INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ECONOMICS & MANAGEMENT SCIENCES

OPEN ACCESS JOURNAL

Vol 12, Issue 2, (2023) E-ISSN: 2226-3624

Demystifying the Issue of House Affordability in Malaysia: The Bi-Directional Relationship between House Prices, Economic Growth, and Income Inequality

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To Link this Article: http://dx.doi.org/10.6007/IJAREMS/v12-i2/16383 DOI:10.6007/IJAREMS/v12-i2/16383

Published Online: 13 August 2023

Abstract

To understand the issue of house affordability in Malaysia, this study investigated the relationship between house prices and economic growth based on the data from the year 2000 to 2020. By utilizing the Toda-Yamamoto Granger causality test, it is identified that the relationship between the variables is bidirectional where house price movement is explained by economic growth. It implies that economic development drives house prices upward in the country. Conversely, the level of economic growth is also determined by house prices, and this clarifies the significant role of the housing market in stimulating the economy. The analysis also indicates that there is a mutual interaction between house prices and income inequality. Although the increase in house prices leads to higher economic growth, the rise in aggregate income that comes with it is enjoyed mainly by the top income earners of society. These findings are important for policymakers in addressing the issue of house affordability since it suggests that the issue of house affordability is partly contributed by income disparity. Since house price moves together with economic development, houses in Malaysia should remain affordable as long as income disparity is lessened if not diminished by ensuring that the economic prosperity is equally distributed among the society.

Keywords: House Price, Economic Growth, Bidirectional Relationship

Introduction

The housing market is one of the largest industries in Malaysia (Baharuddin et al., 2019) where in 2021 alone, there were 300,497 transactions worth RM144.87 billion being made in the property market (NAPIC, 2022). Given its significant market size, the housing market presents a certain degree of influence on the Malaysian economy (Hui, 2018). Based on the data provided by Bank Negara Malaysia (2012), RM454.3 billion, or 41% of total financing was provided by the banking sector for property acquisition and development, and this accounts for a significant portion of household indebtedness. Moreover, banks' exposure to the residential real estate industry as end financing was said to be worth RM303.9 billion, or 27.4% of all loans that were made through the banking system.

Ismail (2019) said that household debt for mortgage financing purposes had increased as indicated in Figure 1. In 2004, the household debt for mortgages covered 48.8% of all loans and it increased to 55.2% in 2016.

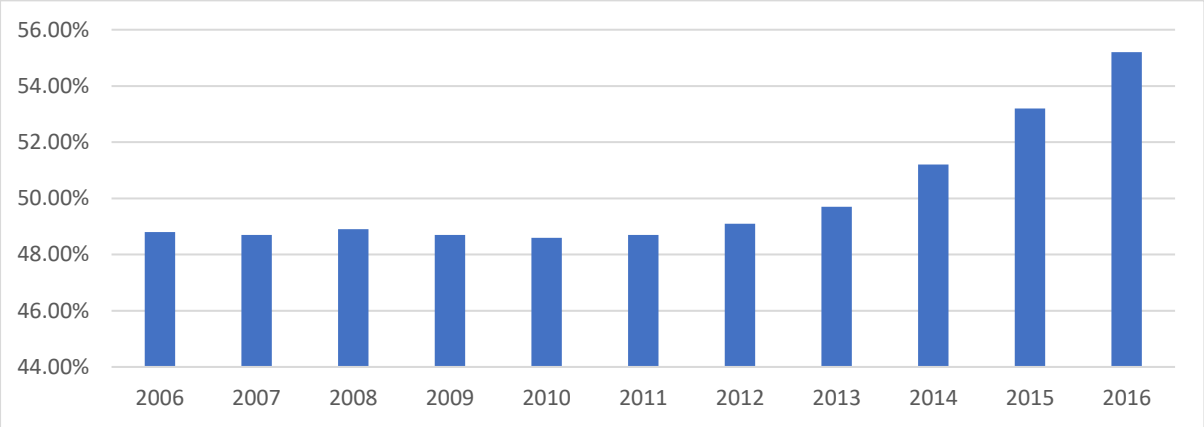

Figure 1: Household debt by financing purpose

Among the main concerns of Bank Negara Malaysia (2021) on the property sector is the residential properties that are severely unaffordable. Bank Negara Malaysia (2021) said, to afford a house priced up to RM300,000, a household needs to earn RM100,000 a year. Yet, 76% of households in Malaysia earn less than RM100,000 a year while only 36% of newly launched units are priced at RM300,000 at most. Based on the report by Muzafar and Kunasekaran (2021) for Khazanah Research Institute, market housing affordability in Malaysia is considered seriously unaffordable where Figure 2 indicates the level of median multiple across states in the country[1].

