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MACROECONOMIC FACTORS THAT MOSTLY EFFECTS THE HOUSING PRICE IN ASIA-PACIFIC COUNTRIES

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AUTHOR'S
DECLARATION

I declare that the work in this project paper was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with Academic Rules and Regulations for UniversitI Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Most research on housing price concentrates on macroeconomic factors such as gross domestic product (GDP), inflation rate, interest rate, population and unemployment rate. This research aim is to determine the relationship between macroeconomic factors and house price index in Asia-Pacific countries. It is specifically focusing on Australia, Canada, China, Hong Kong, Indonesia, Japan, Malaysia, New Zealand, Singapore and South Korea. The data was analysed to determine macroeconomic factors that mostly affect the housing price. This research employs a panel regression model to examine the relationship between macroeconomic factors and housing price and to determine the most significant macroeconomic factor that influencing the housing price. The results indicate that GDP and inflation rate are the most significant factors toward housing price.

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LIST OF ABBREVIATIONS

Abbreviations

IMF	International Monetary Fund
BIS	Bank for International Settlement
CPI	Consumer Price Index
MHPI	Malaysian House Price Indexes
HPI	Housing Price Index
GDP	Gross Domestic Product
INF	Inflation Rate
IR	Interest Rate
POP	Population
UEM	Unemployment Rate
CI	Corruption Index

CHAPTER ONE
INTRODUCTION

1.1 INTRODUCTION

For the past several years, housing prices boom among Asia-Pacific economies has attracted a great deal of interest especially from researchers. Many researchers are interested to examine and analyse the factors that affecting the housing price. There are numerous studies at global level has identified macroeconomic as a major factor of housing price and discussed about the relationships between housing price and macroeconomic variables. These include gross domestic product, inflation rate, interest rate, population and unemployment rate (Shiller, 2007; Rapach and Strauss, 2009; Zhang, Hua, and Zhao, 2012).

This research aimed to explore the factors regarding to the increasing trend of house price in Asia-Pacific by examining the relationship between macroeconomic and housing price. The chapter one begins with background that frames the study. Following this is the problem statement, research questions and accompanying by research objectives. Also included in this chapter are significance of the study, scope of study and limitation encountered in this study.

1.2 BACKGROUND OF STUDY

Housing market is an essential sector of an economy. Housing is a human necessity which reflects the individuals' quality of life as the largest percentage of the average individual's income will probably on housing. The economic system is likewise moved by changes of the housing market. A dynamic housing market partly causes a strong economic growth. In recent years, rapid economic growth has resulted in a greater demand for houses.

Literature shows that House Price Index (HPI) is used by researcher to represent housing price. According to Haron and Ibrahim (2016), housing price Index (HPI) is an index that used to measure the prevailing trends of residential house price. In other words, HPI is an analytical tool to estimate the residential housing price. For instance,

Glindro, Subhanij, Szeto, and Zhu (2011) used HPI in their research to study the factors affecting the housing price in nine Asia-Pacific economies such as Australia, China, Hong Kong, Korea, Korea, Malaysia, New Zealand, Philippines, Singapore and Thailand.

Therefore, this study will explore the impact of macroeconomic variables towards HPI as well as examine whether macroeconomic such as GDP, inflation rate, interest rate, unemployment rate population and corruption index have relationship with the increasing trend of housing price in Asia-Pacific countries such as Australia, Canada, China, Hong Kong, Indonesia, Japan, Malaysia, New Zealand, Singapore and South Korea.

1.3 PROBLEM STATEMENT

There have been growing concerns about housing market in few economies. An average of real house price across countries has been increasing for the past four years (Hites and Prakash, 2017). For instance, in Australia, housing price continued to rise and the strongest to be recorded in Sydney and Melbourne. Besides that, housing prices in Canada, China and Hong Kong also have continued to experience a strong inflation.

There has been different view on house price estimation (Glindro et al., 2011). A pessimistic view argues that house prices have been overestimated in many countries and will face downward adjustments in the near future. In contrast, an optimistic view stated that at this around, house price growth is recovered from previous crisis. They debated that after the previous crises, house prices were too low as compared to their fundamental values. Therefore, the recovery in house price from very low levels is simply the consequence from the mean reversion process.

This research will investigate the factors that could give effect toward rising housing price in Asia-Pacific. Australia, Canada, China, Hong Kong, Indonesia, Japan, Malaysia, New Zealand, Singapore and South Korea are chosen because these countries are the Top 10 of Knight Frank Global House Price Index among other Asia-Pacific countries. Therefore, GDP, inflation rate, interest rate, unemployment rate, population and corruption index has been chosen as these can be a major factor that gives impact to the House Price Index in those countries. These may be

contributed to arising of housing market year by year. However, it is quite complicated to detect and analyse which determinants that are significant in depicting the relationship between the variables and the housing market in those countries.

