

The Relationship between House Prices and Economic Growth in Malaysia: An Empirical Analysis

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Abstract

The economy can be affected by movements in housing prices through multiple channels. House prices in Malaysia increased 0.3 percent YoY in March 2021, following a 1.2 percent YoY increase the previous quarter. This current study employs an autoregressive distributed lag model (ARDL) to examine the relationship between GDP and housing prices (HPs) in Malaysia. This study is using quarterly data over the period 2011:1 to 2020:4 for the six variables such as gross domestic product (GDP), housing prices (HP), lending rate (LR), exchange rate (EXCHR) and world governance indicators (VAA, PS, GE, RQ, ROL and COC). The results of ARDL cointegration tests running from housing price to GDP provide strong evidence to support the hypothesis that housing price and economic growth are cointegrated.

Keywords

House Price, Economic Growth, World Governance Indicators, ARDL, Malaysia

1. Introduction

The 2008 economic and financial crisis and subsequent years demonstrated the importance of the housing market for both financial stability and economic growth. Many economists and policymakers agree that house prices have a significant impact in driving economic growth or decline. Due to wealth effect, the rising of house prices encourage consumer spending which lead to higher economic growth. According to the Property Market Review 2021/2022 reported by Rahim & Co (2021), Malaysia recorded 201,065 property transactions totaling RM98 billion, a minor decline of 1.8 percent in volume year on year. From 2016 to 2020, Malaysia's house prices rose by annual average of 7.2%. In Malaysia, Housing Index is measured by the annual change in the House Prices. Housing price index is one of the widely used indicators in real estate property market as it portrayed the general fluctuation of housing prices across the period. On top of it, housing price index served as a broad indicator for the operation and transaction of the property markets (Kassim, Redzuan, & Harun, 2017; Xin, Burhan, & Diah, 2019). The index is based on the hedonic approach to price measurement using multivariate regression analysis with 1990 as the base year. The index provides 70 sets of house price indices for 14 states and five regions, as well as for Malaysia as a whole. According to NAPIC,

base year adjustments represent changes in house prices in response to buyer preferences emerging market trends and efforts to contain housing prices in Malaysia (Zulkifli, Kogid, Pinjaman, & Alin, 2021) (Figure 1).

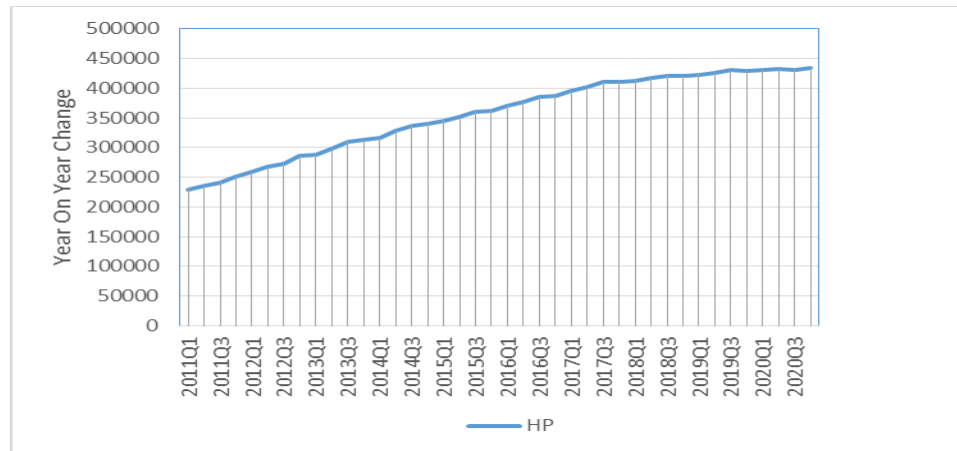


Figure 1. Malaysian House Price Growth (Source: BNM)

In general, empirical evidence of the consumption effect of house prices is consistent with theories. At the aggregate level, Abu Hasnat (2017); Kundan Kishor (2007); Miller, Peng, and Sklarz (2011) find that housing wealth significantly correlates with consumption, and the correlation is stronger than the correlation between consumption and financial wealth. At the household level, Attanasio, Blow, Hamilton, and Leicester (2009); Campbell and Cocco (2007); Carroll, Otsuka, and Slacalek (2011), Mian, Rao, and Sufi (2013) and Berger, Guerrieri, Lorenzoni, and Vavra (2018) find strong correlation between house prices and consumption.