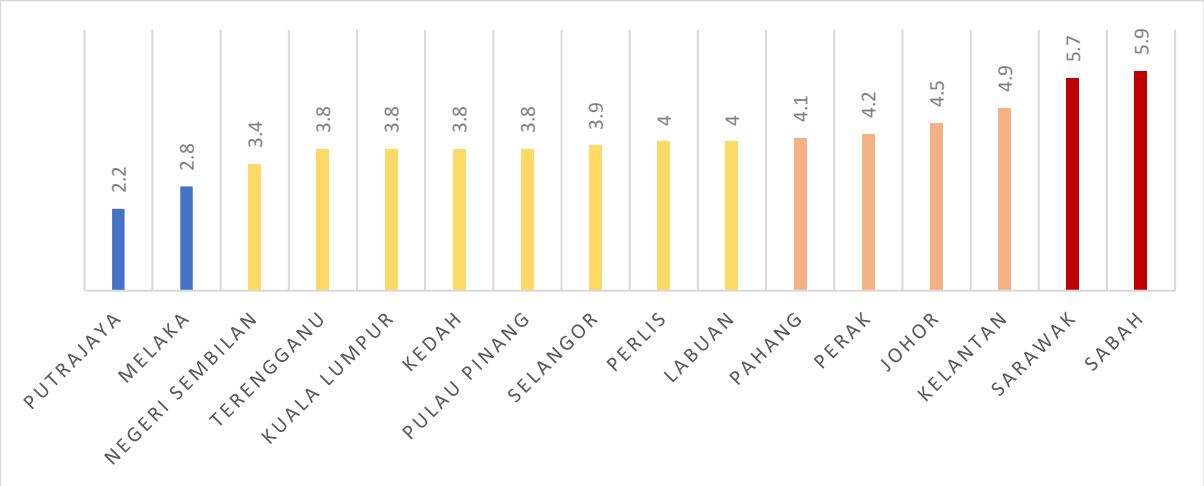

Figure 2: Median Multiple by State in Malaysia

	Severely unaffordable
	Seriously unaffordable
	Moderately unaffordable
	Affordable

[1] The median multiple measures housing market's affordability using house price-income ratio.

Sabah and Sarawak are categorized as severely unaffordable while Kelantan, Johor, Perak, and Pahang are seriously unaffordable. There were 8 states that were considered as moderately unaffordable namely Labuan, Perlis, Selangor, Pulau Pinang, Kedah, Kuala Lumpur, Terengganu and Negeri Sembilan. There were only two states that were considered as affordable, namely Melaka and Putrajaya.

The issue of house affordability has translated into the increasing number of unsold houses where, as shown in Table 1, the total residential overhang increased from 14,792 units that worth RM14,792 billion to 29,565 units that worth RM18,918 billion in 2020. The number of unsold under construction also increased between 2016 to 2020 from 64,077 units to 71,735 units while the number of unsold properties that were not constructed raised from 11,622 units to 12,975 units.

Table 1
Statistics on unsold houses based on states in Malaysia, 2016 -2020

Year	**Status**		
	Overhang (Value in RM)	**Unsold under construction**	**Unsold not constructed**
2016	14792 (RM14,792 billion)	64077	11622
2017	24738 (RM15,644 billion)	61882	12626
2018	32313 (RM19,861 billion)	80894	19865
2019	30664 (RM18,819 billion)	72692	16774
2020	29565 (RM18,918 billion)	71735	12975

Source: NAPIC (2020).

According to Bank Negara (2021), houses are said to be unaffordable due to house prices that grew faster than income where from 2014 to 2020 for example, house prices increased by 4.1% while the increase in income was only 2.1%. This led to an important question on the factors that drive the increase in house prices in the country. To understand this, various studies were conducted in investigating the movement of house prices and the influence of macroeconomic factors including Apergis (2003), Hashim (2010), Belej and Cellmer (2014), Micheal and Zhao (2016), and Grum and Govekar (2016). According to several researchers such as Tsatsaronis and Zhu (2004) and Glindro et al. (2018), house prices can be explained by the level of economic development where an increase in household income due to economic growth is said to increase the demand for houses (Özmen et al., 2019) and this will eventually be translated into the increase in house prices (Gallin, 2006). Nevertheless, some pointed out that economic growth could also be explained by house prices (Miller et al., 2011; Aizenman et al., 2016). This suggests that the relationship between house price and economic growth could be bidirectional as argued by (Chan and Woo, 2013; Marfatia, 2020).