1.4 RESEARCH QUESTIONS

In this study, the formulation of research question is needed to be developed in order to inquire about the relationship between economic variables and housing price. Thus, there is several research questions have been developed in this study:

1.4.1 Is there any relationship between GDP and housing price?

1.4.2 Is there any relationship between inflation rate and housing price?

1.4.3 Is there any relationship between interest rate and housing price?

1.4.4 Is there any relationship between population and housing price?

1.4.5 Is there any relationship between unemployment rate and housing price?

1.4.6 Is there any relationship between corruption index and housing price?

1.5 RESEARCH OBJECTIVES

The research objectives have been developed based on the research questions. The purpose of research objectives to identify the goals associated with each of research questions. Therefore, these are the research objectives that related to research question:

1.5.1 To determine the relationship between GDP and housing price in Asia-Pacific countries.

1.5.2 To determine the relationship between inflation rate and housing price in Asia-Pacific countries.

1.5.3 To determine the relationship between interest rate and housing price in Asia-Pacific countries.

1.5.4 To determine the relationship between population and housing price in Asia-Pacific countries.

1.5.5 To determine the relationship between unemployment and housing price in Asia-Pacific countries.

1.5.6 To determine the relationship between corruption index and housing price in Asia-Pacific countries.

1.6 SIGNIFICANCE OF STUDY

This research will provide a clearly picture for readers, such as policy makers, homebuyers and Government about the macroeconomic factors that affect housing price index in Asia-Pacific. As this study primarily focusing on the housing price, it will help Government to enhance growth in the housing market for homebuyers that need a house for living. It will also give recommendations to policy makers and governments in order to take action more quickly to intervene with policies to help the housing market for Asia-Pacific countries. Therefore, the intention for overall study is to contribute to the development for government implementation on the scenario planning that has relationship upon unanticipated growth of housing price in the future.

1.7 SCOPE OF STUDY

The main purpose of this study is to investigate the influence of economic variables towards housing price in Australia, Canada, China, Hong Kong, Indonesia, Japan, Malaysia, Singapore and South Korea. This research focuses on the relationship between housing price index and GDP, inflation rate, interest rate, unemployment rate, population as well as corruption index. Data are collected from year 2006 to year 2016 for each country from International Monetary Fund (IMF), World Development Bank, Bank for International Settlement (BIS) and Transparency International.

1.8 LIMITATION OF STUDY

Limitation can be found throughout this research. One significant limitation may relate to the small range of year of the data sample were covered as there was only year from 2006 until 2016 were taken into research. This has limited the validity of this study and the extent of period study. However, the researcher unable to cover more data range due to the availability of house price index for some which provided from Bank for International Settlements only started from year 2005. Besides that, there are many factors affecting house price and it is difficult to include all of them in this research so the reliability of the result could be weakened.

1.9 SUMMARY

In chapter one, this chapter describes the background of study, the statement of problem which briefly explained the issues and concerns regarding to the housing price in Asia-Pacific economies. Research questions and objectives have been developed based on the problem statement. Following by significance of study which explained the importance of research to the readers; scope of study and limitation of study.

CHAPTER TWO
LITERATURE REVIEW

2.1 INTRODUCTION

According to Sekaran and Bougie (2010), literature review can be defined as a broad documentation review by which published and unpublished work from secondary data in the areas of a particular interest to the researcher. The purpose of the literature review is to review about the relationships between each independent variables and dependent variable as well as how these variables can give impact to the dependent variable.

2.2 LITERATURE REVIEW ON TOPIC

The key elements of housing market are the average house price and housing price trends. Housing market refers to the supply and demand for houses for particular country or region (Zhu, 2006). The relationship of supply and demand affects the housing market and the house prices. When demand exceeds supply, price rises, according to standard theory of economy. For instance, interest rate changes can greatly influence people to purchase a residential property. This is because as interest rates low, the cost to obtain a mortgage also low thus increasing demand and real estate prices (Robert, 2017).

Existing literature shows that the movements of housing prices are closely linked to a common set of macroeconomic variables and market-specific conditions (Glindro et al., 2011). Previous studies focused mainly on the macroeconomic factors such as GDP, inflation rate, interest rate and unemployment rate to determine the relationship with housing price. They are proven to have important impacts on house prices, either positive or negative.

Previous researcher found a close relationship between presence of these macroeconomic variables and housing prices the after analysing the relationship between housing prices and several economic variables. There is a study considered the factors that can cause the housing price fluctuations which the expected factors are related to macroeconomic variables. This section will make a general review of the macroeconomic factors of house prices.

2.3 MACROECONOMIC FACTORS

2.3.1 Gross Domestic Product

According to Picardo (2016), gross domestic product is one of the most widely used measures of an economy's output or production. Ong (2013) defined GDP as the total value of goods and services produced within a given period after goods and services' cost involved in the process of production is deducted. There is a cause and effect relationship between GDP that can be measured as economic growth and consumption expenditure which as a result, the consumption expenditure increased.

Zhu (2003) examined the relationship of real GDP towards house prices and argued that increases in house prices can have a positive effect on real GDP in many countries. Based on Zandi, Supramaniam, Aslam, and Theng (2015) research, they found that there is a positive correlation between housing price and GDP. However, the correlation between the two variables showed that it is not statistically significant. Another researcher found that there is a strongest correlation between GDP and house price index as well as has significant relationship with house price index in Malaysia (Ong, 2013)

In addition, Zhu (2006) has explained the correlation between GDP rate and housing price in Asia which is a very significant positive correlation especially in China and Korea. However, there are too many different arguments among researchers on how GDP rate would affect the housing price either in positive or negative way (Ong and Chang, 2013). For instance, Ley and Tutchener (2001) stated that GDP rate has negative effect on housing price. They found that there is a strong effect of globalization towards housing price movement. In contrast, Shaari, Mansor, Mahmood, Affandi, & Baharuddin (2016) found a positive and significant impact of GDP towards house price.