Drawing on a series of studies that have been completed, there are few that have illustrated the impact of housing on the Malaysian economic performance. Therefore, this paper adopts an econometric approach to examine the relationship between house price changes and economic growth, using a time series data from the first quarter of 2011 through the fourth quarter of 2020.

2. Literature Review

From the first quarter of 2005 to the third quarter of 2009, Valadez (2011) examined the relationship among the house prices and GDP in the United States. The authors used Number Crunching Statistical Service (NCSS) software to conduct the regression analysis. In the results, it was found that housing price index changes can be used to find quarterly changes in Real GDP. Using the Toda and Yamamoto approach, Meidani, Zabihi, and Ashena (2011) examined the existence of causality among house prices, inflation, and economic growth in Iran from 1990Q1 to 2008Q3. The results showed that consumer price index, gross domestic products, and exchange rates have significant and multidirectional links.

Simo-Kengne, Bittencourt, and Gupta (2012) examined the impact of house price changes on South African economic growth across provinces using seemingly unrelated regression (SUR) from 1996 to 2010. The results revealed that, In South Africa, house price changes have a significant impact on economic growth because of control heterogeneity, endogeneity, and spatial dependence.

Chan and Woo (2013) studied the dynamic relationships among residential proper prices, stock price and GDP in Hong Kong. The findings revealed that there is long-run bidirectional causal links between the real GDP and asset prices. Pan and Wang (2013) examined the effect of house prices on bank stability to a panel of 286 Metropolitan Statistical Areas over the period of 1990Q1-2010Q4 by applying threshold estimation technique which was developed by Hansen (1999). The Authors used non-performing loans in order to measure bank instability, and two house price indicators (percentage changes in house price index and house price deviations from their long-run fundamental

values) were considered. The results suggested that the equilibrium house prices increase with rising demand due to income and labor force growth and provide evidence of a house price adjustment to the long-run equilibrium.

Said and Majid (2014) analyses the performance of housing market before and after the Asian financial crisis by employing t-statistics. The findings of the study showed that any changes in government housing policies and actions led to a change in the value of residential property prices. Loutskina and Strahan (2015) showed that financial integration boost the positive effect of housing price shocks on the economy over the period of 1994 to 2006. Using variation in the impact of credit supply subsidies from the GSEs to construct an instrument for housing price changes, the authors demonstrated a causal link from housing to the overall local economy.

By applying vector auto-regression, Zhang, Li, Hui, and Li (2016) empirically analyzed the relationships between housing prices and the macroeconomy in the context of China's first-, second- and third-tier cities. The findings showed that interest rate had negative and significant impact on housing price. On the other hand, initially the impact of inflation on housing price was observed positive. The authors provided more targeted policy recommendations to the government in order to promote the healthy development of China's real estate industry and the macroeconomy.

Lee (2017) investigated the cointegration and causality relationship between residential proper price and stock price in Hong Kong by using the data from the first quarter of 1980 to the third quarter of 2015. Autoregressive distributed lag (ARDL) and non-causality test of Granger, Huangb, and Yang (2000) was used to estimate unrestricted error correction model. The results showed strong evidence of cointegration among stock and residential properties. Moreover, in Hong Kong, the stock price has an important causal effect on residential property price. Teye, Knoppel, de Haan, and Elsinga (2017) examined ripple effect from the housing markets of Amsterdam to the housing markets of other regions in the Netherlands by using Toda–Yamamoto Granger Causality and ARDL approach. They identified which regional housing markets are influenced by changes in Amsterdam house prices. The authors found that except one, Amsterdam house prices have influence on all the Dutch regions. Their cointegration test showed evidence of a long convergence between Amsterdam house prices and all other regions in the Netherlands.

