000	77.19725
2	12.45519	19.13763	1.964047	0.255298	66.18783
3	10.79562	9.020466	7.785800	0.197778	72.20034
4	10.86170	6.079017	11.86114	0.199973	70.99816
5	9.354246	4.219040	19.73775	0.153755	66.53520
6	10.29197	4.046996	23.82031	0.169846	61.67088
7	10.29164	2.950345	27.10041	0.185860	59.47175
8	10.66093	2.292388	29.49987	0.158428	57.38839
9	10.40843	1.850978	32.23524	0.179282	55.32607
10	10.77524	1.716634	34.24265	0.205216	53.06026

Table 4.4.4 tabulates the variance decomposition of each variable for ten periods, and the results were reported. In the first period, LNHPI, LNCPI, and LNGDP have transmitted shocks towards POP which is less than 1 percent. However, only LEN does not transmit any shocks from itself towards POP. In second period, shock to LNGDP account for 16.11 percent variation of the fluctuation of POP, in the other word, for short run, shock on LNGDP cause highest impact among other variables to POP

Table 4.4.5: Variance Decomposition of LEN in Malaysia

Percentage of Forecast Variance explained by Innovations					
Period	LNHPI	LNGDP	LNCPI	LEN	POP
1	0.074116	8.611694	2.569014	70.45275	18.29243
2	4.923491	14.95066	1.764553	52.11819	26.24311
3	6.485626	20.15727	2.366366	39.30601	31.68473
4	7.331850	19.69096	8.893554	30.50505	33.57859
5	7.398018	17.86603	15.39633	24.57681	34.76280
6	7.148342	17.18973	19.73072	20.53090	35.40030
7	6.797032	17.21331	22.62903	17.50927	35.85136
8	6.493827	17.04452	25.39948	15.21232	35.84986
9	6.160937	16.52312	28.00299	13.46731	35.84565
10	5.826501	16.12195	30.31958	12.10388	35.62810

From the table 4.4.5, it can be conclude that in period 10, LNHPI, LNCPI, LNGDP, and POP in explaining the variability of LEN has increase significantly in the long run. However, shock to POP and LNCPI provides high percentage of impact towards LEN compare with the other two variables, which are more than 20 percent in long run respectively.

4.5 Impulse Response Function

According to Figure 2.3, generalized IRFs from shock by one standard deviation to individually of four independent variables (LNGDP, LNCPI, POP, and LEN) are traced out. We can observe that the one standard deviation of LNCPI and POP will cause a positive impact to LNHPI. The LNCPI significantly increased from the first period until the tenth period, in other words; LNCPI gives positive impact towards LNHPI. While the response of LNHPI to LEN tend to have positive impact in a beginning period and declining to zero after that, it turns to become negative impact towards LNHPI. On the other hand, the response of LNHPI to LNGDP shows the negative impulse stating from the first period. The response drops and then reverts upwards in long run relationship after about fourth period. Responses of shock from LNHPI to LEN have positive impact in the first eight periods, after that it returns to the negative downward sloping on period 8th onwards. In the final analysis, just LNGDP and LEN have negative impact towards LNHPI, while LNCPI and POP have positive impact towards LNHPI.