In Malaysia, efforts to understand the relationship between house price and economic growth is scarce and most of the attempts are focused on unidirectional relations (Sukrri et al., 2019; Kabine, 2021; Zulkifli, et al., 2022). Furthermore, the relationship between house prices and

economic growth is somewhat ambiguous. Pinjaman and Kogid (2020) for example argued that economic growth has a positive relationship with house prices, even in the long run. But this is in contrast with Pillaiyan (2015) who did not recognize economic development as a long-term driver of house prices in the country.

The existence of a bidirectional relationship implies that the issue of house affordability cannot solely be explained by the higher rate of increase for house prices relative to income since the increase in house prices should move the level of income upward. This should minimize the price-to-income gap and lessen the issue of house affordability. Nevertheless, by referring to the statistics indicated in Figure 2 and Table 1, most of the states in the country fall in the category of moderately unaffordable to severely unaffordable with a large number of unsold houses. One possible reason is the existence of income inequality which causes houses to remain severely unaffordable since the increase in income was only benefitting the high-income earners. According to Dewilde and Lancee (2013), in countries with higher income inequality, access to housing for low-income homeowners is restricted.

Thus, the aim of the current paper is threefold. The first is to investigate the bidirectional relationship between house prices and economic growth, as well as between house prices and income inequality. The second is to identify the existence of the house price bubble as investigated by (Yip et al., 2017). The bubble existed when the movement of house prices are not determined by the market fundamentals (Stiglitz, 1990; Tomal, 2021). The last objective is to explore the role of income inequality in explaining the issue of house affordability in Malaysia.

Investigating the mutual interaction between the house prices and income inequality, and between house prices and economic growth is significant for the country since the findings can be used as a source of reference for policymaking in addressing the issue of house affordability apart from its potential contribution to the body of knowledge. In addition to acknowledge the significant role of the housing market, the findings could also help to determine whether the housing market in the country is experiencing a house price bubble so that appropriate measure could be taken for offsetting policies.

The current paper, at first, briefly review the findings of previous studies and relevant theories in the literature. Then, the techniques to achieve the research objective were explained in the Methodology while the findings are discussed in the Results section. In Conclusion, the analysis is summarized, research implications, as well as some limitations of the study, are presented.

Literature Review

To monitor the relationship between house prices and economic growth, it is important to understand its theoretical background. Based on Kim and Chung (2016); Miller et al (2011), two theories explain how house prices and the economy are related and these theories are the wealth effect and collateral effect. The theory of wealth effect is closely associated with homeowners where the expected lifetime wealth of homeowners is estimated to grow if housing prices unexpectedly rose and this would result in higher desired consumption since homeowners would wish to smooth consumption over their lifetime. Meanwhile, collateral consumption theory postulates that house price movement may change the actual

consumption rather than the desired consumption. House price gains, assuming that property wealth can be collateralized, might enable homeowners to relax their financial restraints and potentially increase their actual spending. Miller et al (2011) add that for housing price changes to have no effect on desired consumption, they must be completely anticipated and have no impact on predicted lifetime wealth.

Empirically, several works have been done in understanding the behaviour of house prices and economic growth. Marfatia (2020) employed a Cross-Wavelet Coherence (CWT) method and highlighted the long-run impact of economic growth on house prices in several European countries including Belgium, Finland, Germany, and Switzerland. According to Kishor and Marfatia (2017), industrial production, which can be used to represent economic growth is important in predicting house price movements through its predictive impact on consumers' wealth and consequently on housing demand and its prices.

Meanwhile, in investigating the bidirectional relationship between house prices and economic growth, Tsatsaronis and Zhu (2004) employed Vector Autoregression (VAR) analysis on 17 developed countries and found that economic growth has a significant contribution to house price movements over long horizons. Conversely, the impact of a shock on housing prices on economic growth is also significant, but not as high as the impact of economic shocks on house prices. Adding on to the debate about the direction of causation, Marfatia (2020) believes that the direction depends on time and frequency. Between 1975 and 1995, the direction of causality in Australia, Belgium, Finland, and Sweden was from per capita income to housing prices. This implies that the housing affordability argument is correct in terms of driving house prices. In contrast, other nations, like Germany and Italy, exhibit a reverse link between housing prices and per capita income in the 1980-2000, implying wealth channel effects.