Kok, Ismail, and Lee (2018) investigated the macroeconomic determinants on the house price and house demand in Malaysian from 2002 to 2015 by using Structural Vector Autoregressive Regression. The findings of the study showed that real gross domestic product strongly impact on house prices in comparison to other macroeconomic shocks. In addition, monetary liquidity and positive effective exchange rate paly important role in demonstrating the transaction volume. Chi-Wei, Yin, Tao, and Zhou (2018) applied bootstrap Granger causality to inspect the association among housing prices and GDP across provinces in China from 1998 to 2015 and found that housing prices cause GDP not only in the eastern but also in most provinces of the central region. On the other hand, due to insufficient land supply, housing speculation and HPs deviating from the economic fundamentals, there is no influence of GDP on housing price in the eastern region. Furthermore, in the western region, housing prices do not Granger cause GDP. The authors conclude that government should formulate reasonable regional policies in order to the development of housing markets and economic growth. Sidek (2018) examined the nexus between housing price and political institution in the context of Malaysia from 1988 to 2015. Using ARDL bounds testing, the finding of the study showed before election the effect of housing prices is positive whereas the after the election the negative effect has been observed. The authors concluded that in order to ensure more stable housing prices there should be a strong and balance democratic regime.

Lin, Hsu, and Lin (2019) studied the diverse effect of housing prices on consumption in Taiwan from the first quarter of 1998 to third quarter of 2013. As independent variables, the authors use housing price index, consumption, stock price index, national income per capita and mortgage IR. The findings showed that the interest rates have played a minimal role in consumption, whereas there is a significant positive effect of stock price index on consumption. The authors concluded that there is a negative effect of rising house prices on consumption indicating that high housing prices trigger the crowding-out effect on consumption and in turn contribute to sluggish economic growth. Kiong and Aralas (2019) examined the determinants of Malaysian housing price over the period 2000Q1 to 2017Q4. The authors took financial crisis as a variable along with other independent variables, such as GDP, inflation rate, population, housing stock, interest rate and exchange rate. The findings indicated that except GDP, all the other variables have long run relationships with housing price. In addition, the short run relationship was observed between financial crisis and gross domestic product with housing price.

Baharuddin, Isa, and Zahari (2019) studied the impact of interest rates, inflation rates and gross domestic product on housing price in Malaysia by using quarterly data from 2005 to 2019. The findings showed that long run relationship

exist among independent variables and housing price. Baharuddin et al. (2019) provided invaluable insightfulness to various stakeholders including policy makers, institutional support and small contractors about the increasing on demand of house and fluctuation of price has that can lead to the changes in the condition of housing market. Yin, Nee, and Senadjki (2019) examined the impact of housing affordability, housing prices and gross domestic product on housing glut; the impacts of a housing glut on the health of a market: and possible strategies to prevent a bubble collapse. Although it is widely accepted that housing affordability and housing price play an important role in causing the housing glut but their study showed very mild effect on housing glut.

Ok, Kim, and Park (2019) analysed the relationship among house prices and bank performance in Korea. The Authors calculated bank performance by using lending growth rate, non-performing loans and return on assets. The results showed that banks' lending decisions, quality of assets owned by banks and bank profitability can be affected by the fluctuations in housing prices. The study concluded that dropping housing prices could be significantly hampered banks' profitability and soundness.

Rahman and Ridzuan (2020) investigated the impact of gross domestic product, consumer price index, base lending rate and money supply on house price index in Malaysia from the period of 1988 to 2017. The ARDL estimation showed that, in the long run, GDP and base lending rate is significantly affect house price index in Malaysia whereas money supply and consumer price index showed negative impact on house price index. Marfatia (2020) studied the time-frequency linkage of macroeconomic drivers and 15 OECD country's housing market from the first quarter of 1975 to the past quarter of 2016. The results showed that the relationship between house prices and key macroeconomic indicators varies significantly across countries, time, frequencies and the direction of causation. At the higher frequencies, house prices are more related to interest rates in short-run while at the lower frequencies, house prices are most related to per capita income growth in long-run. Moreover, at medium frequencies, the nexus between stock market and housing market is significant.