2.3.2 Inflation Rate

According to Barnes (2010), inflation can mean either an increase in money supply or an increase in price levels. Tsatsaronis and Zhu (2004) added higher inflation could lead to higher mortgage finance and construction. As a result, it will push up the property price higher. Hui and Ng (2009) explain further about investment in property can be a good hedging against inflation. Higher uncertainty on

investment such as in bonds and equities is associated with higher inflation, hence investment in property market become more attractive for the long-term savings.

According to Kuang and Liu (2015), house become important asset for current Chinese household wealth when Chinese people are motivated to purchase houses in order to hedge against high inflation. Housing purchase is an effective hedging for inflation as the effect of Consumer Price Index (CPI) on housing price is greater than effect of housing price on CPI. They test the relationship between housing price and inflation using Unit Root and Cointegration Test. The result showed that inflation has positive impact towards housing price in China. The finding can be supported by other researchers in which inflation has a positive and significant relationship with housing price (Pillaiyan, 2015; Shaari et al., 2016; Tsatsaronis and Zhu, 2004).

2.3.3 Interest Rate

Definition of interest rate by Ong (2013) is a rate that is an additional charge derived from borrowing. An interest rate is typically expressed as an annual percentage of the principal. Sutton (2002) examined the house price fluctuations in advanced economies such as Australia and Canada and he recommended that decreases in real interest rates lead over time to increases in house prices.

According to McGibany and Nourzad (2004), they found out interest rates have long-term relationship with changes in house price. This can be proven by Chien, Lee, and Cai (2014) as they used Johansen's Fisher panel cointegration test and found that in the long run, house price and long-interest rate move together as the variables have panel long-run equilibrium relationship.

Besides that, research done by Ong (2013) found that interest rate has no significant effect towards Malaysian house price. Tang and Tan (2015) estimated impact of interest rate on housing price in Malaysia by using Ordinary Least Square (OLS) estimator and they found that there is no significant negative impact on Malaysian House Price Indexes (MHPI). However, Kuang and Liu (2015) found that interest rate has negative influence on housing price in China.

Many researchers proved about interest rates have strong impact on house price dynamic. According to Demewez (2011), interest rate has strong inverse

relationship with housing price index. This can be supported a research done by Candas, Kalkan, and Yomralioglu (2015) where they analysed data using panel data and cross-sectional regression analysis to investigate the relationship between residential housing price and interest rate. They found that 3.61 percent points decline in residential housing price are affected by one percent point increase in interest rate.

2.3.4 Population

A slowdown in growth of population will add another challenge to economic growth and housing market (Michael, 2015). According to Sam and Mark (2016), global population has expanded by 1.24 percent every year for decades; today the rates has declined to 1.18 percent or about 83 million people a year. The overall growth rate which peaked in 1960s has declined since 1970s. According to Nguyen, (2016), demographics are the data that represent the population's composition such as age, gender, incomes and population growth. These statistics are one of the factors that often neglected but important factor to determine how properties is priced and what types of properties are in demand. Major changes in demographics could give a large impact to the housing trend for decade.

Population growth is generally anticipated to have a positive impact on houses price (Otto, 2007). According to Pashardes and Savva (2009), there is a huge increased in houses price due to an increase in population. Ge and Williams (2014) stated that a rising population increases the housing demand. This can be explained by Kamal, Hassan, and Osmadi (2016) as an increased in population growth can be attributed to migration of local citizens and foreign workforce that created greater demand for housing. Besides that, Ong (2013) stated an increasing number of households will definitely need more houses to live in. Young generation prefers to work in urban areas and will purchase a house near work places. The researcher investigated the determinants that affecting the price of housing in Malaysia and the findings showed that population has significant relationship and positive correlation with housing price.

2.3.5 Unemployment Rate

According to Barksenius and Rundell (2012), in the short term and/or long-run, unemployment rate is one of the factor determining real estate price. In their study,

they found that there is a quick increase in unemployment when the real estate collapsed in early 90's. In the long-run, they expected unemployment to be stationary but within the time periods of their study, unemployment rate is unlikely to be non-stationary.

Based on the findings of Deng, Ma, and Chiang (2009), they found that unemployment rate has significant effect toward housing price in China. The results showed 10 percent change in the unemployment rate will induce a 28.25 percent decrease in real housing prices. This can be supported by Xu and Tang (2014) which they employed cointegration approach test and they found unemployment rate gives a positive effect towards house prices. It means that an increasing in unemployment rate can be followed by the rising in house price.

2.3.6 Corruption Index

Corruption is defined as the abuse of entrusted power for private gain. It can be classified as grand, petty and political, depending on the amounts of money lost and the sector where it occurs.