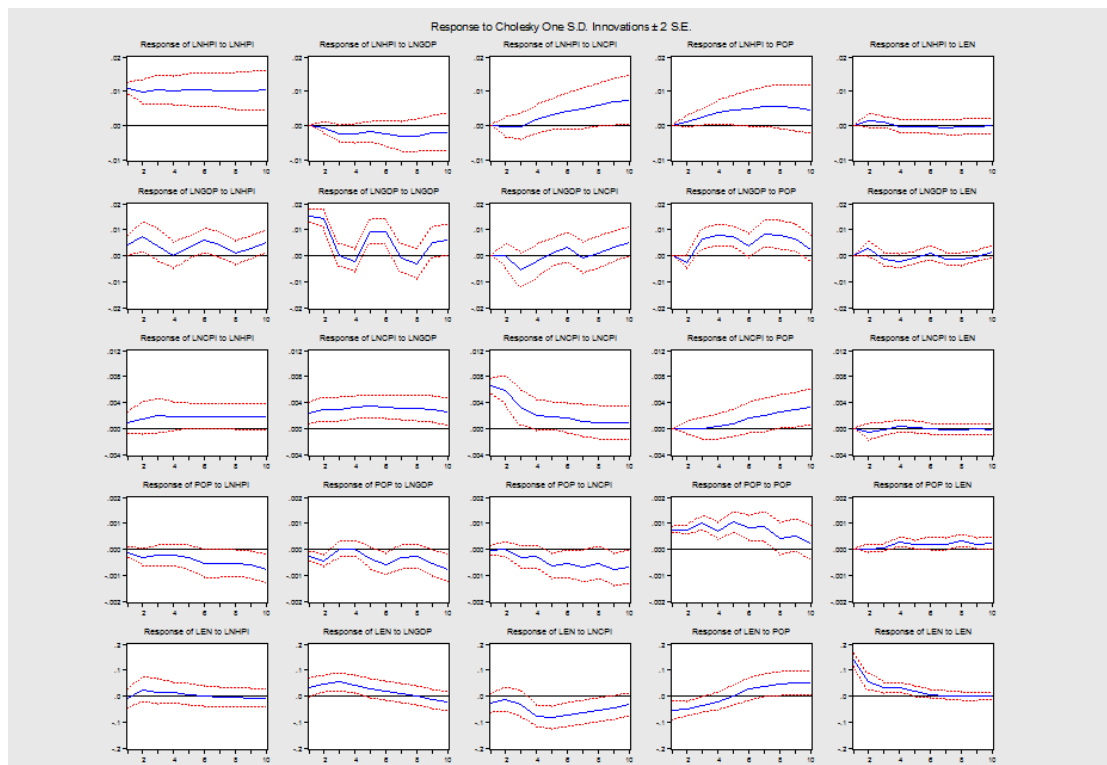


Figure 4.7 : Generalized Impulse response functions for ten periods

4.6 Discussions of Major Findings

4.6.1 Interest Rate

Based on the results of this study, lending rate (LEN) has negative relationship with the housing price (HPI) at 5 % of significance level. It implied that when the lending rate decreases, the housing price will be increase. It implied that interest rate has a significant impact towards the housing price in Malaysia with our previous finding. It shows consistent to have negative relationship with our result in this study according to the finding in past researcher done in previous chapter(Li & Chand, 2013; Agnello&Schukneht, 2011; Adam & Fuss, 2010).

According to Agnello and Schukneht (2011), they used real housing prices data annually that contributed by the bank of international settlement (BIS) to do their analysis. Their findings on the variables (interest rate, money and credit supply) has the opposite impact on the chances of occurring of housing burst, therefore they can conclude that if there is a decrease in interest rates, there will be a higher chance that the housing price will boom. Besides, Agnello and Schukneht (2011) also conclude that among the determinants of housing price, domestic liquidity and short- term interest rates have strong effects on the chances of housing booms and bursts will occur.

In addition, based on Adams and Fuss (2010), long term interest rates are one of the macroeconomic effects towards the housing market. They found that if there is a rise in the long term interest rates, will influence the demand to own a house. This means that higher long term interest rates caused other fixes-income assets becomes attractively, reducing the demand on this investment will cause the housing price to reduce in the long run. In their study, the demand and housing price eventually decrease due to a greater long term interest rate that reflected in higher mortgage rates.

Other than that, according to Fitwi, Hein and Mercer (2015), they found out that the Federal Reserve policymakers are partially responsible for the housing price increase due to maintaining a low interest rate for too long. They claim that if there is decrease

in short term interest rates, the cost of housing purchases will also decrease which will drive the demand for housing to increase and it cause the increasing of the housing price.

4.6.2 Inflation Rate

This study found that the inflation rate is significant at 5% significance level. Moreover, it is positively affecting the house price in Malaysia in long run. The finding in this study was consistent with the expected sign as stated in previous chapter. In previous research finding, there was a positive relationship between inflation rate (INF) and housing price index (HPI).

As refer to previous researcher Hussain and Malik (2011), there are two categories of inflation are involved such as demand pull inflation and cost push inflation. Demand-pull inflation occurred due to the increase in demand for services and goods as well. In means that the aggregate demand is greater than aggregate supply. As increase in goods and services' demand, supplier will tend to mark up the price of goods and services since they are unable to produce more to meet the consumer need. This statement has supported by the Tsatsaronis and Zhu (2004) and Liew and Haron (2013). On the other hand, cost-push inflation refers to the cost of materials increase will lead to the cost of finished goods increase (Hussain & Malik, 2011). These two factors draw the prices of goods and services rise, and eventually inflation will happen.

The next explanation is relationship between the impact of inflation and the real payments on long-term fixed-rate mortgage (Frappa & Mesonnier, 2010). If the inflation happens, the financing mortgage will decreases then rise shall happen to the housing price. If one would expect housing demand, and thus real house prices will respond to changes in inflation (Beltratti & Morana, 2010). More specifically, mortgage rates will follow a case which low mortgage rates contributing to greater real housing prices, while higher mortgage leading to low real housing prices (Apergis, 2003). Besides that, inflation will influence by the current financing conditions, which have the directly impact on the housing demand. The theory behind this statement is common for households to reduce their risk by investing in residential real estate other than other financial instrument. Such high inflation condition able to attract investors by high level

of uncertainty and hence will bring to increase in house price. Thus, inflation is positively related to the price of houses.