Ismail and Nayan (2021) provided new knowledge about the customers' confidence regarding the effect of housing industry on residential property prices in Malaysia over the period 2004Q1-2018Q4 by using autoregressive distributed lag technique. The existence of long-run adjustment was shown in results. The authors indicated that consumer confidence in the housing sector, as well as a number of macroeconomic indicators, have a considerable impact on residential property prices. In order to improve the consumer sentiment towards the residential property market, it was suggested to government and policymakers to understand to understand the consumer's' confidence. Cellmer, Cichulska, and Belej (2021) identified the factors that significantly determine the regional spatial differentiation of housing prices as well as housing market activity in Poland from the period of 2008 to 2018. Average housing price (PRC) and number of transactions (NB) were used as dependent variables. As independent variables, the authors used population density (POP), birth rate (BRTH), share of mobile working age population (MOB), migration rate (MIGR), average salary (SAL), registered unemployment rate (EMP), business entities (BSN), and emission of dust pollution PM10 (POL). The results showed that average monthly salary has the strongest impact on average prices and the number of transactions. Zulkifli et al. (2021) examined the macroeconomic determinants of the housing price in Malaysia from 2000 to 2019 by using Autoregressive distributed lag (ARDL) model. The results showed that there is positively significant relationship between gross domestic product and money supply in Malaysia. On the other hand, in the long run, there is significant but negative relationship between house price and consumer price index.

Habanabakize and Dickason (2022) determined the effect of consumer price index, interest rate, rental price and political risk on housing prices by applying Vector Autoregressive (VAR) model, the Johansen test for cointegration (Johansen & Juselius, 1990), Vector Error Correction Model (VECM) and Granger causality test on monthly data starting from January 2002 to December 2019. The finding showed that, in long run and short run, housing prices is influenced by political risk, inflation, rental and interest rate. According to the researchers, In order to improve the housing market and price stability, there should be stable political situation, interest rate and inflation rate. Dumitrescu, Enciu, Hândoreanu, Obreja, and Blaga (2022) investigated the determinants of household debt in twenty-six OECD countries from the first quarter of 2002 to fourth quarter of 2020. They found that lower household debt boost economic growth and Inflation reduces household borrowing only when debt levels are high. Furthermore, it was shown in results that mortgage credit interest rate and household debt are positively linked.

Therefore, from the previous studies, it is observed that there is lot of literature on the nexus between housing price and economic growth. Studies on GDP's effects on housing price have been few in Association of Southeast Asian

Nations (ASEAN) countries, particularly in Malaysia. As a result, the researcher aimed to investigate the relationship between the impact of housing price and economic growth in Malaysia. Hence, this research is based on the following hypotheses:

Hypothesis 1: There is a long-run relationship among the gross domestic product, lending rate, exchange rate, world governance indicators and house prices.

Hypothesis 2: There is association between world governance indicators (voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, control of corruption) and higher housing prices.

3. Methods

The below graphical framework is formulated by researcher in order to achieve the objectives of the study figure 2.

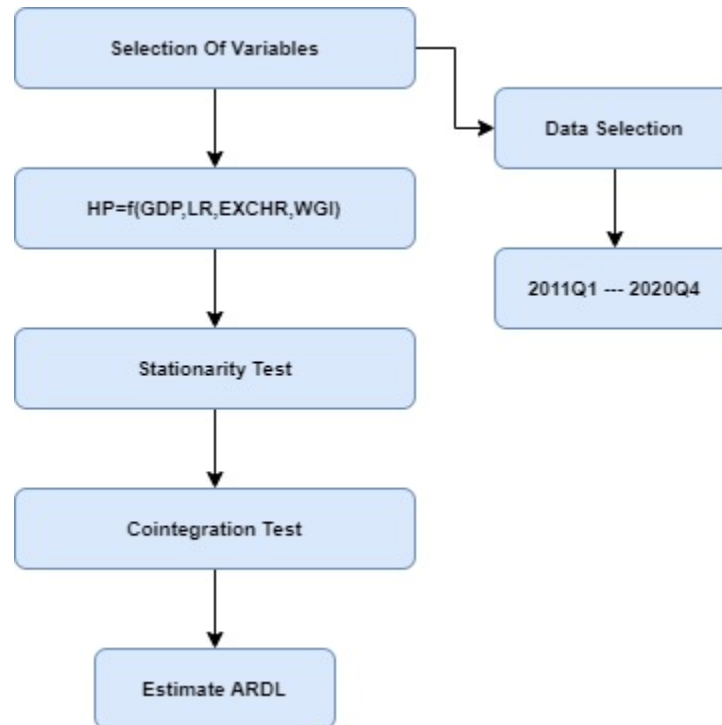


Figure 2. Research Framework

By using Eview version 12, this paper employs the Autoregressive Distributed Lag approach (ARDL) because the variables are integrated of order (1) and (0). Except lending rate and exchange rate, the selected variables in this study were converted into natural logarithms (LN) in order get consistent and efficient findings. The ARDL approach contains three steps in estimating the model. The first step is to estimate a standard log-log specification of the cointegrating long-run relationship. The ARDL model for economic growth:

$$\begin{aligned}
 LHP_t = & \alpha_0 + \beta_1 GDP_{t-1} + \beta_2 LR_{t-1} + \beta_3 EXCHR_{t-1} + \beta_4 LVAA_{t-1} + \beta_5 LPS_{t-1} \\
 & + \beta_6 LGE_{t-1} + \beta_7 LRQ_{t-1} + \beta_8 LnROL_{t-1} + \beta_9 LCOC_{t-1} + \sum_{i=1}^k \alpha_1 \Delta LGDP_{t-i} + \sum_{i=0}^p \alpha_2 \Delta LR_{t-i} \\
 & + \sum_{i=0}^q \alpha_3 \Delta EXCHR_{t-i} + \sum_{i=0}^r \alpha_4 \Delta LVAA_{t-i} + \sum_{i=0}^s \alpha_5 \Delta LPS_{t-i} + \sum_{i=0}^t \alpha_6 \Delta LGE_{t-i} \\
 & + \sum_{i=0}^u \alpha_7 \Delta LRQ_{t-i} + \sum_{i=0}^v \alpha_8 \Delta ROL_{t-i} + \sum_{i=0}^w \alpha_9 \Delta LCOC_{t-i} + \epsilon_t \dots \dots \dots (1)
 \end{aligned}$$

Where Δ is a first different operator, while (k,p,q,r,s,t,u,v,w) is optimum lag and ϵ_t refer to the error term. To examine the long run relationship between the variables, the joint hypotheses to be tested are: $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9$ (No long run relationship); $H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq \beta_9$ (A long run relationship exists).

The second step is to test the existence of a long run relation between the variables. The equation of the LGDP can be estimated as below:

$$LHP_t = \alpha_0 + \sum_{i=1}^k \alpha_1 LGDP_{t-i} + \sum_{i=0}^p \alpha_2 LR_{t-i} + \sum_{i=0}^q \alpha_3 EXCHR_{t-i} + \sum_{i=0}^r \alpha_4 LVAA_{t-i} + \sum_{i=0}^s \alpha_5 LPS_{t-i} + \sum_{i=0}^t \alpha_6 LGE_{t-i} + \sum_{i=0}^u \alpha_7 LRQ_{t-i} + \sum_{i=0}^v \alpha_8 ROL_{t-i} + \sum_{i=0}^w \alpha_9 LCOC_{t-i} + \epsilon_t \dots \dots \dots (2)$$

In order to choose optimal lag of the variables either Akaike Information Criteria (AIC) or Schwarz Bayesian Criteria (SBC) can be chosen. In this study, the selection of optimum lags is AIC. The most important thing about selecting appropriate lag orders is to ascertain the true dynamics of the models.

The final step is to estimate an error correction model associated with the long run estimates, where γ is the short-run dynamic coefficients of the convergence of the model to equilibrium and ECM is the speed of adjustment. This is specified as follows:

$$LHP_t = \gamma_0 + \rho ECM_{t-1} + \sum_{i=1}^k \gamma_1 LGDP_{t-i} + \sum_{i=0}^p \gamma_2 LR_{t-i} + \sum_{i=0}^q \gamma_3 EXCHR_{t-i} + \sum_{i=0}^r \gamma_4 LVAA_{t-i} + \sum_{i=0}^s \gamma_5 LPS_{t-i} + \sum_{i=0}^t \gamma_6 LGE_{t-i} + \sum_{i=0}^u \gamma_7 LRQ_{t-i} + \sum_{i=0}^v \gamma_8 ROL_{t-i} + \sum_{i=0}^w \gamma_9 LCOC_{t-i} + \epsilon_t \dots \dots \dots (3)$$

4. Data Collection

This research employed time-series quarterly data to investigate the cointegration relationships between house price and economic growth in Malaysia. The data series on housing price came from National Property Information Centre (NAPIC), the data series on GDP have been extracted from Bank Negara Malaysia (BNM), the data series on exchange rates and lending rate have been taken from International financial statistics (IFS), while the data series on Worldwide Governance Indicators (WGI) were downloaded Word Bank (2021). The estimation period covers a period of 10 years from 2011, Q1 to 2020, Q4, a total of 41 observations.