Based on Transparency International (2017) report, Australia, Canada, the United Kingdom and United States are identified as the top four hot spots targeted by corrupt officials or criminals. It found whilst all four countries are vulnerable to enabling the corrupt and other criminals to launder money in the real estate sector, Australia was the worst, failing to address 10 out of 10 loopholes. It stated that those countries had one common thing that is high-end real estate properties in key markets are purchased by shell companies or trusts without undergoing adequate due diligence or scrutiny by the professionals involved in the deal.

According to Shaari et al., (2016), corruption index is a ranking of countries according to the extent to which corruption is believed to exist. It ranks almost 200 countries on a scale of zero to 10, with zero indicating high levels of corruption and 10 indicating low levels. They applied Fixed Effect Model in their study and the results showed that Corruption Index has negative effect on housing price and also higher corruption perception index (low corruption/clean) will significantly contribute to higher housing prices. There is an evident in Singapore where the housing price keeps increasing, even though the corruption index is very clean.

2.4 THEORETICAL FRAMEWORK

The framework of study is formulated as followed:

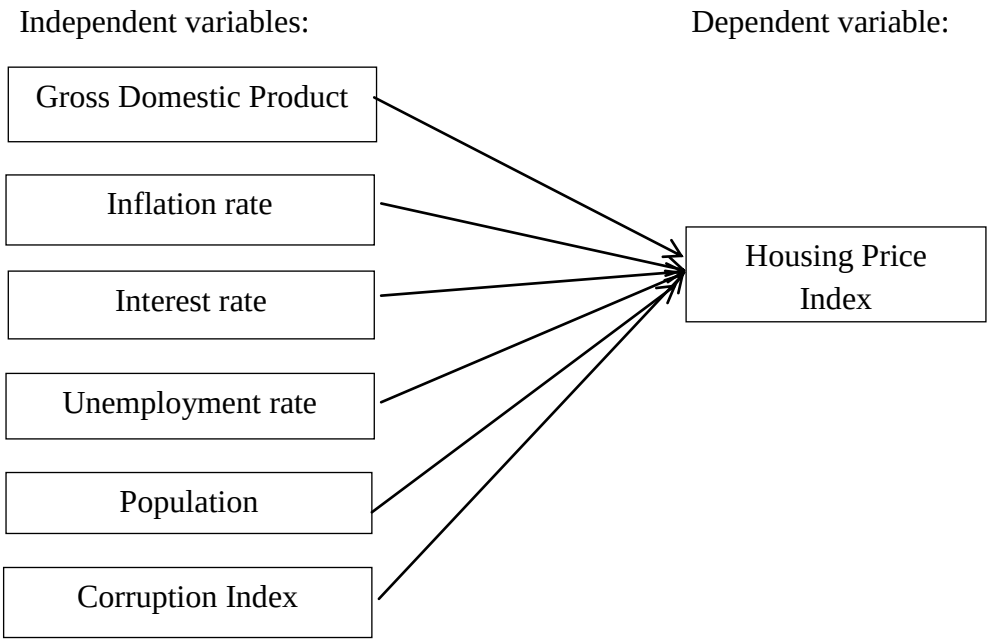

Figure 2.4.1 Theoretical Framework

Table 2.4.1 shows the measurement used for each variable:

Independent Variables	**Measurement**
GDP	GDP growth
Inflation rate	Consumer Price Index (CPI)
Interest Rate	Real Interest Rate
Unemployment rate	Percentage of total labour force
Population	Population growth
Corruption Index	Changes in corruption perception index
Dependent Variable	
House Price	Changes in housing price

Table 2.4.1 Measurement of Variables

2.5 SUMMARY

Table 2.5 shows the summary of literature review for each variable:

VARIABLE(S)	AUTHORS	FINDINGS/RESULTS
GDP	(Zandi, Supramaniam, Aslam, and Theng, 2015)	There is a positive correlation between housing price and GDP. However, the correlation between the two variables showed that it is not statistically significant.
	(Ong, 2013)	There is a strongest correlation between GDP and house price index as well as has significant relationship with house price index in Malaysia
	Zhu (2006)	Correlation between GDP rate and housing price in Asia which is a very significant positive correlation especially in China and Korea.
	(Ong and Chang, 2013)	However, there are too many arguments among researchers on how GDP rate would affect the housing price either in positive or negative way.
	Ley and Tutchener (2001)	GDP rate has negative effect on housing price. They found that there is a strong effect of globalization towards housing price movement.
	(Shaari, Mansor, Mahmood, Affandi, and Baharuddin, 2016)	GDP has a positive and significant impact towards housing prices.

Inflation Rate	Tsatsaronis and Zhu (2004)	Higher inflation could lead to higher mortgage finance and construction. As a result, it will push up the property price higher.
	(Kuang and Liu, 2015)	Inflation has positive impact towards housing price in China.
	(Pillaiyan, 2015; Shaari et al., 2016; Tsatsaronis and Zhu, 2004)	Inflation has a positive and significant relationship with housing price
Interest Rate	Sutton (2002)	Examined the house price fluctuations in advanced economies such as Australia and Canada and he recommended that decreases in real interest rates lead over time to increases in house prices.
	McGibany and Nourzad (2004)	They found out interest rates have long-term relationship with changes in house price.
	Chien, Lee, and Cai (2014)	In the long run, house price and long-interest rate move together as the variables have panel long-run equilibrium relationship.
	Ong (2013)	Interest rate has no significant effect towards Malaysian house price.
	Tang and Tan (2015)	They found that there is no significant negative impact on Malaysian House Price Indexes (MHPI).
	Kuang and Liu (2015)	Interest rate has negative influence on housing price in China.
	Demewez (2011)	Interest rate has strong inverse relationship with housing price index.