4.6.3 Gross Domestic Product (GDP)

Based on empirical result of the study, there is a positively relationship between GDP and HPI. It implies that when GDP increases will lead housing price to increase or vice versa. By then, it also proves that this study is consistent with the research as stated in previous chapter. There have few researches which can determine GDP is positively affected housing price. Firstly, according to Ong (2013) mentioned that GDP is found to be significant positively correlated with the housing price in Malaysia. Secondly, the housing price will be influenced when level of Gross Domestic Product GDP occurs (Paz, 2003). Thirdly, based on Piazzesi & Schneider (2009), it mentioned that the housing price has strong positive relationship with GDP rate. Last but not least, the housing market and housing price pointed out a very strong positive correlation with GDP rate in Asia (Zhu, 2006).

The reason that GDP in Malaysia has the positive relationship to housing price is because increase in personal consumption. According to Chioma (2009), economic growth, and the consumption expenditure can be measured because of there is a causal relationship with the gross domestic product, which grows as a result of the increase in consumption expenditure. In particular, when a country having a low GDP level during economic downtown, it will directly causes increase in job uncertainty which means high unemployment rate in the economy. Hence, resulted in decrease demand for houses and subsequently the housing price will drop as well.

In addition, housing investment considered as an element of the GDP. Thus, rising in investment on housing property will cause the GDP move up or vice versa. Furthermore, an increase in GDP reflect a favorable economy, all people has the ability to buy a house. People will tend to make an investment on fixed asset such as residential house property because they believe that the housing market is doing well during favorable

economy and they will get a favorable return on investment in future. Therefore, the demand of housing will exceed supply of housing market.

4.6.4 Population

According to the empirical in chapter, we found sufficient evidence that the relationship from population (POP) to housing price index (HPI) significant in the short run at 5% significant level and it is a positively relationship between POP and HPI. Since many authors said that rising populations boost the housing prices, makes overpopulation in town areas and making number of houses undersupplied. That is the reason home price keeps on growing.

Besides, another reason why population can positively affect housing price is that the population growth is much greater than the growth in housing supply. In general economics concept, the law of supply and demand illustrates if excess demand will be occurred within the economy will drive up the house price since product are limited. Hence, we know that when the population rises, it will drive up the housing price accordingly.

On the other hand, increasing population will drive house prices higher and higher. The study in previous chapter also mentioned that GDP and population have causal interaction between them. One of the reasons for high population result rapid house price is that there is rapid expansion economy. This means that higher GDP causes people has more income and hence the market has higher willingness to expand their family size and to pay more premium prices. Thus, there is higher housing price while the population of that country is growing.

4.7 Conclusion

In a nutshell, this study intend to use a series of time series econometrics test to analyze the dynamics of the data. This study apply unit root tests in figuring out whether the variables are stationary or non-stationary. The unit root test result from E-view is being reviewed based on the Augmented Dickey Fuller and Philips Perron tests. Two of the variables are non-stationary at level, except GDP and Population. After the first difference of both ADF test and PP test, all of the four independent variables are stationary. Then we proceed to Johansen & Juselius Cointegration test and in order to determine and select the lag length, we applied VAR lag order criteria selection. From this study we found that with lag length of 3 is the best for undergoing this cointegration test.

Based on our trace statistics and maximal eigenvalue statistics, it showed us that the empirical model has two co-integrating vector from both statistics. Hence, long run relationship do exist in this model. Next, this study proceeded with VECM approach since there is a long run relationship in this model. The VECM results showed that lending rate, population, GDP and consumer price index are significant to house price index. The sign of coefficient for growth domestic product, consumer price index and population is positively related to House Price Index while lending rate is negatively related to House Price Index.

Granger Causality is being used for the determination of short run and causality direction of the model. From the results, it clearly showed that from population growth and lending rate are uni-directional towards the housing price index. Therefore, we made a conclusion that only gross domestic product and Consumer Price Index do not have granger causality and short run relationship to the HPI.

Conclusively, this chapter has simplified all of the empirical results and findings in figure, diagram and table form. The specific explanations are written below on each of the test results in order to provide a clearer picture of it. The limitations, suggestions and findings of the whole study will be explained and discussed in the chapter 5.

CHAPTER 5: CONCLUSION, IMPLICATIONS, LIMITATIONS & RECOMMENDATIONS

5.0 Summary of Statistical Analyses

The main objective of this study is to investigate the determinant of residential housing price in Malaysia based on four factors. This chapter comprised the empirical result from previous chapter and the detail will be explained accordingly. Our new empirical model is form after the unit root test and the selected factors are inflation rate, GDP growth, population and lending interest rate are separated and formed four equation models. The implication of this study and the limitations that occurred in the study will be thoroughly discussed. Lastly, recommendations for future studies also will be provided.

Due to some of the macroeconomic variables are non-stationary, the unit root tests carried out in order to prevent from spurious regressions. Each of the variables is test for stationarity by using the ADF and PP test.