5. Results and Discussion

5.1 Descriptive Statistics and Correlation Analysis

Descriptive statistics indicating the mean, median, maximum, and minimum values of the selected parameters with the Jarque-Bera and probability values as shown in Table 1. The LGDP has a maximum mean while LCOC has a lowest mean which means that, in comparison to other series, the quarterly gross domestic product is of a large magnitude and control of corruption is of the lowest magnitude. The series of gross domestic product, exchange rate, voice and accountability, and government effectiveness are positively skewed in table 1.

Table 1: Descriptive Statistics (EViews 12)

	LHP	LGDP	LR	LEXCHR	LVAA	LPS	LGE	LRQ	LROL	LCOC
Mean	12.76	13.12	4.64	4.52	3.60	3.94	4.37	4.30	4.24	4.14
Maximum	12.98	13.87	5.03	4.62	3.78	4.08	4.44	4.33	4.31	4.21
Minimum	12.34	12.55	3.51	4.42	3.36	3.78	4.31	4.25	4.13	4.01
Std. Dev.	0.20	0.53	0.31	0.07	0.10	0.08	0.03	0.03	0.06	0.05
Skewness	-0.66	0.40	-1.92	0.17	0.22	-0.34	0.21	-0.91	-0.37	-0.46
Kurtosis	2.18	1.25	7.59	1.38	2.64	2.26	1.93	2.79	1.76	2.60
Jarque-Bera	4.03	6.14	59.77	4.57	0.54	1.69	2.19	5.56	3.45	1.66

The correlation coefficients matrix is shown in Table 2 which indicates a strong positive correlation among the variables. That means that the endogenous variable, i.e., housing price, and exogenous variable, i.e., economic growth, are strongly correlated with the coefficient of 0.794. Therefore, an increase of 1 percent in economic growth leads to an increase of 0.794 percent in housing price. Similarly, an increase of 1 percent in exchange rate leads to an increase of 0.880 percent in housing price. However, a weak and negative correlation occurs between lending rate and government effectiveness (Table 2).

Table 2. Correlation Matrix

Correlation Probability	LHP	LGDP	LR	EXCHR	LVAA	LPS	LGE	LRQ	LROL	LCOC
LHP	1.00									
LGDP	0.79	1.00								
LR	-0.35	0.23	1.00							
LEXCHR	0.88	0.90	0.42	1.00						
LVAA	0.63	-0.25	-0.01	-0.36	1.00					
LPS	0.48	-0.37	0.01	-0.30	0.13	1.00				
LGE	-0.06	0.30	-0.14	0.24	0.19	0.36	1.00			
LRQ	0.68	-0.45	-0.33	-0.53	0.07	0.67	0.07	1.00		
LROL	0.80	-0.53	-0.23	-0.60	0.55	0.74	0.35	0.63	1.00	
LCOC	0.54	0.38	-0.05	0.31	0.47	0.10	0.23	0.05	0.13	1.00

5.1 Unit Root Test

The data are analyzed for the augmented Dickey–Fuller stationarity test and Phillips–Perron test, as depicted in Table 2. The results show that none of the study variables is I(2); therefore, the ARDL model is the convenient model to assess the long-run relationship among variables in table 3.

Table 3. Unit Root Test

Variables	ADF		PP	
	I(0)	I(1)	I(0)	I(1)
LGDP	-1.357885	-6.296771*	-1.999284	-6.230923*
LHP	-2.788967***	-0.645012	0.206329**	-28.23400
LR	-1.534345	-2.947601**	-0.676389	-3.121412**
EXCHR	-1.217811	-6.116055*	-1.210161	-6.127360*
LVAA	-3.409245***	-1.758303	-2.463336**	-1.790986
LPS	-3.549679**	-5.550561**	-1.976014	-2.756183***
LGE	-2.493430	-4.592597*	-2.448751	-3.415065**
LRQ	-2.518063	-3.262069	-1.567252	-3.294500**
LROL	-4.118914**	-4.679058	-1.706116	-3.969601**
LCOC	-2.691107	-2.718482	-2.776575**	-2.868030

