THE DETERMINANTS OF HOUSING PRICES IN MALAYSIA

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ABSTRAK

Kertas kajian ini bertujuan untuk mengenal pasti faktor penentu harga rumah di Malaysia. Dalam kajian ini, kaedah kointegrasi dan Granger casuality digunakan untuk mengkaji hubungan dan kaitan antara harga rumah dan pembolehubah lain yang mungkin memberi kesan kepada perubahan harga rumah Malaysia seperti pendapatan, kos pembangunan bangunan kediaman, populasi dan aktiviti spekulasi. Spekulasi adalah fokus utama dalam kajian ini di mana pembuktian menunjukkan dengan jelas faktor ini mempengaruhi harga rumah di Malaysia. Selain itu, ujian Granger casuality dalam kerangka VAR turut menunjukkan wujudnya dwi-arah hubungan antara harga rumah dengan spekulasi. Secara ringkas, kerajaan perlu mengambil peranan aktif dalam memantau dan merekabentuk instrument dasar yang sesuai untuk membendung aktiviti spekulasi yang menyebabkan ketidakstabilan dalam harga rumah.

Kata kunci: Harga Rumah, Spekulasi, Granger casuality

ABSTRACT

This paper attempts to explore the significant factors that determine the housing price in Malaysia. In this study, cointegration and Granger causality approaches were employed to examine the long-run relationship and direction causality between housing price and other variables which may affect to the changes in housing price such as level of income, development cost of residential building, population and speculation. Speculation is the major concern in this paper, whereby it has determined housing price in Malaysia. Furthermore, Granger causality test within the VAR framework shows that a bi-directional causality does exist between housing prices and speculation. In summary, the government must take an active role to monitor and design an appropriate policy instrument to curb the speculation activity in housing price, which may cause volatility.

Keywords: Housing Price, Speculation, Granger casuality

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1. INTRODUCTION

Housing is an essential need for every humankind. Besides providing shelter for human being protection, it also contributes significantly to socio-economic development and the wellbeing of communities. According to the Report of Household Expenditure Survey 2014, the highest contributor to Malaysian mean monthly consumption expenditure was on Housing, water, electricity, gas & other fuels with a share of 23.9 per cent. The spending on this group is relatively higher than spending on the other basic necessities such as Foods & non-alcoholic beverages and Transport with the share of 18.9 per cent and 14.6 per cent, respectively. The composition of this group enlarged from 21.1 per cent of share recorded during 1993/94, and this expansion was largely attributed by higher housing price.

Based on Malaysian Housing Price Index compiled by National Property Information Centre (NAPIC), Malaysia's housing price grew faster at an average of 9.5 per cent from 2009 to 2015, as compared to an average of 3.4 per cent from 2000 to 2009. The growth was escalating faster than Malaysia's Gross National Income (GNI) per capita which grew by only 6.7 per cent in that particular period. This phenomenon has induced Malaysia housing price to become seriously unaffordable. It is reported that the average price of housing in Malaysia is 4.4 times more than the median annual income in the year 2014, increased further from 4.07 times in 2002, and 1.4 times higher than suggested (Khazanah Research Institute, 2015). Therefore, this issue attracts the interest of policymakers, market analysts and researchers to study further factors that drive Malaysia's housing price as it might consequently lead to detrimental impact towards economic and financial stabilities (Kiat et al., 2015).

By far, most available literature have discovered Gross Domestic Product (GDP), inflation, employment and demographic (Panagiotidis et al., 2015) as common macroeconomic determinants of housing prices. Meanwhile, taxation, loans, interest rates and household income are the determinants as the financial factors of which are closely related to the movement of housing prices. (Kiat et al., 2015). However, the exorbitant increase in Malaysia's housing prices has spurred debate of whether fundamental factors fully explain the increment or there is the role of speculation in determining house prices in Malaysia.

As for this paper, further investigation on existing macroeconomics variables will be done with the recent set of data over the study period of 1990 to the year of 2015, which consist of quarterly data of 25 observations. Concurrently, the investigation on knowing the significant role of speculation in determining housing prices in Malaysia will be the central concern in this study. The answer on the role of speculation in determining housing prices in Malaysia will be the main focus as understanding the link between housing price and speculation can provide some guidance for prudent housing policy.

