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DOES HOME FINANCING PROMOTE AFFORDABILITY OF HOME OWNERSHIP IN MALAYSIA? AN EMPIRICAL ANALYSIS BETWEEN ISLAMIC AND CONVENTIONAL BANKS

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ABSTRACT

The aim of this study is to examine the influence of home financing offered by both Islamic and conventional banks and affordability of home ownership (as measured by House Price/GDP per capita) in Malaysia. At the same time, it attempts to assess the effects of employment and interest rate as measured by Overnight Policy Rate (OPR) on home ownership affordability. The study employs the Auto Regressive Distributed Lag Model (ARDL) on yearly data from 2007 to 2014 in order to investigate the link between affordability and selected banking variables such as total home financing by Islamic banks and OPR. Data were extracted from the National Property Information Center (NAPIC) and Bank Negara Malaysia (BNM) Monthly Statistical Bulletin. This study finds that there are cointegrating relationships among all the selected variables at the selected lag length. Home financing of both Islamic and conventional banks were found to be significant in influencing Affordability of Home ownership in Malaysia. Consistent with the fundamentals of Islamic finance, our findings further suggest that OPR (interest rate) is less significant in determining home affordability in the case of Islamic home financing compared to conventional home loan. This study is an empirical attempt to analyze the effect of Islamic home financing as well as conventional loan on affordability. The approach used is technically not new, but it offers better insights into the applicability of Islamic finance in promoting affordability of home ownership. This finding therefore warrants

a more in-depth analysis to explore alternative home financing mechanisms such as rental rate pricing to promote home ownership affordability among low to medium income earners in Malaysia.

JEL Classification: G21, R21

Key words*:* Housing affordability, Islamic home financing, Conventional home loan, Employment, OPR, ARDL

1. INTRODUCTION

Housing affordability remains a pressing issue as well as a policy concern for both developed and developing countries. For a developing economy such as Malaysia, with the current economic challenges of lower Gross Domestic Product (GDP) growth, increased inflation rate, weaker currency, linear trend in wage structure, the concern of low to middle income earners to own a home becomes more prevalent.

Underpinning the focus on affordability is the increasing household debt to GDP. The ratio of household debt to GDP in Malaysia has increased from 70 percent in 2009 to 83 percent in 2014 (BNM, 2014). Amid the lower economic growth, the ratio of household debt to GDP continues to elevate to 89.1 percent in 2015 (BNM, 2015). This figure also ranks us as having the highest debt to GDP ratio among the developing countries in Asia such as Thailand (30 percent), Indonesia (15.8 percent), Hong Kong (58 percent), Taiwan (82 percent), Japan (75 percent) and Singapore (67 percent) (Ho, 2015). This situation reflects affordability of the Malaysian household to own a house as financing becomes more stringent.

To date, there is no clear definition of affordability of home ownership. The general definition refers to the ability of the median income households to afford a house based on their income level. It can only be assessed through the price of houses to household income ratio. The United Nations has highlighted that defining housing affordability is imperative to fully understand its link with affordable financing which in turn affects the housing market, leading to economic growth and future sustainability (UN-Habitat, 2009). In 2012, the United Nations also reiterated the importance of affordable housing activities as a catalyst for economic growth and the need for stabilizing and reducing volatility in housing markets.

As a result of more stringent financing policies (example: loan approval based on net income instead of gross income, loan tenure reduced to a maximum of 35 years) from financial institutions, the

issue of promoting affordability of home ownership remains a daunting task for many countries including Malaysia (KRI, 2015). For example, in August 2015, Khazanah Research Institute (KRI) revealed that the Malaysian housing market is believed to be seriously unaffordable. Pursuant to this, on 23 September 2015, a forum titled "Does Greater Prosperity Come with Less Housing Affordability" was held with invitations to all relevant stakeholders and representatives. These KRI, National House Buyers Association (NHBA), Real Estates Housing Developers' Association (REHDA), PR1MA Corp Malaysia (PR1MA), Malaysia Economic Association (MEA), and National Housing Department, Urban Wellbeing, Housing and Local Government Ministry. As reported by The Sun Daily on 28 September 2015, no solutions were proposed in this forum since no unanimous agreement could be reached among them on the housing affordability issues (Yeong, 2015). Nevertheless, to ensure affordable housing could be implemented, cooperation from all parties especially the government, financial institutions, housing developers and policy makers is required. Hence, the intervention from the Malaysian Ministry of Urban Wellbeing, Housing and Local Government is needed.