5.2 ARDL Cointegration Test

This study presents the ARDL-bound test cointegration proposed by Pesaran, Shin, and Smith (2001). The ARDL-bound test cointegration is summarized in Table 4. The bound F-test is performed to establish a cointegration linkage among LHP, LGDP, LR, EXCHR, LVAA, LPS, LGE, LRQ, LROL and LCOC. The outcomes from Table 4 indicate that the F-statistic lies above the 10%, 5%, and 1% critical values of the upper bound, meaning that the null hypothesis of no cointegration nexus between LHP, LGDP, LR, EXCHR, LVAA, LPS, LGE, LRQ, LROL and LCOC is rejected at 10%, 5%, and 1% significance levels (table 4).

Table 4. Bound Test

Model	F Statistic	
HP=f(GDP, LR,EXCHR,VAA,PS,GE,RQ,COC)	24.37342	
K=9, n=38		
Narayan (2005) Critical Value	Lower Bound	Upper Bound
1%	2.65	3.97
5%	2.14	3.3
10%	1.88	2.99

In next step, by using Akaike information criteria (AIC), the ARDL (2, 0, 0, 2, 2, 1, 1, 2, 1, 1) is appeared to be an appropriate model for the long-run and short-run relationships between variables. The result of long-run and short-run relationship is reported in table 5 and 6, respectively (table 5 and table 6).

Table 5. Estimation of Long Run Coefficients

Regressors	Coefficient	Std. Error	t-Statistic	Prob.*
LGDP	0.34	0.17	1.95	0.07**
LR	-0.02	0.01	-1.48	0.16
EXCHR	-0.41	0.10	-3.99	0.09**
LVAA	-0.13	0.16	-0.83	0.42
LPS	0.57	0.12	4.76	0.00*
LGE	0.52	1.24	4.21	0.00*
LRQ	0.61	0.36	1.70	0.11
LROL	1.28	0.33	3.82	0.00*
LCOC	-4.01	0.92	-4.34	0.00*
C	-4.49	1.82	-2.46	0.03

Note: *, **, *** is the significance level at 1%, 5% and 10% respectively.

Table 6. ECM and Short-run Dynamics.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT	-0.36	0.20	-0.81	0.04
Δ LGDP (-1)	-0.09	0.02	-4.42	0.00
Δ LR	-0.06	0.02	-2.80	0.01
Δ EXCHR	-0.34	0.24	-1.44	0.16
Δ LVAA(-1)	0.91	0.10	8.82	0.00
Δ LPS	-0.09	0.12	-0.77	0.45
Δ LGE(-1)	-0.75	0.27	-2.81	0.01
Δ LRQ(-2)	2.79	0.28	9.85	0.00
Δ LROL	0.64	0.21	3.06	0.01
Δ LCOC	1.00	0.98	1.02	0.31
C	2.18	1.56	1.39	0.17

Note: *, **, *** is the significance level at 1%, 5% and 10% respectively

The results from Table 5 indicate that changes in LGDP, LPS, LGE and LROL are positively affected by LHP in long-run. The coefficient of LGDP suggests that a one percent increase in the gross domestic product, keeping other factors constant, will raise house price by 0.34 percent. Additionally, by keeping other factors constant, a one percent increase in government effectiveness and rule of law is associated with a 0.52 and 1.28 percent, respectively, increase in house prices.

Based on the results presented in table 6 above, it can be seen that the error correction term (ECT) is negative and significant with the t-value of -0.81. This indicates that there is long-term equilibrium linkage between GDP, LR, EXCHR, VAA, PS, GE, RQ, ROL and COC to HP. The empirical results show that, in short-run, voice and accountability influence house prices in Malaysia. According to Kaufmann and Kraay (2205), voice and accountability measure the freedom of expression and free media, that is, to which extent the citizens of a country are able to select their government. In long-run and short-run, rule of law positively impacts on house price changes. Rule of law promotes business and commercial activities by capturing enforceable contracts. According to Sidek (2018), such circumstances would improve and promote the development of new housing projects.

5.3 Diagnostics Test for ARDL Model

To ensure that the estimated ARDL model met required econometric assumptions, stability tests were performed. Results in Table 7 indicate that the model passed all conducted tests. The null hypotheses for heteroskedasticity, normal distribution and no autocorrelation were accepted, meaning that the study residuals or error term were free of serial correlation, homoscedastic and normally distributed.