This paper comprises five sections. The remainder of the paper is organised as follows. Section 2 provides an overview of the literature and highlights the contributions of this study. The data sources and methodology used to examine the questions of interest are discussed in Section 3. The empirical results are reported and discussed in the subsequent section, whilst Section 5 draws presents concluding remarks.

2. LITERATURE REVIEW

Most of the available literature discovered a common set of fundamental macroeconomic variables or financial variables as key determinants of housing prices in many markets worldwide, including Malaysia housing market. In this section, we will review existing literature and specify the new insights that our study attempt to fill in the gap with different econometric approaches.

From the existing literature, Pillaiyan (2015) addressed four significant macroeconomic drivers of Malaysian house prices which have a strong long term relationship, i.e. inflation, stock market, money supply and the number of residential loans approved. However, in his study, GDP is not identified as a driver of long term house prices.

Notwithstanding the above, Ong (2013) has put forth GDP and other variables such as population and Real Property Gain Tax (RPGT) in the study on housing price determination. The study found that all the variables are positively and significantly correlated with the housing price in Malaysia. The result is in tandem with Wheeler and Chowdhury's (1993) statement that the GDP has a link with the macroeconomic activity in the housing market.

Meanwhile, Osmadi et al. (2015) in their informative study indicated few elements that influence house prices in Malaysia including population, demand and supply, location, physical characteristic, accessibility, developer, cost of material, income and neighbourhood factors.

In another study, Kiat et al. (2015) examine the relationship of macroeconomic determinants and financial determinants with residential housing price in Malaysia. The study found that the inflation rate, employment and interest rate showed positive relationships with the house price index, whereas the exchange rate showed a negative relationship with the house price index. Furthermore, the study indicates that employment, exchange rate, and interest rate are highly significant toward the Malaysian residential housing price. In contrast, the inflation rate is not significant toward the residential housing price of Malaysia.

Although many studies attempt to explain the determinant factor that associates with housing price, only a few analyse the role of speculation activity. Park and Xiao (2009) had to study the role of fundamental factors and speculation in Seoul's housing price from the year 1986 to 2006. They found that both factor; fundamental such as GDP, wage and population, and speculative influence the housing prices in the short terms. By dismantling the price by type of residentials, the study reveals that the price of apartments is more responsive to the changes in both fundamental and speculative factor than other types of houses.

Similar work was also carried out by Ning and Hoon (2012) on analysing the effects of speculation on the real estate price bubble forming in Beijing and Shanghai real estate market. The study found that speculation is the important reason that causes a real estate bubble forming in both cities. Although the speculation level in Shanghai is higher than in Beijing, the effect of the speculation on housing bubble forming in Beijing is much stronger than Shanghai.

3. DATA SOURCES AND METHODOLOGY

In this section, we briefly describe the data used in this study and outline the empirical methodology adopted to characterise house prices determinants in Malaysia and to analyse the speculative effect towards housing prices in Malaysia.

3.1 DATA SOURCE

3.1.1 DEPENDENT VARIABLE - MALAYSIAN HOUSING PRICE INDEX (MPHI)

The annual Malaysian House Price Index (MHPI) of the year 1990 - 2015 from the National Property Information Centre (NAPIC) was utilised in the analysis as a dependent variable. MHPI represents the overall housing market in Malaysia, including the 13 states and 2 federal territories. The main objective of this index is to indicate how much the house price changes over time, as a result of inflation, holding other attributes constant.

3.1.2 INDEPENDENT VARIABLES

For independent variables, four variables were used in the analysis. All variables used for the analysis were annually data from the year 1990 to 2015 and sourced from the Department of Statistics Malaysia and NAPIC. The details on the respective variables are as follows:

i. **Gross National Income (GNI) per capita**
GNI is the sum of value added by all resident producers plus any product taxes (minus subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad divided by the total population. It reflects the average income of a country's citizens;

ii. **Population**
The population of a country is most simply defined as all those persons who are usually resident in the country. The current population estimates are generated using the cohort-component method where the population is updated based on the event of births, deaths and migration;

iii. **Building Materials Cost Index (BCI)**
The BCI is an index designed to measure the average rate of change in prices for 15 selected building materials utilised in 8 building categories in Malaysia. The BCI is based on the Laspeyres formula; and

iv. **Speculation Measurement (SI)**
Speculation can be defined as an activity of purchase or sale of assets in the hope of reselling or repurchasing the asset at a higher or lower price Carter (1998). It is often associated with expectations of a future event or a sense of how other investors might react to such expectations. The speculative behaviour on real estate market leads to the rise of a speculative bubble, an above-normal increase in property price which is not justified by intrinsic factors,

which contributes to the attainment of a price at which the bubble bursts and, consequently, causes market prices to free fall (Brzezicka, 2016).