	Candas, Kalkan, and Yomralioglu (2015)	They found that 3.61 percent points decline in residential housing price are affected by one percent point increase in interest rate.
Population	(Otto, 2007)	Population growth is generally anticipated to have a positive impact on houses price.
	Pashardes and Savva (2009)	There is a huge increased in houses price due to an increase in population.
	Ge and Williams (2014)	Rising population increases the housing demand.
	Kamal, Hassan, and Osmadi (2016)	An increased in population growth can be attributed to migration of local citizens and foreign workforce that created greater demand for housing.
	Ong (2013)	Stated an increasing number of households will definitely need more houses to live in. Population has significant relationship and positive correlation with housing price.
Unemployment Rate	Barksenius and Rundell (2012)	In the short term and/or long-run, unemployment rate is one of the factor determining real estate price. In the long-run, they expected unemployment to be stationary but within the time periods of their study, unemployment rate is unlikely to be non-stationary.
	Deng, Ma, and Chiang (2009)	Unemployment rate has significant effect toward housing price in China. The results showed 10 percent change in the unemployment rate will induce a 28.25 percent decrease in real housing

		prices.
	Xu and Tang (2014)	Unemployment rate gives a positive effect towards house prices. It means that an increasing in unemployment rate can be followed by the rising in house price.
Corruption Index	Transparency International (2017)	Australia, Canada, the United Kingdom and United States are identified as the top four hot spots targeted by corrupt officials or criminals.
	Shaari et al., (2016)	Corruption Index has negative effect on housing price and also higher corruption perception index (low corruption/clean) will significantly contribute to higher housing prices. Housing price in Singapore keeps increasing, even though the corruption index is very clean.

Table 2.5 Summary for Literature Review

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 INTRODUCTION

This research is specifically focusing on the relationship between macroeconomic variables and housing price in Australia, Canada, China, Hong Kong, Indonesia, Japan, Malaysia, New Zealand, Singapore and South Korea. In this chapter, it will explain about the methodology that will be used in this study. Moreover, in this chapter will also explain the detailed procedures of data collection. This study will explain about data sampling, theoretical framework, hypothesis statement and statistical or econometric method.

3.2 SAMPLING

The population for this study is Asia-Pacific region. This study will focus on relationship between the variables whether they have significant relationship with each other. The samples that are being used for this study are Australia, Canada, China, Hong Kong, Indonesia, Japan, Malaysia, New Zealand, Singapore and South Korea. The sample period used for each country is annually from year 2006 to year 2016.

3.3 DATA COLLECTION

All of data are collected from IMF, World Development Bank and International Financial Statistics except for Housing Price Index and Corruption Index. Housing price indexes are obtained from property price statistics in BIS, meanwhile Corruption Index are collected from Transparency International.

3.4 VARIABLES

The dependent variable that will be used in this study is Housing Price Index. This variable will be affected by the independent variables. In this research, the independent variables used are gross domestic product (GDP), inflation rate, interest rate, unemployment rate, population and corruption index.

3.5 HYPOTHESES STATEMENT

Hypothesis 1:

H0: There is no significant relationship between GDP and house prices.

H1: There is a significant relationship between GDP and house prices.

Hypothesis 2:

H0: There is no significant relationship between inflation rate and house prices.

H1: There is a significant relationship between inflation rate and house prices.

Hypothesis 3:

H0: There is no significant relationship between interest rate and house prices.

H1: There is a significant relationship between interest rate and house prices.

Hypothesis 4:

H0: There is no significant relationship between unemployment rate and house prices.

H1: There is a significant relationship between unemployment rate and house prices.

Hypothesis 5:

H0: There is no significant relationship between population and house prices.

H1: There is a significant relationship between population and house prices.

Hypothesis 6:

H0: There is no significant relationship between corruption index and house prices.

H1: There is a significant relationship between corruption index and house prices.

3.6 RESEARCH METHODOLOGY

3.6.1 Descriptive Analysis

Descriptive statistics are brief descriptive coefficients that summarize a given set of data which can be either a representation of the entire population or sample of it. Such summaries may be either quantitative, i.e. summary statistics, or visual. These summaries may either form a basis of initial description of the data as part of a more extensive statistical analysis, or they may be sufficient in and of themselves for a particular investigation. Descriptive analysis provides the details on the normality of the series.

3.6.2 Panel Unit Root Test

Recent literature suggests that panel unit root tests have higher power compared to unit root tests based on individual time-series. This is because the variation across countries adds a great deal of information to the variation across time, resulting in potentially more precise parameter estimates. There are five types of panel unit root tests: Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher-type tests using ADF and PP tests as well as Hadri (2000).