In understanding the relationship between income disparity and house prices, Ozmen et al. (2019) argue a negative correlation between income inequality and house price changes. Özmen et al. (2019) add that the income elasticity of house prices depends on the level of the income distribution, with the influence of income changes on house price changes being larger in places with lower income inequality. This explains the increased number of unsold houses, as a possible demand spike caused by a rise in the income share of the top income quintile is insufficient to offset dropping demand caused by lower income shares of the bottom quintiles. Surprisingly, this contradicts Määttänen and Terviö (2014) theoretical contribution, which holds that the influence of greater income inequality on housing values is determined by the forms of the distributions. House prices will fall as income disparity rises, with the exception of high-income workers, whose prices can rise or fall.

Kim and Rhee (2022), on the other hand, describe the impact of property prices on income disparity. Using the Generalized Method of Moments on 32 OECD nations, real house price inflation raises income inequality significantly in countries with poor income redistribution policies. According to Kim and Rhee (2022), poor income redistribution policies imply that growing asset prices will simply increase the income of the wealthy, hence increasing income inequality.

Methodology

Data

The current paper used annual data from the year 2000 to 2020, and to represent house prices, the current paper used the annual housing price index (HP) retrieved from NAPIC with the year 2000 being treated as the base year. Meanwhile, economic growth is measured by the Gross Domestic Product (GDP) per capita. To assess the level of inequality, the decile dispersion ratio was utilized by dividing the pretax national income of the richest decile by the poorest decile that was retrieved from the World Inequality Database[2]. As an initial attempt to measure the association between the variables, the correlation coefficients were obtained.

Toda-Yamamoto Granger Causality Test

Based on Toda and Yamamoto (1995); Simionescu et al (2022), one of the advantages of the Toda-Yamamoto (TY) Granger causality test is that the test is valid irrespective of whether the series is I(0), I(1) or I(2). In addition, it overcomes the necessity of pretesting for cointegration rank(s) compared to conventional Granger causality (Toda & Yamamoto, 1995). To test for TY Granger Causality between house price and economic growth, the current paper conducted unit root tests based on the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root tests. The unit root tests are used to identify the maximum order of integration (d_{max}) of the variables.

Once the order of integration is determined for the variables, optimal lag length (p) is then determined in the Vector Autoregression (VAR) model. To do that, several information criterions are used as indicators, namely the sequential modified LR test statistic (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC), and the Hannan-Quinn information criterion (HQ).

Then, Modified Wald Test (MWALD) approach is used to establish the VAR ($k + d_{max}$) model for causality. In the study, the TY Granger causality test is produced by estimating the VAR models as shown below:

$$HP_t = \alpha_1 + \sum_{i=1}^{k} \beta_{11i} HP_{t-1} + \sum_{j=k+1}^{d_{max}} \beta_{21j} HP_{t-i} + \sum_{i=1}^{k} \gamma_{11i} GDP_{t-1} + \sum_{j=k+1}^{d_{max}} \gamma_{21j} GDP_{t-i} + \varepsilon_{1t}$$

$$GDP_t = \alpha_2 + \sum_{i=1}^{k} \beta_{12i} GDP_{t-1} + \sum_{j=k+1}^{d_{max}} \beta_{22j} GDP_{t-i} + \sum_{i=1}^{p+d_{max}} \gamma_{12i} HP_{t-i} + \sum_{i=1}^{d_{max}} \gamma_{22j} HP_{t-i} + \varepsilon_{2t}$$

Model 1

Where:

HP_t = House prices at time t

[2] Considering data limitation, the current paper neglected the use of Gini Index in representing the income inequality

$GDP_t =$ Gross domestic product per capita at time t
From Model 1, causality existed from HP to GDP and vice versa if at least one the γ and β coefficients is not equal to 0.

$$HP_t = \alpha_3 + \sum_{i=1}^{k} \beta_{13i} HP_{t-1} + \sum_{j=k+1}^{d_{max}} \beta_{23j} HP_{t-i} + \sum_{i=1}^{k} \gamma_{13i} INEQUALITY_{t-1} + \sum_{j=k+1}^{d_{max}} \gamma_{23j} INEQUALITY_{t-i} + \varepsilon_{3t}$$

$$INEQUALITY_t = \alpha_4 + \sum_{i=1}^{k} \beta_{14i} INEQUALITY_{t-1} + \sum_{j=k+1}^{d_{max}} \beta_{24j} INEQUALITY_{t-i} + \sum_{i=1}^{k} \gamma_{14i} HP_{t-i} + \sum_{j=k+1}^{d_{max}} \gamma_{24j} HP_{t-i} + \varepsilon_{4t}$$