Based on the result show that all the five variables include HPI, CPI, GDP, LEN, and POP are stationary at first difference. Hence, this study will proceed with Johenson & Juselius Cointegration test. It is a test to measure the long run relationship between the variables. Optimum lag length is determine by VAR model before proceed to Johenson & Juselius Cointegration test.

Moreover, the lag number has added one additional lag through the VAR Lag Order Selection Criteria. The empirical results of Johenson & Juselius test show that the model has long run equilibrium relationship between HPI with LEN and POP. Therefore, this study will proceed by using VECM model to determine the long run cointegrating relationship in this model.

From the VECM result, the two variables (LEN and POP) are significant to the HPI. The other two variables (CPI and GDP) show short run equilibrium relationship with

HPI in this model. As a result, VAR model will be carried out to test for the short run equilibrium. Next, the causality direction and the short run relationship of the model will be determined by using Granger Causality test.

According to variance decomposition results, the volatility of LNHPI is mainly affect by its own shocks, after follow by LNGDP, LNCPI, POP and LEN. For generalized impulse response function, just LNGDP and LEN have negative impact towards LNHPI, while LNCPI and POP have positive impact towards LNHPI.

5.1 Implications of the Study

This study is mainly concentrates on the relationship of macroeconomic variables such as lending interest rate, inflation, Gross Domestic Product (GDP) and population growth which is affected the housing price in Malaysia. Hence, there are several participant involved in this study are investors, potential homebuyers, government, policymakers and also future researcher.

Residential housing in Malaysia is getting attractive to investors and potential homebuyers, Because of housing in Malaysia can be considered as a significant component of investment, therefore, investors and homebuyers must have a basic knowledge about housing factors to make decisions before take part in the Malaysia housing market. Furthermore, investors should be cautious when investing in Malaysia housing properties. The housing market may be reaching a peak as interest rates cannot stay low for much longer. As indicated by the short term analysis, any increase in interest rates will result in a corresponding change in house prices in the next quarter (Pillaiyan, 2015). Households and investors (speculators) can technically predict the house prices movements and actualize their planned expenditure (Tuck & Tan, 2015). Investors and homebuyers can evaluate the house price movement by using this study since the results prove that the macroeconomic variables (LEN, CPI, GDP and POP) are significantly correlated with housing prices. As stated in the previous chapter, GDP increases will causes housing prices increase and CPI as well as POP increases will lead

to housing prices increase as well. On the other hand, LEN shows negative relationship which means LEN increases, housing price will decrease.

In the recent years, Malaysia housing market has become one of the important industries in Malaysia economy. The Government of Malaysia recognizes that housing is a primary necessary for every citizen. It is also an important category of the urban economy (Ong, 2013).

By taking into account the factors discussed in this study, government and policymakers are recommended to refer this study for the estimation of housing price movement based on macroeconomic variables (LEN, CPI, GDP and POP). From this study, government and policymakers could gain a better understanding on the housing market dynamics. Others than that, government and policymakers able to make an analysis on the supply and demand of housing price in Malaysia and decide a most suitable policy to be implemented in order to ensure a stable housing market in Malaysia. In addition, policymakers can improve the housing market efficiency by lower bureaucracy in the government regulations and policies which can control the housing market. Eventually, the implementation of these initiatives would able to control the financial stability in the housing market and improve transparency of information to investors, homebuyers and policymakers in Malaysia, thus it lead to increase the efficiency in the housing market (Zainddin, 2010).

There are many arguments on the topic of housing market and some of the researchers have their own viewpoint and different conclusion as well. Regarding to Ong (2013), the population is significant positive correlated with the housing price. This could be due to the fact that when the number of citizen increases, demand for house will definitely increase in order to satisfy the consumers' need. Although this study has different perspective compared to various researchers, this study also can provide another perspective for the argument. In a nutshell, this study could be used as a guide for determine the relationship of macroeconomic variables and housing prices in future research.

5.2 Limitations of Study

We have found out several limitations throughout this study which can impede this research to optimize its results and step forward to become an ideal research. As well, it was rare to find a perfect research without any limitation in reality.

Firstly, there was a limitation that insufficient theory of all variables in this study. In practice, there are a lot of theories of house prices are based on primary data rather than secondary data, as well as less relevant theories can be found. Hence, this study unable to carry out an adequate review of relevant theoretical models to support the selected variables. Moreover, due to the limited knowledge of econometrics tests, this research was not able to explore and carry out more advanced tests to examine the relationship between the response variable and the explanatory variables. Consequently, it obstructed the enhancement and consistency of the empirical results.

In addition, this study encountered problem that the limited data can be obtained from UTAR library DataStream. This study only used the time series data from year 1998 to year 2015 as the study period. Besides, this study used the quarterly data as the sampling method and provides 64 observations have been introduced for each variable. It has control the extent of study period and the validity of this study. Our sample size is considered small, it will be tough to discovery significant correlation from our data, as statistical tests usually require a larger sample size to make sure that a representative distribution of the population then only will be considered meaningful to those people to whom our results will be transmitted and being read.