3.6.3 Pearson Correlation Coefficient

Correlation between sets of data is a measure of how well the independent variable and dependent variable are related. Pearson Correlation is the most common measure of correlation in statistics. Pearson Correlation Coefficient is a measure of the linear dependence between independent variables and dependent variable giving results between +1 and -1 inclusive, where positive value indicates a positive linear relationship between the two variables and the negative value indicates a negative linear relationship between the two variables.

3.6.4 Panel Regression Model

The fundamental advantage of a panel data set over a cross section is that it will allow the researcher great flexibility in modelling differences in behaviour across individuals. The basic framework for this discussion is a regression model of the form

$$yit = \alpha + \beta Xit + \varepsilon it, \text{ for } I = 1,2,\ldots,N, \text{ and } t = 1, 2, \ldots,T$$

Where, y is the dependent variable, X is the independent variable, α and β are coefficients, i and t are indices for individuals and time. The error εit is very important in this analysis. Assumptions about the error term determine whether we speak of fixed effects or random effects.

3.7 SUMMARY

In this chapter, it discusses about the samples that being selected in this research which is within Asia-Pacific countries and how the samples of data are being collected. Besides that, statement of hypothesis has been established for each variable. Lastly, this chapter also describes the method used for this research such as descriptive analysis, panel unit root test, pearson correlation and panel regression model.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter discusses the results of this research on the impact of the macroeconomic factors towards the housing price in Asia-Pacific. The analyses were done based on data collected and analysed using Eviews 9.0. Research findings were illustrated by figures and tables. All of the analysed data and findings were discussed based on research objective and research question.

4.2 DESCRIPTIVE ANALYSIS

	HPI	GDP	INF	IR	POP	UEM	CI
Mean	2.9047	3.8599	2.6168	3.0927	1.0531	4.6723	0.4116
Maximum	25.8056	15.2404	13.1094	11.7821	5.3215	10.3000	13.9535
Std. Dev.	6.2487	3.3102	2.1591	2.5657	0.8221	1.6402	4.0594
Skewness	0.8519	0.6419	1.4685	-0.0707	1.8766	0.8967	0.4432
Kurtosis	4.7724	4.5960	7.4750	3.8396	9.9675	3.4319	4.8232
Prob. Jarque-Berra	0.0000	0.0001	0.0000	0.1899	0.0000	0.0004	0.0001

Table 4.2 Results for Descriptive Analysis

Table 4.2.1 shows summary statistics of the variables. First of all, the mean values for all variables are greater than zero and most of the standard deviation values are greater than one (HPI, GDP, INF, IR, UEM and CI) except POP where the value of standard deviation is 0.8221.

Next, the skewness values for HPI, GDP, INF, POP, UEM and CI are 5.8798, 0.6419, 1.4685, 1.8766, 0.8967 and 0.4432 respectively, indicating that the variables are positively skewed or skewed to the right. The skewness value of IR (-0.0707) indicating that the variable is negatively skewed or skewed to the left. In addition, all the variables have positive kurtosis value. Jarque-Berra is statistically significant for

IR since the p-value (0.1899) is more than 5 percent significance level except GDP, INF, POP, UEM and CI.

4.3 PANEL UNIT ROOT TEST

There are several statistical panel unit root test. For this research, ADF-Fisher Chi-square will be used to test on stationary data. The hypotheses related are

H0: Data is non stationary

H1: Data is stationary

	GDP	INF	IR	POP	UEM	CI
ADF	0.0001	0.0006	0.0000	0.0035	0.0161	0.0000

Table 4.3 Result for Panel Unit Root Test using ADF-Fisher Chi-square

Based on the table, the results showed that GDP, INF, IR, POP, UEM and CI have probability value below than 5 percent significance level. This means that the null hypothesis had been rejected. Therefore, the results show that the data is stationary.

4.4 PEARSON CORRELATION

Correlation t-statistic Probability	HPI	GDP	INF	IR	POP	UEM	CI
HPI	1.0000 …. ….						
GDP	0.1026 1.0724 0.2859	1.0000 … …					
INF	-0.2720 -2.9375 0.0040	0.3188 3.4953 0.0007	1.0000 … …				
IR	0.0465 0.0802 0.6296	-0.1361 -1.4272 0.1564	-0.1214 -1.2709 0.2065	1.0000 … …			
POP	0.0802 0.8365 0.4047	0.1375 1.4423 0.1521	0.2519 2.7052 0.0079	0.1362 1.4287 0.1560	1.0000 … …		
UEM	-0.0643 -0.6691 0.5049	-0.1274 -1.3352 0.1846	0.2855 3.0964 0.0025	-0.0154 -0.1602 0.8730	-0.0307 -0.3187 0.7506	1.0000 … …	
CI	-0.0850 -0.8870 0.3770	0.2314 2.4724 0.0150	0.3276 3.6038 0.0005	-0.1137 -1.1892 0.2370	-0.0847 -0.8835 0.3789	0.1814 1.9169 0.0579	1.0000 … …

Table 4.4 Correlation Matrix

The top value from the table shows the correlation coefficient, the middle value shows the t-test statistic and the bottom value shows the p-value for the t-test statistic. From the table, the p-value for INF (0.0040) is less than 5 percent significance level and it means that the null hypothesis can be rejected. Therefore, INF has positive correlation with HPI. However, the p-values for GDP, IR, POP,

UEM and CI are above 5 percent significance level and means that the null hypothesis can be accepted. This can conclude that there is no correlation between HPI and GDP, HPI and IR, HPI and POP, HPI and UEM as well as HPI and CI.