Model 2

Where

$HP_t =$ House prices at time t
$INEQUALITY_t =$ Income inequality at time t

Meanwhile, Model 2 was utilized to check the relationship between house prices and income inequality. If at least one of the γ and β coefficients is not equal to 0, house prices and income inequality exhibit a causal relationship. To validate the results in Model 1 and Model 2, diagnostic tests were conducted based on the serial correlation LM and stability tests of inverse roots of AR characteristic polynomial. The current paper chose to have two (2) separate models in assesing the relationship between the variables due to limited observations led by data constraints. Nevertheless, this caters the objectives of the current research that is to examine at the bidirectional link between home prices and economic growth, and between house prices and income inequality.

Result Analysis

Table 2
Correlation Coefficient

	House Price	**GDP**	**Income inequality**
House Price	1		
GDP	0.980632391	1	
Income inequality	0.959561519	0.915768914	1

As an initial investigation on the direction and the strength of association between house prices, economic growth, and income inequality, the current paper analyzes the correlation of the variables. Based on the coefficients, there exists a strong and positive linear relationship between the variables, and these provide an early indication of the mutual relations between them.

To proceed with the TY Granger causality test, the study then employed three tests of unit root for stationarity, namely the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests to identify the maximum number of integration (d_{max}) for house prices, economic growth, and income inequality.

Table 3
Unit Root Test

Variables	ADF test			PP test			KPSS test		
	Intercept			Intercept			Intercept		
	At level	1st difference	2nd difference	At level	1st difference	2nd difference	At level	1st difference	2nd difference
House Price	-1.8195	-1.3957	-3.0742**	0.9005	-1.5072	-3.0705**	0.5979**	0.2837	0.3857
GDP	-0.5208	2.7622*	0.0084***	-0.5208	-2.7204*	-3.8212***	0.6171**	0.1113	0.3278
Income Inequality	-0.9615	-1.8070	-3.9488**	-0.4610	-1.8070	-3.9408**	0.5416**	0.1426	0.1105

Note: ***, **, and * denote the rejection of null hypothesis at 1%, 5% and 10% significance levels respectively.

Based on Table 3, both house prices and income inequality were not stationary at level and the first difference from the ADF and PP tests. KPSS test meanwhile shows that house price was stationary at first difference. Since both variables were stationary at the second difference based on most of the tests, the variables are assumed to be integrated of order two ($d_{max} = 2$). Based on the ADF, PP, and KPSS tests, the economic growth measured by GDP per capita were stationary at the first difference. This means that the variables are assumed to be integrated of order one ($d_{max} = 1$). Thus, based on the unit root tests, it can be said that the maximum order of integration for the variables is two ($d_{max} = 2$).

Table 4
Lag Length Selection for Model 1

Lag	LR	FPE	AIC	SC	HQ
0	NA	2.12e+08	24.84846	24.94648	24.85820
1	65.00860	3292926.	20.67557	20.96965	20.70481
2	19.89081*	1033686.	19.48859	19.97872*	19.53731
3	4.229167	1160534.	19.53627	20.22244	19.60447
4	7.225265	862512.6*	19.10370*	19.98592	19.19139*

Note: * indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level). FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, and HQ: Hannan-Quinn information criterion

Table 4 above shows the optimal lag of 4 ($k = 4$) based on the FPE, AIC, and HQ criterions, while LR and SC criterions show the optimal lag of 2 ($k = 2$) for Model 1. After initial analysis, a VAR model with maximum order of integration of ($d_{max} = 2$) does not satisfy the stability condition and for that, the current paper set the selected lag length of ($k = 4$) with a maximum order of integration of ($d_{max} = 0$). The TY granger causality in this analysis is estimated based on Modified Wald Test (MWALD) approach that used chi-square distribution with four degrees of freedom.

Table 5
Toda-Yamamoto Tests of Granger Causality for Model 1

Dependent variable	**Independent variable**	
	House Price	**GDP**
House price	-	12.89917**
GDP	17.74431***	-

Note: ***, **, and * denote the rejection of null hypothesis at 1%, 5% and 10% significance levels respectively.

From Table 5, it is apparent that the null hypothesis that house price does not cause economic development has been rejected at 5% significance level in support of the alternative hypothesis that house price does cause economic development. Similarly, the null hypothesis that economic growth does not cause house prices has been rejected at 1% significance level in support of the alternative hypothesis that economic development does cause house prices. This postulates that there are mutual interation between the two variables and the results coincided with previous findings including (Tsatsaronis and Zhu, 2004; Marfatia, 2020).