5.3 Recommendations for Future Research

It is an important part of a project of avoiding mistakes to be repeated and provide a better result for future research. Research recommendations generate an idea about what can be improve in this research and what could future studies practice in order to create a better study. So, future researches are recommended to carry out some of more advance test statistics in order to obtain accurate result in testing about the long run and short run relationships between the variables. It also may be better for them to check the consistency of the data in the test to acquire a better result.

In the future, it is recommended that researchers can attempt to collect the data from other reliable sources such as the World Bank and Asian Development Bank if they are interested to include more data. Future research is being suggested with the possibility of inclusion of more relevant variables if possible in order to obtain better research outcomes. However, the variables chosen to be used must be relevant with the study in order to show significant and able to enhance the model.

Moreover, the future researchers may advise to use other types of research method for data collection such as primary research for data method. Primary research involves collecting data about a given specific subject directly from the outside the world. It consists of information about interviews, surveys, observations, and analysis. Interviews are classified as qualitative methods which able to provide expert or knowledgeable opinion on a subject and a lot of information from a small group of people. By using questionnaire, it can provide information about a larger population thinks differently based on the subject. In the other hand, observations provide deeper understanding about certain of people, events, or locales without the unfair judgment of an interview. While the analysis involves gathering data and allocating it based on standard required to have a clearer picture of some trend or pattern.

5.4 Conclusion

In the final investigation, it is important to know the determinants of macroeconomic and financial factors to the residential property markets, especially for the policy makers, government, investors, homeowners and homebuyers. The study reviews a certain among of past research paper and journals in order to get overall picture of the residential property markets. The theoretical framework of the house price index also had been widely discussed.

Besides of investigate the relationship between macroeconomic determinants and housing market in Malaysia, this research also identified the long run, short run, causality direction, and shocks of the empirical model in this study. All of the methodologies of this time series data analysis with a complete detail are discussed in this paper.

Lastly, as refer to the empirical results and discussion, this research conclude that lending interest rate, inflation, gross domestic product (GDP) and population growth are significant determinants of Malaysian house price index (HPI). The major findings, implication, limitation and future studies have been widely discussed in the last chapter of this study.

References

- Adams, Z., & Füß, R. (2010). Macroeconomic determinants of international housing markets. *Journal of Housing Economics*, 19(1), 38-50.
- Alexander, C. (1999). Optimal hedging using cointegration. *The Royal Society*, 2039-2058. Retrieved from http://www.carolalexander.org/publish/download/JournalArticles/PDFs/PhilTranrans_357_1758.pdf
- Apergis, N. (2003). Housing Prices and Macroeconomic Factors: Prospects within the European Monetary Union. *International Real Estate Review*, 6(1), 63 - 74.
- Asari, F. F. A. H., Baharuddin, N. S., Jusoh, N., Mohamad, Z., & Jusoff, N. S. K. (2011). A Vector Error Correction Model (VECM) Approach in Explaining the Relationship Between Interest Rate and Inflation Towards Exchange Rate Volatility in Malaysia. *World Applied Sciences Journal*, 12, 49-56.
- Asghar, Z., & Abid, I. (2007). Performance of lag length selection criteria in three different situations. *MPRA paper*. Retrieved from <https://mpra.ub.uni-muenchen.de/40042/>
- Asteriou, D., & Hall, S. G. (2007). *Applied econometrics: A modern approach using EViews and Microfit, Revised Edition*. Palgrave Macmillan.
- Badar, M., & Javid, A. Y. (2013). Impact of Macroeconomic Forces on Nonperforming Loans: An Empirical Study of Commercial Banks in Pakistan. *WSEAS TRANSACTIONS on BUSINESS and ECONOMICS*, 1(10). Retrieved from <http://www.wseas.org/multimedia/journals/economics/2013/56-259.pdf>
- Bank Negara Malaysia. (2012). Risk Development and Assessment of Financial Stability in 2012. In *Financial stability and payment systems report 2011*.
- Beltratti, A., & Morana, C. (2010). International house prices and macroeconomic fluctuations. *Journal of Banking & Finance*, 34(3), 533-545. doi:10.1016/j.jbankfin.2009.08.020
- Brooks, C. (2008). *Introductory econometrics for finance* (2nd ed.). Cambridge: Cambridge University Press.