4.5 PANEL REGRESSION MODEL

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.5372	2.2115	0.6951	0.4886
GDP	0.4221	0.1917	2.2016	0.0299
INF	-1.1658	0.3190	-3.6548	0.0004
IR	0.0192	0.2293	0.0839	0.9333
POP	1.1550	0.7463	1.5476	0.1248
UEM	0.3247	0.3788	0.8571	0.3934
CI	-0.0100	0.1545	-0.0649	0.9483
R-squared	0.1402			
Adjusted R-squared	0.0901			
Prob(F-statistic)	0.0146			

Table 4.5 Panel Regression Model

Based on Table 4.5.1, the estimated regression model can be built as below:

$$HPI = 1.5372 + 0.4221(GDP) – 1.1658(INF) + 0.0192(IR) + 1.1550(POP) + 0.3247(UEM) + 0.3456(CI) + e$$

Where, HPI = Housing Price Index

GDP = Gross Domestic Product

INF = Inflation Rate

IR = Interest Rate

POP = Population

UEM = Unemployment Rate

CI = Corruption Index

e = Error

Figure 4.5 Estimated Regression Model

From the table above, the p-values for GDP (0.0299) and INF (0.0004) are less than 5 percent significance level which is significant to the HPI. Thus, the result shows that GDP has positive relationship with HPI and INF has negative relationship with HPI. The coefficient value for GDP (0.4421) means that a one percent increase in GDP increases the HPI by 0.4421 percent. The coefficient value for INF (-1.1658) means that a one percent increase in INF decreases the HPI by 1.1658 percent. Meanwhile, IR, POP, UEM and CI are not found to have significant relationship with HPI since the p-value is more than 5 percent significant level.

Moreover, the R-squared value is 0.1402 means that the independent variables (GDP, INF, IR, POP, UEM and CI) can explain 14.02 percent of the variations in dependent variable (HPI). The value of adjusted R-squared is 0.0901 and it means that the independent variables can explain 9.01 percent of the variation in dependent variable (HPI) after adjustments. Meanwhile, the p-value for F-statistic (0.0146) is less than 5 percent significance level means that we can reject the null hypothesis and it can conclude that at least one of the independent variables is useful in predicting HPI.

4.6 DISCUSSION ON ANALYSIS AND RESULTS

At the end of the result, it is found that inflation rate has positive correlation with housing price index and it has negative relationship with housing price. It means that housing price will decrease when inflation rate is increased. Meanwhile, GDP is found to have positive relationship with housing price index but it is not correlated. It means that when GDP increased, housing price index will also increase. The result is consistent with research conducted by Shaari et al., (2016) suggest that as the nation economic growth increased, it will cause the housing price to be higher as demand for houses increase.

4.7 SUMMARY

Overall, this chapter discusses about the results of findings by using different methods such as descriptive analysis, panel unit root test, pearson correlation and panel regression model. Based on the results, GDP and inflation rate have significant relationship with house price.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

The aim of this chapter is to present the conclusion drawn from the results of the analysis and then make recommendation for further research.

5.2 CONCLUSION

This research analyse the relationship between macroeconomic factors (GDP, inflation rate, interest rate, unemployment rate, population and corruption index) and housing price in Asia-Pacific countries. This research has basically reviewed selected literature on housing price in Asia-Pacific on several macroeconomic factors. Based on the discussions, this research concludes that GDP and inflation rate are significant factors that mostly affect the housing price in Asia-Pacific. The findings show that GDP has positive significant relationship and inflation rate has negative significant relationship with housing price index.

5.3 RECOMMENDATION

There are several ways to improve this research. Firstly, future researcher could extent the research to consider properly for each country by studying them individually and also could consider the period by extending the period range in order to get better and reliable results. Moreover, future researcher also should consider other significance variables such as mortgage rate, household income and exchange rate by replacing the irrelevant variables that will further improve the model. However, these variables are not included in this research. In the future, it is hoped that other researchers will pursue the housing price fluctuation and those variables mentioned above.

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APPENDICES

APPENDIX A

Descriptive Statistic

	HPI	GDP	INF	IR	POP	UEM	CI
Mean	2.904677	3.859852	2.616811	3.092731	1.053142	4.672273	0.411577
Median	2.255620	3.114634	2.217017	3.166490	0.978736	4.200000	0.000000
Maximum	25.80563	15.24038	13.10942	11.78209	5.321517	10.30000	13.95349
Minimum	-11.92270	-5.417120	-1.346719	-3.903257	-0.200321	1.900000	-11.76471
Std. Dev.	6.248669	3.310153	2.159104	2.565704	0.822053	1.640200	4.059372
Skewness	0.851882	0.641940	1.468501	-0.070669	1.876592	0.896733	0.443245
Kurtosis	4.772353	4.595984	7.475025	3.839553	9.967464	3.431851	4.823157
Jarque-Bera	27.70187	19.22943	131.3209	3.322119	287.0631	15.59716	18.83643
Probability	0.000001	0.000067	0.000000	0.189938	0.000000	0.000410	0.000081
Sum	319.5144	424.5837	287.8492	340.2004	115.8456	513.9500	45.27345
Sum Sq. Dev.	4255.999	1194.326	508.1288	717.5292	73.65912	293.2379	1796.157
Observations	110	110	110	110	110	110	110

