Macroeconomic factors and housing prices in high income and low-income states in Malaysia

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Abstract
The development of housing industry in a country is vital as it is viewed as an economic barometer and contribute significantly to the wellbeing of the society. In Malaysia, the Housing Price Index shows an increasing trend (since it was introduced in 1993) and has outstripped the increase in income levels, lead to a serious unaffordability problem, particularly in several states in Malaysia. Previous studies mostly focus on examining the link between macroeconomic factors and housing price in the context of Malaysia in general, but there were limited studies done in the context of the states in Malaysia. This study aims to examine the impact of macroeconomic factors towards the housing price between higher income and lower income states in Malaysia. Panel regression model were employed using secondary data from 14 states in Malaysia between 2005 to 2017. Results shows that unemployment is not a significant factor that influence housing price in both high- and low-income states. Gross Domestic Product appeared to have higher significant impact towards the housing price in high-income states. Meanwhile, population recorded a significant and an inverse relationship with housing price in both high and low-income states in Malaysia, but the impact is bigger on the low-income states.

Introduction
The development of housing industry in a country is vital as it is viewed as an economic barometer and contribute significantly to the wellbeing of the society. Economic and sociological scholars documented the importance of residential property on economic development and stability, and residential housing reported as a major component of household expenditure (Trofi mov, Md. Aris, & C.D. Xuan, 2018). The housing prices is one of the most researched topics, as it is palpably high related to the people’s cost and standard of living. Therefore, housing price ought to be affordable to benefit the people and should be monitored consistently by the policy makers. In Malaysia, houses remained unaffordable to many households due to factors such as unresponsiveness of housing supply to effective demand (Khazanah Research Institute, 2015), and failure in the market to produce a sufficient quantity of affordable housing for the people (Su Ling, Almeida, & Wei, 2017).

Housing price movements in Malaysia reflected by Malaysia Housing Price Index (MHPI). The MHPI was first introduced in 1993, and up until 2017, it shows an increasing trend throughout the period. This has become an alarming concern for the policy makers as it is affecting the consumer’s housing affordability which indirectly impacting the society’s welfare. Using the Median Multiple(MM) approach, housing affordability also defined as the house price-to-income ratio of 3.0 and below (Su Ling & Almeida, 2016). In 2014, the housing affordability ratio in Malaysia was 4.4, indicates that houses in Malaysia as a whole, were ‘seriously unaffordable’. Meanwhile, within Malaysia, houses in Terengganu, Kuala Lumpur, Penang, and Sabah were ‘severely unaffordable’. Unaffordability exist when the housing prices persistently increasing, but income level are not. Hence, research on the housing prices or income levels are certainly purposeful.

Median monthly household income in Malaysia (national level) recorded at RM5228. Wilayah Persekutuan Kuala Lumpur recorded the highest median monthly household income at RM9073. Apart
from Wilayah Persekutuan Kuala Lumpur, the states of Selangor, Johor, Melaka, and Pulau Pinang recorded higher median monthly household income as compared to the national level. Therefore, the states which recorded higher median income than the national level are categorized as the higher income states. On the other hand, the states of Terengganu, Negeri Sembilan, Perlis, Sarawak, Sabah, Perak, Pahang, Kedah and Kelantan registered a lower median monthly income between RM3079 to RM 4694 which is below the median income of the national level. Therefore, these states are categorized as the lower income states.

Meanwhile, researches on housing prices from macroeconomic perspective mainly focus on macroeconomic components such as the Gross Domestic Product (GDP), population, inflation, unemployment rate, and money supply. GDP growth found to be a significant factor which influence the housing price, as it will increase the per capita income, enhance consumption ability which leads to an increase in housing price. In addition, GDP were also used for supporting facilities which increase the housing value added, and therefore will push the price up (Guo & Wu, 2013). However, GDP could have much less significant impact of the dynamic of housing price level (Gaspar, 2017), or not significant at all (Grum & Kobe, 2016), as there were other factors which have a stronger links on housing price, and differences in economic characteristics. Population and housing price are positively related (Mariadas, Selvanathan, & Hong, 2016), as increasing in total population leads to an increase in aggregate demand and therefore force the market price to rise. On the contrary, population factors could be insignificant when there are other factors which have a stronger effects on housing prices (Guo & Wu, 2013).