Table 7. Diagnostic results summary

Test	Null Hypothesis	Prob Value or F Value	Decision
LM Test for ARCH	No serial correlation	0.4695	H ₀ Accepted.
JB Test	Residual is multivariate normal	0.1217	H ₀ Accepted.
Heteroskedasticity Test: Breusch-Pagan-Godfrey	No heteroscedasticity	0.8496	H ₀ Accepted

5.4 Stability Check

From the ARDL model, the CUSUM and CUSUMsq test for instability of parameters is shown in Figure 3. This stability tests are used to ascertain the parameter instability of the equation employed in the ARDL model. The equation parameter is stable enough to estimate the long- and short-term causalities in the autoregressive distributed lag model because the plots in CUSUM and CUSUMsq tests are within the critical bound at the 5% level of significance (Figure 3).

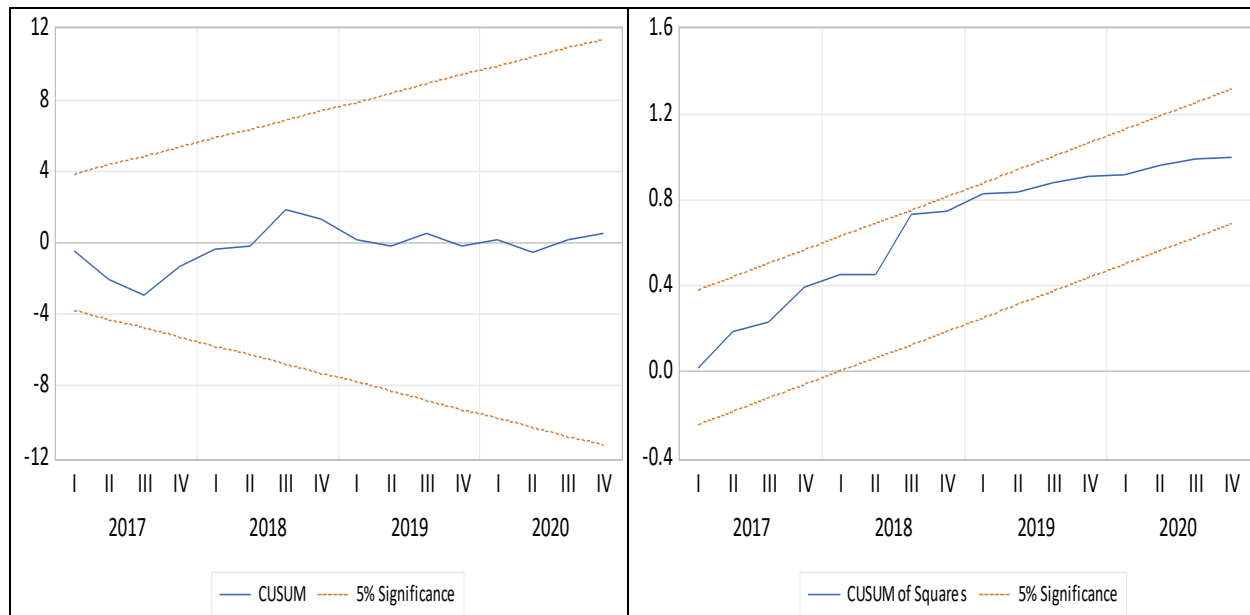


Figure 3. Plot of CUSUM and CUSUMsq tests for the parameter stability

6. Conclusion

This paper has investigated the nexus between housing prices (HP), economic growth (GDP), lending rate (LR), exchange rate (EXCHR) and world governance indicators (voice and accountability, political stability, government effectiveness, regulatory quality, rule of Law, and Control of Corruption) in Malaysia over the period 2011Q1 to 2020Q4 by using ARDL model. For stationarity analysis of selected variables, the study used unit root tests. The ADF and PP unit root tests showed that all the time series variables are stationarity at level $I(0)$ and at first difference $I(1)$. To conclude, house prices is associated with GDP. Moreover, the coefficient of ECT was found to have negative value and statistically significant. This means that short-run relationship between Malaysian housing price and economic growth exists, and the speed of adjustment was found to be approx. 36 percent in order to return to the long run equilibrium. Furthermore, the study performed stability, and diagnostic tests.

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