Against the backdrop of economic challenges, stringent and prudent policies of financial institutions, and the government efforts in promoting affordable home ownership, the predicament of low-middle income earners in owning a home is still a pressing issue. The present study attempts to examine the influence of home financing offered by both Islamic and conventional banks and affordability of home ownership. It also attempts to unravel the short run and long run dynamics between government effort variables, as measured by the level of employment and monetary policy variables proxied by Overnight Policy Rate (OPR, interest rate) and home ownership affordability. If these variables are found to be significant in determining home ownership affordability, we can infer that both the government and financial institutions can play a role in making homes more affordable in Malaysia.

The next section (Section 2) deliberates the issue of housing affordability and the types of home financing in Malaysia. Section 3 presents the theoretical underpinnings and literature review. Section 4 highlights the research methodology. Section 5 discusses the results and analysis. Section 6 concludes the study.

2. HOUSING AFFORDABILITY AND HOME FINANCING IN MALAYSIA

In Malaysia, housing affordability is currently a serious problem particularly in Kuala Lumpur where house prices have escalated significantly in the past decades (NAPIC, 2014). To measure housing affordability, several approaches may be used. Among the measurements commonly adopted are the price to income ratio (PIR), the rent to income ratio (RIR), housing expenditure to income ratio, market basket measure, quality- based measure and residual income measure (Md Sani, 2015). PIR, however, is commonly used as an indicator in measuring housing affordability (Kutty, 2005; Md Sani, 2015).

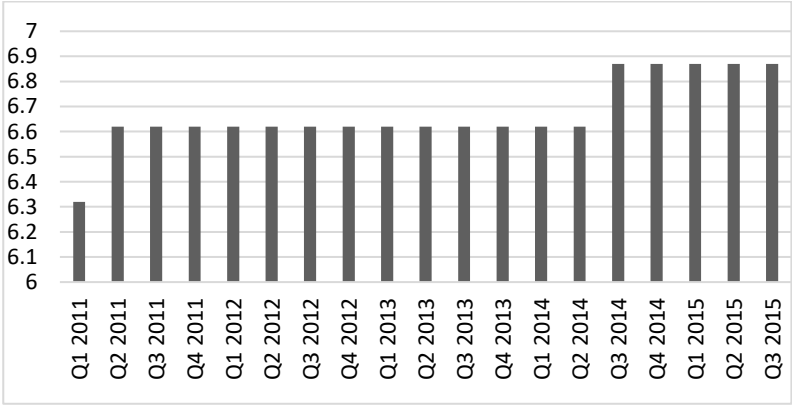
In the process of buying a house, financing is needed since buying a house requires a large monetary outlay. Financing can be divided into two categories namely house financing scheme offered by the government or financing from private financial institutions. Various types of home financing are offered by financial institutions in Malaysia. For instance, in Islamic banking, various products are offered under the home financing facility such as *mushārakah mutanāqiṣah*, *baī' bithaman ājil*, *al-ijārah thumma al-baī'* (AITAB), *tawarruq* and others. The most popular mode of home financing in Malaysia is *murābaḥah* combined with *baī' bithaman ājil* and *mushārakah mutanāqiṣah* (Mohd Yusof et al., 2011). The main issue associated with housing affordability is that many applicants are ineligible for home financing due to their inability to pay the monthly instalments which are usually based on high interest rates (Bujang et al., 2015). Figure 1 shows the trend for Base Financing Rate (BFR) in Malaysia from Q1 2011 until Q3 2015. Meanwhile, while conventional banking also offers housing loans based on borrower-lender contract, they are also facing the same issue of eligibility and affordability of home ownership.