In this study, speculation on house prices is measured by the differences between the observed house prices (P_t) and predicted house price fundamentals (P_t*). Intuitively, it is distinct from high house price inflation because the latter may simply reflect the increase in house price fundamentals.

$$SI = P_t - P_t^*$$

SI = Speculative measure
P_t = Observed house price
P_t^* = Predicted / intrinsic House price fundamentals

Since the exogenous variable in the model is known with certainty, or equivalently its distribution is a mass point, then the rational expectation is equivalent to perfect foresight. Is an unanticipated shock occurs to the demand variable, its effect on the future path of all market variables can be forecast correctly, even though the occurrence of the shock itself caught the market by surprise. In effect, market participants have perfect foresight with respect to the effects, but not the timing, of the shock.

With perfect foresight, real estate prices will equal the present discounted value of the future rents that actually unfold after the unanticipated shock. Thus prices at the time *t* will follow the asset market equilibrium condition with respect to the subsequent movement of rents that results from a shock (Abel and Blanchard 1986). The equilibrium return to capital (*r*) is assumed to be exogenous:

$$P_t = P_{t-1}(1 + r) - R_{t-1} \quad \text{(perfect foresight)}$$

P_t = the real price of the property asset at time t
P_{t-1} = the real price of the property asset at time t-1
r = the real total rents received during the period t
R_{t-1} = the time-varying real discount rate

3.2 METHODOLOGY

3.2.1 Model Specification

In this study, a simple model equation was set up to test the null hypothesis of MHPI does not Granger caused by in Malaysia. The basic equation can be presented as:

Growth of Malaysia Housing Price = f (GNIP, Pop, BCI, SI)

Where GNIP is GNI per capita, Pop is numbers of population and BCI is Construction Building Cost Index, and SI is Speculation Measurement.

3.2.2 Diagnostic Test

In order to determine the robustness of the model, diagnostic tests are implemented, namely Breusch-Godfrey Serial Correlation LM Test which to test the presence of serial correlation and Breusch-Pagan-Godfrey to test on the heteroscedasticity.

3.2.3 Unit Root Tests

The Augmented Dickey-Fuller (ADF) unit root tests were applied in this study. The equation is as follows:

$$\Delta Yt = \alpha + \beta Yt - 1 + \sum \quad \varphi \Delta yt - i + \in t$$

where Δ is the first difference operator; y_t shows series used in the study; t=1, t is an index of time; p represents the number of lags, which is determined based in the Schwarz Info Criterion (SIC); $\in t$ is a stationary random error term. The null hypothesis of nonstationary $(\beta = 0)$ is tested against the alternative hypothesis of stationary $(\beta, 0)$. If the calculated test statistic is higher than the critical values, the null hypothesis of nonstationary is rejected, which means that a unit root does not exist in the series. After examining the stationary properties for variables, if the unit root exists, then it is necessary to apply the cointegration test.

3.2.4 Cointegration Tests

Johansen multivariate cointegration technique, proposed by Johansen (1988) and Johansen and Juselius (1990), was used. This technique provides two different likelihood tests based on trace statistic and maximum eigenvalue statistics. The Trace test is a joint test that tests the null hypothesis of no cointegration (H0: r = 0) against the alternative hypothesis of cointegration (H1: r > 0). The Maximum Eigenvalue test conducts tests on each eigenvalue separately. It tests the null hypothesis that the number of cointegrating vectors is equal to r against the alternative of r+1 cointegrating vectors (Brooks, 2008).

3.2.5 Granger causality Tests

Granger causality test was performed after obtaining the cointegration test results. Granger (1987) and Granger (1988) point out that if two time-series variables are cointegrated, then at least one-directional Granger-causation exists. Therefore, the existence of a stable long-run relationship (cointegrating relationship) among House Price and other variables at least in one direction. Hence, there are two possible sources of causality: error correction term, which shows long-run causality and lagged explanatory variables, revealing short-run causality.