Table 6
Lag Length Selection for Model 2

Lag	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	NA	344029.5	18.42384	18.51825	18.42284
1	82.96334	589.1838	12.04356	12.32678	12.04055
2	16.21848*	206.9038	10.95505	11.42708	10.95002
3	5.599948	194.2543	10.78839	11.44923	10.78135
4	4.353486	198.9342	10.59614	11.44580	10.58709

5	4.120845	187.4999*	10.09926	11.13774	10.08820
6	3.041601	190.0882	9.111794*	10.33908*	9.098721*

Note: * indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level). FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, and HQ: Hannan-Quinn information criterion

Model 2 was employed to test for the relationship between house prices and income inequality. Although AIC, SC, and HQ indicated the optimal lag of ($k = 6$), the current paper used 5 ($k = 5$) lags as suggested by the FPE with maximum order of integration of ($d_{max} = 2$) as it satisfies the serial correlation and stability conditions.

Table 7
Toda-Yamamoto Tests of Granger Causality for Model 2

Dependent variable	**Independent variable**	
	House Price	**Income Inequality**
House Price	-	13.48857***
Income Inequality	17.70624***	-

Note: ***, **, and * denote the rejection of null hypothesis at 1%, 5% and 10% significance levels respectively.

From Table 7, it is evident that house prices and income inequality are mutually interactive where the null hypotheses of no causal relationships were both rejected at 1% level. This implies that the hike in house prices causes income inequality to increase. According to Kim and Rhee (2022), weak income redistribution policies implies that rising asset prices will only increase the income of the rich, thereby further increasing income inequality. Similarly, an upward movement in house prices could also be explained by income inequality and postulates that an increase in income inequality causes house prices to rise as well.

Diagnostic tests were conducted to validate the results for Model 1 and Model 2 and based on VAR Residual Serial Correlation LM Tests and inverse root of AR characteristic polynomial, both models were free from serial correlation and satisfies the stability conditions, respectively.

Conclusion

The study investigated the relationship between house prices, economic growth, and income inequality for Malaysia by using annual time series data from 2000 to 2020 and based on Toda-Yamamoto (TY) tests of Granger causality. By referring to the VAR Granger causality, the results provide evidence of bidirectional causality between house prices, economic development, and income inequality as indicated in Table 8 and Table 9 where an increase in house price could lead to economic growth and income inequality. Conversely, changes in the level of economic growth and inequality will ultimately move house prices in a similar direction.

Table 8
Summary of findings for Model 1

Dependent variable	**Independent variable**	
	House Price	**GDP**

House Price	-	Causal relationship
GDP	Causal relationship	-

Table 9
Summary of findings for Model 2

Dependent variable	**Independent variable**	
	House price	**Income inequality**
House price	-	Causal relationship
Income inequality	Causal relationship	-

The empirical findings of the study provide some theoretical contribution and important implications for the policymakers in the country. First, economic growth is expected to drive house prices upward due to the influence of income on house demand as explained based on the theory of wealth effect and collateral effect. For that, house supply should be stimulated through certain policies corresponding to economic development to avoid an excessive increase in house prices due to the surge in demand.

Secondly, similar to the argument claimed by Pillaiyan (2015), the significant relationship also suggests that the property market in Malaysia was not experiencing a house price bubble since the movement of house prices was explained by the economic growth and not due to excessive public expectations of future price increases (Case & Shiller, 2003).

The significant impact of house prices on income inequality explains why houses are severely unaffordable with high property overhangs in the country. Even though house prices led to an increase in income which should minimize the issue of house affordability, the increase mainly benefitted the high-income earners as indicated by the significant relationship between house prices and income inequality. By taking that into consideration, policymakers should construct any efforts that could minimize income inequality and indirectly mitigate the issue of house affordability. According to Özmen et al. (2019), policies directed at improving income equality might help mitigate the imbalances in the housing market.
As a suggestion for future studies, several other variables should be considered to understand more about factors that could influence house prices in Malaysia. In addition, the impact of house prices on the economy should also be assessed so that relevant policies could be created to mitigate any issues that are related to it.

Acknowledgement
The authors extend their sincere gratitude to the Ministry of Higher Education (MoHE) and Universiti Malaysia Sabah for supporting this work under the Fundamental Research Grant Scheme for Research Acculturation of Early Career Researchers (RACER/1/2019/SS08/UMS//3).

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