- Brunnermeier, M. K., & Julliard, C. (2007). Money Illusion and Housing Frenzies. *Rev. Financ. Stud.*, 21(1), 135-180. doi:10.1093/rfs/hhm043
- Cağlayan, E., & Saçıldi, I. S. (2010). Does purchasing power parity hold in OECD countries? *International Research Journal of Finance and Economics*, 37, 138-146.
- Chen, M. C., & Patel, K. (1998). House Price Dynamics and Granger Causality: An Analysis of Taipei New Dwelling Market. *Journal Of The Asian Real Estate Society*, 1(1), 101 - 126.
- Chen, Y., Gibb, K., Leishman, C., & Wright, R. (2012). The Impact of Population Ageing on House Prices: A Micro-simulation Approach. *Scott J Polit Econ*, 59(5), 523-542. doi:10.1111/j.1467-9485.2012.00593.x
- Cheung, Y., & Lai, K. S. (1997). Bandwidth Selection, Prewhitening, and the Power of the Phillips-Perron Test. *Econ. Theory*, 13(05), 679. doi:10.1017/s0266466600006137
- Chui, L., & Chau, K. W. (2005). An Empirical Study of the Relationship between Economic Growth, Real Estate Prices and Real Estate Investments in Hong Kong. *Journal Of Surveying and Built Environment*, 16(2), 19-32.
- Cvijanovic, D. (2012, April 15). Real estate finance: How demographics drive housing prices. Retrieved from <http://www.hec.edu/Knowledge/Finance-Accounting/Financial-Markets/Real-estate-finance-How-demographics-drive-housing-prices>
- Dickey, D. A., & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, 74(366a), 427-431. doi:10.1080/01621459.1979.10482531
- Dritsaki, C., & Dritsaki, M. (2010). Government Expenditure and National Income: Causality Tests for Twelve New Members of E.E. *The Romanian Economic Journal*, 13(38), 67-89.
- Elder, J. (2003). An impulse-response function for a vector autoregression with multivariate GARCH-in-mean. *Economics Letters*, 79(1), 21-26.

Engsted, T., Hviid, S. J., & Pedersen, T. Q. (2015). Explosive Bubbles in House Prices? Evidence from the OECD Countries. *SSRN Electronic Journal*. doi:10.2139/ssrn.2548466

Factors that affect the housing market | Economics Help. (n.d.). Retrieved from <http://www.economicshelp.org/blog/377/housing/factors-that-affect-the-housing-market/>

Fitwi, A. M., Hein, S. E., & Mercer, J. M. (2015). The U.S. housing price bubble: Bernanke versus Taylor. *Journal of Economics and Business*, 80, 62-80. doi:10.1016/j.jeconbus.2015.05.001

Frappa, S., & Mésonnier, J. (2010). The housing price boom of the late 1990s: Did inflation targeting matter? *Journal of Financial Stability*, 6(4), 243-254. doi:10.1016/j.jfs.2010.06.001

Granger, C. W. (1969). Investigating Causal Relations by Econometric Models and Cross-spectral Methods. *Econometrica*, 37(3), 424. doi:10.2307/1912791

Gujarati, D. N., & Porter, D. C. (2009). *Essentials of econometrics* (3rd ed.). New York: McGraw-Hill/Irwin.

Guo, M. Z., & Wu, Q. (2013). *The Empirical Analysis of Affecting Factors of Shanghai Housing Prices*, 4(14). Retrieved from http://ijbssnet.com/journals/Vol_4_No_14_November_2013/27.pdf

Gutiérrez, C. E. (2007). Selection of Optimal Lag Length in Cointegrated VAR Models with Weak Form of Common Cyclical Features. *Working Paper*. Retrieved from <https://www.bcb.gov.br/pec/wps/ingl/wps139.pdf>

Hashim, Z. A. (2010). *House Price and Affordability in Housing in Malaysia*. Retrieved from [http://www.ukm.my/penerbit/akademika/ACROBATAKADEMIKA78/akademika78\[03\]A4.pdf](http://www.ukm.my/penerbit/akademika/ACROBATAKADEMIKA78/akademika78[03]A4.pdf)

Hawa, M. R. (2013). *The Effect of Macroeconomic Variables Toward Housing Prices in Malaysia*. Retrieved from

https://www.academia.edu/11788805/MACROECONOMIC_VARIABLES_EFFECT_TOWARDS_HOUSING_PRICES

Hill, R. C., Griffiths, W. E., & Lim, G. C. (2007). *Principles of Econometrics. Third (3rd) Edition.*

House Prices in Malaysia | Malaysian Real Estate Prices. (n.d.). Retrieved from <http://www.globalpropertyguide.com/Asia/Malaysia/Price-History>

Hui, H. (2010). House price diffusions across three urban areas in Malaysia. *International Journal of Housing Markets and Analysis*, 3(4), 369-379. doi:10.1108/17538271011080664

Hussain, S., & Malik, S. (2011). Inflation and Economic Growth: Evidence from Pakistan. *International Journal of Economics and Finance*, 3(5). doi:10.5539/ijef.v3n5p262

Johansen, S. (1991). Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models. *Econometrica*, 59(6), 1551-1580. doi:10.2307/2938278

Kearl, J. R. (1979). Inflation, Mortgage, and Housing. *Journal of Political Economy*, 87(5, Part 1), 1115-1138. doi:10.1086/260815

Keilis-Borok, V., Soloviev, A., Allègre, C., Sobolevskii, A., & Intriligator, M. (2005). Patterns of macroeconomic indicators preceding the unemployment rise in Western Europe and the USA. *Pattern Recognition*, 38(3), 423-435.