In addition, unemployment could influence housing price in a negative relationship. Higher is the unemployment, lower is the price per square meter of residential property (Grum & Kobe, 2016). Even though most of previous study found that unemployment and housing price are significantly and inversely related, the impact of unemployment towards the housing price is different depending on the area of observation. A high rate of unemployment in a country does not ensure a significant impact on housing price, and vice versa (Grum & Kobe, 2016).

Previous studies reported contradict findings on the impact of macroeconomic factors towards housing prices. In the case of Malaysia, most studies focus on examining the impact of macroeconomic factors towards the housing price in the context of Malaysia in general, but there were limited studies done in the context of the states in Malaysia. Therefore, this study aims to examine the impact of macroeconomic factors towards the housing price in higher income and lower income states in Malaysia. In the next section, literature review on housing price and macroeconomic factors and economic inequality will be discussed. Third section will elaborate on the data and methodology, followed by the discussion and findings, and final section will conclude.

**Literature Review**

Unemployment rate is the number of unemployed people as a percentage of the labour force, where the latter consists of the employed plus those in paid or self-employment. When unemployment rate is high, demand for houses will decrease as a result of decreasing in consumer’s affordability to buy house, hence force the market price to fall. This indicate the negative relationship between unemployment rate and the housing price. A study by (Grum & Kobe, 2016) on the prices of real estates in various cultural environment found that unemployment significantly influence the price of real estates in Greece, Poland, France and Norway, but not a significant factor in Slovenia. The study further conclude that high rate of unemployment doesn’t ensure the significant of influence on real estate’s prices. In the case of Malaysia, a study by (A. Aziz, 2013) found that unemployment had a significant impact on Malaysian Housing Price Index.

Gross Domestic Product (GDP) measures the total amount of income earned within a country regardless of a citizenship. GDP value reflects the countries national income. Higher GDP indicates higher per capita income which reflects individual’s ability to purchase properties, thus increase the demand for housing and lead to a higher market price. In Malaysia, more percentage of its residents earning higher income, leads to higher demand for higher prices properties (A. Aziz, 2013). Therefore, there would be a direct relationship between the GDP and the housing price (Osmadi, Kamal, Hassan, & Fattah, 2015). Impact of GDP towards house price is supported by (Kok, Ismail, & Lee, 2018) in their study on the changes of Malaysia’s house price index using impulse response analysis which conclude that the effect of
real GDP on house prices persist comparably longer and stronger. However, each country is different economically and therefore leads to different findings on the link between the GDP and real estate prices. When some studies support the theory in which the GDP affects the price of housing commodity through various aspects and factors (Guo & Wu, 2013), others found that real estate prices have not been linked to the GDP (Gaspar, 2017; Grum & Kobe, 2016; Pillaiyan, 2015).

Population is the main key factor which affecting the house price (Kamal, Hassan, & Osmadi, 2016), as people will move to the area houses are built or the area which more convenience or have more people living in such as urban area (Mariadas et al., 2016). As such, urban population growth could have a bigger impact on housing price as demand is on pricier residential properties (A. Aziz, 2013). As population increase, it indicates the number of family members increases, hence need more houses to live, and lead to a higher market price for houses (Ong, 2013). The significant impact and positive relationship between the population and housing prices was supported by the study by(Osmadi et al., 2015; Trofimov et al., 2018). However, population ageing could have a negative effect on housing market. When most people are elderly, they usually own more than one house assets, so the intention to buy more assets is low, which will reduce the housing demand (Wang, Wang, & Zhang, 2015). Furthermore, total population in Malaysia has include immigrants whom staying in the country for a short period of time. Hence, they would rather rent a house instead of buying (Mulder, 2006).

Inequality is the state of not being equal, in which it concerns variations in living standards across a whole population(McKay, 2002). Inequality has many dimensions such as income and wealth, age, education, employment status, and marital status (Díaz-Giménez, Quadridi, & Rios-Rull, 1997). Economic inequality is a state of inequality in the distribution of income and assets in a population. This study will focus on economic inequality which relates to the differences in income and wealth in different states in Malaysia. Economic inequality in Malaysia can be identified using the median monthly income data by states from the Department of Statistics, Malaysia. The median monthly income data is able identify the higher income and lower income states by comparing the median monthly income by states with the average median monthly income in Malaysia.