APPENDIX B

Panel Unit Root Test

Panel unit root test: Summary
Series: GDP
Date: 06/16/17 Time: 15:17
Sample: 2006 2016
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-7.19648	0.0000	10	97
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.25764	0.0000	10	97
ADF - Fisher Chi-square	53.4182	0.0001	10	97
PP - Fisher Chi-square	57.0370	0.0000	10	100

Gross Domestic Product

Panel unit root test: Summary
Series: INF
Date: 06/16/17 Time: 15:18
Sample: 2006 2016
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-6.46638	0.0000	10	97
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.57557	0.0002	10	97
ADF - Fisher Chi-square	46.8218	0.0006	10	97
PP - Fisher Chi-square	63.7256	0.0000	10	100

Inflation Rate

Panel unit root test: Summary
Series: IR
Date: 06/16/17 Time: 15:19
Sample: 2006 2016
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-6.72999	0.0000	10	98
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.85527	0.0000	10	98
ADF - Fisher Chi-square	61.1446	0.0000	10	98
PP - Fisher Chi-square	83.4710	0.0000	10	100

Interest Rate

Panel unit root test: Summary
Series: POP
Date: 06/16/17 Time: 15:22
Sample: 2006 2016
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.34220	0.3661	10	96
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.16676	0.1217	10	96
ADF - Fisher Chi-square	41.2009	0.0035	10	96
PP - Fisher Chi-square	24.7577	0.2109	10	100

Population

Panel unit root test: Summary
Series: UEM
Date: 06/16/17 Time: 15:24
Sample: 2006 2016
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.43822	0.0000	10	96
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.33294	0.0098	10	96
ADF - Fisher Chi-square	35.8324	0.0161	10	96
PP - Fisher Chi-square	31.2944	0.0514	10	100

Unemployment Rate

Panel unit root test: Summary
Series: CI
Date: 06/16/17 Time: 15:26
Sample: 2006 2016
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-8.36063	0.0000	10	97
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.61186	0.0000	10	97
ADF - Fisher Chi-square	64.6722	0.0000	10	97
PP - Fisher Chi-square	85.4007	0.0000	10	100

Corruption Index

APPENDIX C

Pearson Correlation Matrix

Covariance Analysis: Ordinary
Date: 06/16/17 Time: 15:31
Sample: 2006 2016
Included observations: 110

Correlation t-Statistic Probability	HPI	GDP	INF	IR	POP	UEM	CI
HPI	1.000000						

GDP	0.102647	1.000000					
	1.072407	-----					
	0.2859	-----					
INF	-0.272000	0.318788	1.000000				
	-2.937460	3.495302	-----				
	0.0040	0.0007	-----				
IR	0.046497	-0.136056	-0.121388	1.000000			
	0.483731	-1.427207	-1.270903	-----			
	0.6296	0.1564	0.2065	-----			
POP	0.080234	0.137471	0.251912	0.136199	1.000000		
	0.836513	1.442334	2.705191	1.428740	-----		
	0.4047	0.1521	0.0079	0.1560	-----		
UEM	-0.064250	-0.127430	0.285542	-0.015411	-0.030651	1.000000	
	-0.669085	-1.335173	3.096352	-0.160178	-0.318689	-----	
	0.5049	0.1846	0.0025	0.8730	0.7506	-----	
CI	-0.085046	0.231447	0.327633	-0.113687	-0.084710	0.181395	1.000000
	-0.887042	2.472395	3.603773	-1.189180	-0.883512	1.916911	-----
	0.3770	0.0150	0.0005	0.2370	0.3789	0.0579	-----

APPENDIX D

Panel Regression Method

Dependent Variable: HPI
Method: Panel Least Squares
Date: 06/16/17 Time: 16:27
Sample: 2006 2016
Periods included: 11
Cross-sections included: 10
Total panel (balanced) observations: 110

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.537170	2.211510	0.695077	0.4886
GDP	0.422117	0.191735	2.201561	0.0299
INF	-1.165752	0.318965	-3.654799	0.0004
IR	0.019245	0.229337	0.083914	0.9333
POP	1.155007	0.746300	1.547644	0.1248
UEM	0.324676	0.378824	0.857064	0.3934
CI	-0.010034	0.154498	-0.064943	0.9483

R-squared	0.140153	Mean dependent var	2.904677
Adjusted R-squared	0.090065	S.D. dependent var	6.248669
S.E. of regression	5.960637	Akaike info criterion	6.469753
Sum squared resid	3659.507	Schwarz criterion	6.641602
Log likelihood	-348.8364	Hannan-Quinn criter.	6.539456
F-statistic	2.798128	Durbin-Watson stat	1.660048
Prob(F-statistic)	0.014586		