Kim, B.H., & Min, H.G. (2011). Household lending, interest rates and housing price bubbles in Korea: Regime switching model and Kalman filter approach. *Economic Modelling*, 28, 1415 – 1423.

Labonte, M. (2011). Inflation: Causes, Costs, and Current Status. *Congressional Research Service*. Retrieved from <https://www.fas.org/sgp/crs/misc/RL30344.pdf>

LaCour-Little, M., Calhoun, C.A., & Yu, W. (2011). What role did piggyback lending play in the housing bubble and mortgage collapse? *Journal of Housing Economics*, 20, 81–100.

- Larock, D. (2010). Do Higher Interest Rates Cause Lower House Prices? *Dave The Mortgage Planner*.
- Lee, C. L. (2009). Housing price volatility and its determinants. *International Journal of Housing Markets and Analysis*, 2(3), 293-308. doi:10.1108/17538270910977572
- Lee, Y., Kim, T., & Newbold, P. (2005). Spurious nonlinear regressions in econometrics. *Economics Letters*, 87(3), 301-306. doi:10.1016/j.econlet.2004.10.016
- Li, Q. & Chand, S. (2013). House prices and market fundamentals in urban China. *Habitat International*, 40, 148-153.
- Libdeh, H. A., & Harasheh, M. (2011). Testing for correlation and causality relationships between stock prices and macroeconomic variables The case of Palestine Securities Exchange. *International Review of Business Research Papers*, 7(5), 141-154.
- 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.
- Lin, J. L. (2006). Teaching notes on impulse response function and structural VAR. Retrieved from [http://econ.ccu.edu.tw/academic/master_paper/060503seminar\(impulse\).pdf](http://econ.ccu.edu.tw/academic/master_paper/060503seminar(impulse).pdf)
- Luo, Z., Liu, C., & Picken, D. (2007). Granger Causality Among House Price and Macroeconomic Variables in Victoria. *Pacific Rim Property Research Journal*, 13(2), 234-256. doi:10.1080/14445921.2007.11104232
- Mahalik, M. K., & Mallick, H. (2011). What Causes Asset Price Bubble in an Emerging Economy? Some Empirical Evidence in the Housing Sector of India. *International Economic Journal*, 25(2), 215-237. doi:10.1080/10168737.2011.586806

- Mallick, H., & Mahalik, M. K. (2012). Fundamental or speculative factors in the housing markets of emerging economies? Some lessons from China. *Journal of Economic Policy Reform*, 15(1), 57-67. doi:10.1080/17487870.2011.642580
- Masih, R., & Masih, A. M. (2001). Long and short term dynamic causal transmission amongst international stock markets. *Journal of International Money and Finance*, 20(4), 563-587.
- Mcleod, S. (2014). *Maslow's hierarchy of needs*. Retrieved June 23, 2015, from <http://www.simplypsychology.org/maslow.html>
- Miles, D. (2012). Population Density, House Prices and Mortgage Design. *Scott J Polit Econ*, 59(5), 444-466. doi:10.1111/j.1467-9485.2012.00589.x
- Ming, N. (2013). Impact of changing interest rates on house prices. *Atchison Consultants*. Retrieved from <http://atchison.com.au/wp-content/uploads/2013/06/Property-Observer-Correlation-of-mortgage-rates-and-residential-property-prices-2013-08-14.pdf>
- Mulder, C. H. (2006). Population and housing. *Demographic Research*, 15, 401-412. doi:10.4054/demres.2006.15.13
- 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.
- 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.
- Pesaran, M. H., & Shin, Y. (1997). Generalized impulse response analysis in linear multivariate models. *Economics Letters*, 58(1), 17-29.
- Pettinger, T. (2013, November 26). Factors that affect the housing market. Retrieved from <http://www.economicshelp.org/blog/377/housing/factors-that-affect-the-housing-market/>
- Piazzesi, M., & Schneider, M. (2009). *Momentum Traders in the Housing Market: Survey Evidence and a Search Model*, 99(2). Retrieved from <http://www.aeaweb.org/articles.php?doi=10.1257/aer.99.2.406>