Based on Figure 1, it shows an increasing trend of BFR which was also benchmarked to interest rate. For instance, in 2011, the BFR was 6.32 in Q1 and tremendously increased to 6.6 in Q4. This trend may affect the eligibility and affordability of home ownership as applicants will face hardship in obtaining loans or financing for their house.

Many studies have been conducted in Malaysia to investigate the main issues on housing affordability such as the factors influencing affordability (Bujang et al., 2015; Esruq-Labin et al., 2013; Md Sani, 2013; Md Sani and Che Munaaim, 2012). Promoting affordability of

home ownership continues to be a formidable task due to the surge in house prices, in contrast to the relatively linear trend in income structures. Therefore, the Government of Malaysia has proposed in its 10th Malaysia Plan (Rancangan Malaysia Ke-10: 2011-2015), the development of "*rumah mampu milik*" (affordable houses) for the middle income group. However, the main obstacles in implementing this policy are (i) the target groups are not eligible for the housing assistance programs, and (ii) applicants who met the eligibility requirement cannot secure financing to buy medium cost houses due to the increase in house prices (Wan Abd Aziz, Hanif and Singaravello, 2011).

FIGURE 1
Base Financing Rate (BFR) in Malaysia, Q1 2011 until Q3 2015



Source: Department of Statistics, Bank Negara Malaysia.

The Prime Minister of Malaysia, when tabling Budget 2016, has announced an allocation amounting to RM 1.6 billion to build 175,000 units of houses which are to be sold at 20 percent below the market price (Malaysian Government Budget, 2016). This is one of the government initiatives to reduce the affordability issues in Malaysia. Based on the census by the Department of Statistics Malaysia (DOSM), household home ownership showed a marked decline from 67.3 percent to 59.0 percent from 2000 to 2010. In addition, 21.3 percent of households do not own a house (DOSM, 2015). These results indicate that households are facing vast challenges in terms of financing in the pursuit of owning their dream house.

One of the main factors affecting home ownership affordability in Malaysia is the house price itself (Hashim, 2010; McCord et al., 2011). House prices will continue to increase sharply thus making homes unaffordable during economic boom and after the Asian Financial Crisis in 1997 and late 1998 (Hashim, 2010). In terms of price range, house prices of RM 200,000 and below account for 43.4 percent of the national total in the first quarter of 2014. Meanwhile, house prices of between RM 200,000 to RM 500,000 represent 41.5 percent of the market share (NAPIC, 2014). According to KRI (2015), the median all-house prices in Malaysia stood at RM 242,000 and vary by states due to differences in median incomes. The house affordability index for Malaysia based on median house price to median income is 4.4 which is considered to be seriously unaffordable (KRI, 2015).

Meanwhile, another factor influencing housing affordability is income (McCord et al., 2011; Wan Abd Aziz, Hanif and Singaravello, 2009). Income is a critical factor in determining households' economy. It also determines households' purchasing power. Currently, the median monthly household income in Malaysia is RM 4,585, an increase of 11.7 percent from RM 3,626 in 2012 (DOSM, 2015).

Since households will seek financing from various financial institutions in Malaysia, OPR and the Base Lending Rate (BLR) will ultimately influence the total cost of financing for the applicants. This is because banks will adjust their lending rates by a similar quantum when the OPR and BLR change. Higher lending rate will increase the cost of securing home financing (McCord et al., 2011). Based on the BNM monthly statistical bulletin report for 2014, the total amount of loans/financing applied for the purchases of residential properties, as at December 2014, is RM 13,468.1 million for commercial banks and RM 4,261.1 million for Islamic banks. However, as at December 2014, the amount of total loans or financing approved by conventional banks and Islamic banks stood at RM 6,862 million and RM 2,974.2 million respectively. The difference between the amounts of total loans applied for and total loans approved by financial institutions can be regarded as the level representing the eligibility of applicants in securing home financing. At the same time, it reflects the sensitivity of the applicants' affordability to interest rate movements. This view is supported by the study of Lerman and Hendey (2011) which showed that lower interest rate spurs demand for property while higher interest rate reduces the supply of loans.