4. RESULTS AND DISCUSSION

4.1 Diagnostic Test

Table 1 shows the result of the diagnostic test using the Breusch-Godfrey Serial Correlation LM Test and Breusch-Pagan-Godfrey. The results found that serial correlation does exist. Although the autocorrelation does exist, the OLS estimator is still linear unbiased as well as consistent and asymptotically normally distributed but they are no longer efficient. Meanwhile, the heteroscedasticity test shows that the null hypothesis was not rejected ($p>0.05$) concluding the series have constant errors' variances.

Table 1: Diagnostic Test

Test	Chi-square statistics	*p*-value	Conclusion
Breusch-Godfrey LM Test	20.92654	0.0000	Serial correlation does exist
Breusch-Pagan-Godfrey	1.787738	0.5021	No heteroscedasticity

4.2 Unit Root Tests

The second step of our empirical work was to determine the degree of integration of each variable using Augmented Dickey-Fuller (Dickey and Fuller, 1979, 1981) test in order to avoid spurious causality or spurious absence of causality (Clark and Mirza, 2006). We find that all the variables are nonstationary in their level (except MHPI and SI), but become stationary after taking the first differences (see Table 2). Hence, we can conclude that all variables to be random walk indicating that all variables are integrated of order one, I(1). Importantly, none of the data series is I(2) or above. Therefore, it is justified for using the Johansen Multivariate Cointegration test to investigate the long-run relationships between variables.

Table 2: Augmented Dickey-Fuller (ADF) test

Variable	Augmented Dickey-Fuller	
	Level	First Difference
MHPI	-4.262227**	-6.101665**
	(-3.737853)	(-3.752946)
LOG(GNIP)	-1.290261	-5.184812**
	(-3.724070)	(-3.737853)
LOG(BCI)	-0.325582	-3.510945*
	(-3.724070)	(-3.737853)
LOG(POP)	-0.024889	-4.452842**
	(-3.752946)	(-3.752946)
SI	-4.629227**	-6.110835**
	(-3.737853)	(-3.752946)

Notes: (*) significance at 1% and (**) significance at 5 %
Critical Value based on MacKinnon (1996) one-sided p-values

4.3 Cointegration Tests

Unit root test does confirm that none of the series is integrated of I(2); therefore, we may apply Johansen Multivariate Cointegration test out to investigate the long-run relationships between variables. Table 3 indicates that there was three cointegrating equation at a 5 per cent significance level suggesting the long-run relationship does exist.

Table 3: Johansen Multivariate Cointegration test

Series: **HPI DLOG(GNIP) DLOG(BCI) SI D(G_POP)**

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.934031	130.8638	69.81889	0.0000
At most 1 *	0.782491	68.33657	47.85613	0.0002
At most 2 *	0.590567	33.24976	29.79707	0.0192
At most 3	0.402558	12.71116	15.49471	0.1258
At most 4	0.036865	0.863912	3.841466	0.3526

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

4.4 Granger causality

We have established that a long-run relationship exists between House Price and economic growth in Malaysian. However, the direction of causality is not clear from the Johansen cointegration test. Therefore, we shall conduct the Granger causality test for establishing the direction of causality within VAR framework. From Table 4, the null hypothesis of speculative measure (SI) does not Granger cause House Price (MHPI) is rejected at 10 per cent.

The result also shows that MHPI does not Granger cause SI is rejected at 5 per cent. The overall results conclude that bi-directional causality running between MHPI and speculation in Malaysia in the long-run.

Table 4: Granger causality test

Direction of causality	F-Statistic	Prob.
Causality from independent variables to House Price:		
SI does not cause Granger MHPI	3.51547	0.0741*
LOG(GNIP) does not cause Granger MHPI	0.66193	0.4250
LOG(BCI) does not cause Granger MHPI	1.08811	0.3088
LOG(POP) does not cause Granger MHPI	0.02829	0.8680
Causality from House Price to independent variables:		
MHPI does not cause Granger SI	5.73227	0.0256***
MHPI does not cause Granger LOG(GNIP)	0.36847	0.5503
MHPI does not cause Granger LOG(BCI)	0.43631	0.5161
MHPI does not cause Granger LOG(POP)	0.50419	0.4855

Note: ***,**,* denotes the significances level of variables at 1%, 5% and 10% respectively.