- Pillaiyan, S. (2015). *Macroeconomic Drivers of House Prices in Malaysia*, 11(9). Retrieved from <http://www.cscanada.net/index.php/css/article/viewFile/7482/7482pdf>
- Poterba, J. M. (1992). Tax reform and the housing market in the late 1980's: who knew what, and when did they know it?, in L. Browne and E. S. Rosegren (eds.). *Real Estate and Credit Crunch, Federal Reserve Bank of Boston Conference Series*, 36, 230-251.
- Printzis, T., & Printzis, P. (2015). *On the macroeconomic determinants of the housing market in Greece: A VECM approach* . Retrieved from <http://www.lse.ac.uk/europeanInstitute/research/hellenicObservatory/CMS%20pdf/Publications/GreeSE/GreeSE-No88.pdf>
- Rahamn, M. M., Khanam, R., & Xu, S. (2012). The Factors Affecting Housing Price in Hangzhou: An Empirical Analysis. *International Journal of Economic Perspectives*,6(4), 57-66.
- Ray, M. V. (2012). *The housing bubble and the GDP: a correlation perspective*. Retrieved from <http://www.aabri.com/manuscripts/10490.pdf>
- Ray, S. (2012). Testing Granger Causal Relationship between Macroeconomic Variables and Stock Price Behaviour: Evidence from India. *Advances in Applied Economics and Finance (AAEF)*, 3(1), 470-481. Retrieved from www.worldsciencepublisher.org
- Rogers, J. H. (2001). Price Level Convergence, Relative Prices, and Inflation in Europe. *SSRN Electronic Journal*. doi:10.2139/ssrn.266505
- Runkle, D. E. (1987). Vector Autoregressions and Reality. *Federal Reserve Bank of Minneapolis and Brown University*. Retrieved from <https://www.minneapolisfed.org/research/sr/sr107.pdf>
- Sekaran, K. (2015). *Bajet2016: Harga rumah tinggi, tidak mampu dimiliki-Netizen*, Retrieved October 10, 2015, from

- <http://www.astroawani.com/berita-bisnes/bajet2016-harga-rumah-tinggi-tidak-mampu-dimiliki-netizen-75396>
- Shafie, R. (2015). *Tegas tangani isu harga rumah*, Retrieved October 10, 2015, from <http://www.utusan.com.my/rencana/tegas-tangani-isu-harga-rumah-1.133558>
- Shi,S.,Jou, J. & Tripe, D. (2014), Can interest rates really control house prices? Effectiveness and implications for macroprudential policy. *Journal of Banking & Finance*, 47, 15–28.
- Taltavull de La Paz, P. (2003). Determinants of housing prices in Spanish cities. *Journal of Property Investment & Finance*, 21(2), 109-135. doi:10.1108/14635780310469102
- Tan, T.H. (2010). Base lending rate and housing prices: Their impacts on residential housing activities in malaysia. *Journal of Global Business and Economics*, 1(1), 1 – 14.
- Tan, Y. K. (2011). An Hedonic Model For House Prices In Malaysia. *Working Paper*. Retrieved from http://www.prrs.net/papers/tan_an_hedonic_model_for_house_prices_in_malaysia.pdf
- Tang, T. C., & Tan, P. P. (2015). *Real Interest Rate and House Prices in Malaysia: An Empirical Study*, 35(1). Retrieved from <http://www.accessecon.com/Pubs/EB/2015/Volume35/EB-15-V35-I1-P30.pdf>
- Tsatsaronis, K., & Zhu, H. (2004). What drives housing price dynamics: cross-country evidence. *BIS Quarterly Review*. Retrieved from http://www.bis.org/publ/qtrpdf/r_qt0403f.pdf
- Tse, C., Rodgers, T., Niklewski, J. (2014). The 2007 financial crisis and the UK residential housing market: Did the relationship between interest rates and house prices change? *Economic Modelling*, 37 ,518–530.
- United Nations. (2009). Housing and demographics changes. *THE RELATIONSHIP BETWEEN POPULATION AND HOUSING*, 8.

Valuation and Property Services Department. (2012). *The Malaysian house price index* [Brochure]. Malaysia: Kementrain Kewangan Malaysia.

Wadud, I.M., Bashar, O.H. & Ahmed,H.J.A. (2012).Monetary policy and the housing market in Australia. *Journal of Policy Modeling* 34,849–863.

Wanga, Z. & Zhang, Q. (2014). Fundamental factors in the housing markets of China. *Journal of Housing Economics*, 25, 53–61.

Zainuddin, Z. (2010). *An Empirical Analysis of Malaysian Housing Market: Switching and Non-Switching Models*. Retrieved from [https://researcharchive.lincoln.ac.nz/bitstream/handle/10182/3511/Zainuddin_phd .pdf?sequence=3](https://researcharchive.lincoln.ac.nz/bitstream/handle/10182/3511/Zainuddin_phd.pdf?sequence=3)

Zandi, G., Mahadaran, S., Aslam, A., & Lai, K. T. (2015). *The Economical Factors Affecting Residential Property Price: The Case of Penang Island* , 7(12). Retrieved from <http://www.ccsenet.org/journal/index.php/ijef/article/viewFile/55163/29446>

Zhang,Y., Hua, X., Zhao, L. (2012). Exploring determinants of housing prices: A case study of Chinese experience in 1999–2010. *Economic Modelling*, 29, 2349–2361.

Zhu, H. (2006). *The structure of housing finance markets and house prices in Asia*. Retrieved from http://www.bis.org/publ/qtrpdf/r_qt0612g.pdf