Differences in income and wealth level contributes to the differences in housing affordability among the society (Yap & Ng, 2018). Higher income indicates higher housing affordability which reflects higher demand for houses, thus contributes to an increase in housing prices. Thus, prices and inequality endogenously interact (Zhang, 2015), as previous study evidently highlighted that increasing in absolute income inequality contributed to the rise in real house prices (Godá, Stewart, & Torres, 2016). The plausible factors contributes are the process of bidding, speculation, and increasing housing consumption at the top (an increase in the numbers of richer people will allow this group to ‘consume’ more housing) (Green & Shaheen, 2014). However, influences of income inequality on affordability for low income group could be different depending on the status of ownership such as renters or owners (Dewilde, 2011). Other than that, the types of income inequality could produce a different outcomes, as relative income inequality found not cointegrated with the housing price (Godá et al., 2016). Therefore, contradict conclusion is possible, in which an income inequality is not a determinant of housing price (Arshad, Ismail, & Rahman, 2018; Baranoff, 2016).

Hence, macroeconomic factors evidently influence the housing price in previous studies. The fact that the housing price index is continuously increasing in Malaysia provide an opportunity to investigate on the impact of macroeconomic factors in Malaysia, particularly between high income and low-income states.

**Data and methodology**

Secondary data was collected from various sources which are the National Property Information Centre (NAPIC), Economic Planning Unit (EPU), Annual Economic Report, Bank Negara Annual Report, and Department of Statistic. Panel data was obtained from all fourteen states (including Federal Territory) in Malaysia which are Kuala Lumpur, Negeri Sembilan, Melaka, Pahang, Johor, Perak, Penang, Kedah, Kelantan, Terengganu, Sarawak, and Sabah. The period of analysis is from 2005 to 2017.

In this study, the following panel regression model was formed to examine the link between housing price index as the dependent variable, with independent variables which include employment rate, GDP, and population. This regression model is based on (Mihaljek, 2007):
where HPI\textsubscript{it} (Housing Price Index) is an indicator for housing prices for state \textit{i} in year \textit{t}. UN (unemployment), GDP (Gross Domestic Product), POP (population), are macroeconomic variables as the independent variables. \(\alpha, \beta_1, \beta_2, \beta_3\) are regression coefficient and \(\varepsilon_{it}\) is the error term.

The same multiple regression model used to determine the factors influence housing price in high income and low-income states. High income states and low-income states differentiated according to the level of median income by states obtained from the Department of Statistics Report. Median monthly household income in Malaysia (national level) recorded at RM5228. The states which recorded higher median income than the national level is categorized as the higher income states which are Wilayah Persekutuan Kuala Lumpur, Selangor, Johor, Melaka, and Pulau Pinang. On the other hand, the states of Terengganu, Negeri Sembilan, Perlis, Sarawak, Sabah, Perak, Pahang, Kedah and Kelantan registered a median monthly income below the median income of the national level categorized as the lower income states.

**Findings and Discussion**

Correlation analysis was performed to identify the relationship and correlation level between the variables in all states, and the result shown in Table 1. Results shows that there is a weak correlation between the housing price index and the other variables. The strongest correlation to the Housing Price Index is the Gross Domestic Product at 0.3603, while the weakest is unemployment at 0.0439. Unemployment correlated negatively to the Housing Price Index, while Gross Domestic Product and population shows a positive correlation. However, correlation level does not imply causation, therefore further analysis needs to be employed to achieve the objective of the study.

![Image](https://example.com/table1.png)

The level of significant for Breusch and Pagan Lagrangian multiplier (BPLM) test for the study is less than 0.05, indicates that the data cannot be pooled by panel OLS. Hence, data analysis continued with the Hausman test to determine between random effect and fixed effect model. The result of the Hausman test indicate that fixed effect model will be used. Mean VIF score for all regression models is lower than 10, indicates the models are free from multicollinearity problem. Modified Wald Test result indicate the models for all states and low-income states suffered from heteroskedasticity, however, high income model is homoskedastic. All three models suffered from autocorrelation problem as indicated by the result of Wooldridge test. Hence, all states and low-income states models were corrected for heteroskedasticity and autocorrelation problem, meanwhile high-income model was corrected for autocorrelation problem.

Table 2 shows the panel regression result for all states, the fixed effects, and corrected heteroskedasticity and autocorrelation. Corrected heteroskedasticity and autocorrelation result shows that GDP and population significantly influence the housing price in Malaysia at 99% confidence level. However, unemployment rate found to be insignificant towards the housing price. The Gross Domestic Product recorded a positive relationship with housing price, but the relationship between the population and the housing price shows otherwise.