5. CONCLUDING REMARKS

The main objective of this paper is to provide empirical evidence on factor determination of housing price in Malaysia and its direction causality by using Granger causality approach. The empirical result suggests evidence of a long-run relationship between housing prices and other variables such as level of income, development cost of residential building, population and speculation in the cointegration test. Furthermore, Granger causality test within the VAR framework shows that a bi-directional causality does exist between housing prices and speculation. A major implication was found in our study, whereby housing price in Malaysia has evidently determined by speculation. In summary, it is suggested that the government must take an active role to monitor and design an appropriate policy instrument to curb the speculation activity in housing price, which may cause house price volatility.

REFERENCES

Abel, A. B., & Blanchard, O. J. (1986). The Present Value of Profits and Cyclical Movements in Investment. *Econometrica, 54*(2), 249-273.

Brooks, C. (2008). *Introductory Econometrics for Finance: 2nd Edition.* Cambridge: Cambridge University Press.

Brzezicka, J. (2016). Speculative Bubbles and Their Components on The Real Estate Market- A Preliminary Analysis. *Real Estate Management And Valuation, 24*(1), 87-99.

Capozza, D. R., Hendershott, P. H., Mack, C., & Mayer, C. J. (2002). Determinants of Real House Price Dynamics. *National Bureau of Economic Research Working Paper Series 9262*.

Carter, P. (1998). *Learning to Speculate.* Warsaw: Liber.

Cindy Liew, & Nuzul Azam Haron. (2013). Factors Influencing the Rise of House Price in Klang Valley. *International Journal of Research in Engineering and Technology*.

Clarke, J., & Mirza, S. (2006). A Comparison of some common methods for detecting Granger noncausality. *Journal of Statistical Computation and Simulation, 76*(3), 207-231.

Department of Statistics, Malaysia. (2015). *Report on Household Expenditure Survey 2014.* Putrajaya, Malaysia: Department of Statistics, Malaysia. Retrieved from https://www.dosm.gov.my/v1/index.php?r=column/cthree&menu_id=RWpud1h0cFA0dEFaRVZsdHpFaTRMdz09

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators of autoregressive time series with a unit root. *Journal of the American Statistical Association, 74*(366), 427-431.

Dickey, D. A., & Fuller, W. A. (1981). The Likelihood Ratio Statistics For Autoregressive Time Series With a Unit Root. *Econometrica, 49*(4), 1057-72.

Gao, Z., Sockin, M., & Xiong, W. (2019). Economic Consequences of Housing Speculation. *NBER Working Paper 26457*, pp. 1-52.

Ho, Bing Han, Goh, Wei Kiat, Ng, Chow Yet, Pang, Kim Hao, & Toh, Si Hui. (2015, Nov 15). *Macroeconomic and financial determinants of Malaysian residential property markets.* Retrieved from UTAR Institutional Repository: http://eprints.utar.edu.my/id/eprint/1723

Khazanah Research Institute. (2015). *Making Housing Affordable.* Kuala Lumpur, Malaysia: Khazanah Research Institute.

Malpezzi, S., & Watcher, S. M. (2002). The Role of Speculation in Real Estate Cycles. *Zell//Lurie Real Estate Center Working Paper No. 401*.

Ning, C., & Hoon, D. (2012). Case Studies of The Effects of Speculation on Real Estate Price Bubble Forming: Beijing and Shanghai. *18th Annual PRRES Conference*, (pp. 1-12). Adelaide, Australia.

Osmadi, A., Kamal, E. M., Hassan, H., & Fattah, H. A. (2015). Exploring the Elements of Housing Price in Malaysia. *Asian Social Science, 11*(24).

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

Park, D., & Xiao, Q. (2009). *Housing Prices and the Role of Speculation: The Case of Seoul.* Metro Manila, Philippines: Asian Development Bank.

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

T Sang Ong. (2013). Factor Affecting the Price of Housing in Malaysia. *Journal of Emerging Issues in Economics, Finance and Banking (JEIEFB), 1*(5).