![Image](https://example.com/table2.png)
Table 3 shows the summary of panel regression findings for high income and low-income states in Malaysia. Both high income and low-income states recorded a non-significant influence of unemployment towards the housing price. However, the result shows that Gross Domestic Product and population significantly influence the housing price index at 99% confidence level. Results on the relationship between the variables in high income and low-income states is in line with the result for all states, whereby the GDP shows a positive relationship, meanwhile population shows a negative relationship with the housing price.

### Table 3: Results of Panel Regression Analysis for high income states and low-income states

<table>
<thead>
<tr>
<th>Variables</th>
<th>High Income States</th>
<th>Low Income States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fixed Effect</td>
<td>Corrected Serial Correlation</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.052***</td>
<td>-415.4***</td>
</tr>
<tr>
<td></td>
<td>444.3</td>
<td>126.4</td>
</tr>
<tr>
<td>lnun</td>
<td>11.84***</td>
<td>3.998</td>
</tr>
<tr>
<td></td>
<td>4.286</td>
<td>2.715</td>
</tr>
<tr>
<td>lnGDP</td>
<td>86.27***</td>
<td>78.79***</td>
</tr>
<tr>
<td></td>
<td>19.27</td>
<td>12.71</td>
</tr>
<tr>
<td>lnPop</td>
<td>154.3*</td>
<td>-45.12**</td>
</tr>
<tr>
<td></td>
<td>83.65</td>
<td>21.99</td>
</tr>
<tr>
<td>BP-LM Test</td>
<td>(0.0002)***</td>
<td>-</td>
</tr>
<tr>
<td>Hausman Test</td>
<td>(0.0000)***</td>
<td>-</td>
</tr>
<tr>
<td>Multicollinearity (VIF Test)</td>
<td>2.89</td>
<td>-</td>
</tr>
<tr>
<td>Heteroskedasticity (Modified-Wlad Test)</td>
<td>(0.8505)</td>
<td>-</td>
</tr>
<tr>
<td>Serial Correlation (Woolridge Test)</td>
<td>(0.0000)***</td>
<td>-</td>
</tr>
<tr>
<td>Observations</td>
<td>65</td>
<td>65</td>
</tr>
</tbody>
</table>

Notes: Figures in parentheses are robust standard errors (for variables only). ***, ** and * denotes significance at 1%, 5% and 10% level, respectively. BP-LM represent Breusch and Pagan Lagrangian Multiplier Test, whereas VIF represent Variance Inflation Factor. Symbol ‘-’ indicates non-related test for the model.
increase (A. Aziz, 2013; Kok et al., 2018; Osmadi et al., 2015). While economic inequality is evidently not a contributing factor towards the changes in housing price (Arshad et al., 2018; Baranoff, 2016; Goda et al., 2016), the coefficient level indicates that the impact of GDP towards the housing prices is higher in high-income states. On the other hand, the inverse relationship between the population and housing price can be explained using the population ageing and the motives of demand factors. Higher rate of population ageing in a country reflects the lower demand for housing as this group usually own more than one house assets, which therefore reduce the housing demand in the country (Wang et al., 2015). Motives of demand refers to the immigrants who demand houses for rental rather than ownership (Mulder, 2006). Population recorded a significant and negative relationship towards the changes in housing price in both high and low-income states. However, population appeared to be more significant (99 percent confidence level) and higher impact (coefficient value is 57.19) towards the housing price in low-income states as compared to the high-income states which recorded a significant level of 95 percent confidence level and coefficient value is 45.12. The Low-income states demand for houses as a necessity for the household, however high income states are more motivated by the profitable investment in housing (Dewilde, 2011) as the level of affordability is higher than the low-income states.

Conclusion

The focus of this study is to examine the influence of macroeconomic factors towards the housing price in high- and low-income states in Malaysia. High- and low-income states were determined in accordance to the average mean income by states as compared to the Malaysia’s average mean income. The results of panel regression analysis show that unemployment is not a significant factor that influence the housing price in high income states, low income states, and Malaysia in general. Gross Domestic Product found to have a direct relationship with the housing price, but the impact is higher on high-income states. Meanwhile, population found to have an inverse relationship with the housing price, and evidently greater influence in low-income states. Thus, it will be interesting to further investigate on the causal relationship between the population and the housing price in future research. Furthermore, future research could enhance the study by segregating the population by age group to investigate on the negative relationship between the population and housing price.

References