Unemployment rate, employment rate and labor force which act as indicators for the overall economic well-being in a country also play a central role in influencing the level of affordability (Davenport, 2003). Higher unemployment rate will reduce affordability since households will have insufficient funds to make house purchases. Accordingly, unemployment level indicates the ability of households to obtain financing from financial institutions. However, in Malaysia, despite a decrease in unemployment rate from 3.5 percent in 2000 to 3.0 percent in 2014, the number of household home ownership showed a drop from 67.3 percent in 2000 to 59.0 percent to 2010.

GDP also plays a vital role in determining housing affordability among households. Increasing trends in GDP will boost the household income level. Therefore, this will increase their prospect of home ownership. Nevertheless, in Malaysia, the GDP stood at RM 265,753 million in the fourth quarter of 2014 compared to RM 206,677 million in the fourth quarter of 2010. From this result, it is evident that a discrepancy exists between the increasing trend of the GDP and the declining trend in home ownership rate in Malaysia. According to Chiuri and Japelli (2002), an increase in household income will increase home ownership.

Worthington and Higgs (2013) also used house price over earnings to represent the value of housing affordability (dependent variable). In addition, they also employed the housing affordability index as their dependent variable. Their findings suggest that housing affordability is high in the long run and interest rates have a relatively more substantial effect in the short run. They also found that economic growth negatively affects housing affordability only in the short run.

3. THEORETICAL UNDERPINNINGS AND LITERATURE REVIEW

The notion of housing affordability was first defined in the 1980s where it expressed the challenge of the household in facing the housing and non-housing expenditures (Stone, 2006). However, according to Montagnoli and Nagasayu (2013), there is no explicit definition of the term “affordability”. Quigley and Raphael (2004) highlighted that the concept of housing affordability cannot be specifically defined since it includes various factors such as house price, household income both in the long and short term, and financial market imperfections. Meanwhile, Gans and King (2004) explained that long term affordability is normally a situation where individuals

are unlikely to have sufficient income to pay for a house while short term affordability is concerned with those who have sufficient income to purchase a house but face constraints in financing it in the short run.

MacDonald (2011) defined housing affordability in Malaysia as a situation where the monthly loan instalments must not exceed one third (1/3) of the gross monthly household income. If the household housing expenditures exceed 30 percent of their income, then they will be categorized as belonging to the housing stress category. Meanwhile, Md Sani (2013) echoed the definition given by Ndubueze (2007) where housing affordability is the ability of the households to pay the price of the house (i.e., monthly instalments) and at the same time still have remaining balance of income for other expenses.

Based on the 11th Annual Demographia International Housing Affordability Survey 2015, housing affordability is rated according to the "Median Multiple". Median Multiple refers to house price over income. This calculation has been widely used and is recommended by the United Nations and the World Bank. Table 1 shows the Demographia housing affordability ratings.

TABLE 1
Housing Affordability Ratings

Rating	Multiple
Severely Unaffordable	5.1 and over
Seriously Unaffordable	4.1 to 5.0
Moderately Unaffordable	3.1 to 4.0
Affordable	3.0 and under

Source: 11th Annual Demographia International Housing Affordability Survey 2015.

In the current study, we adopt the notion of housing affordability which comprises of income, housing expenses and non-housing expenses and at the same time can be measured in terms of the monthly loan instalment not exceeding one third of the household income.

With regard to the determinants of affordability, to the best of our knowledge, little research has been done by previous researchers using the econometric approach and economic variables. Thus, we face obstacles obtaining the past literature related to our present study. Most of the previous studies used the survey approach. Bujang et al. (2015) has conducted a survey on 100 Gen Y members in Malaysia. Their survey found that household income, deposit, supply of affordable house and price of the house are positively significant to housing affordability. Also, findings from Stone (2006) indicate that

income is the key elements in and has positive significance on housing affordability. This finding has been supported by Ndubuezu (2009) who examined the determinants of housing affordability and found that income, housing expenditure, and household size significantly influence housing affordability. They revealed that income has positive relationship and was the utmost influential variable to housing affordability. Similarly with Bramley (2012) who has reported that income, wealth, price of the house, demographic factors and education background are very significant in determining housing affordability.

Montagnoli and Nagasayu (2013) on the other hand examined the determinants of housing affordability in the UK. They used the house price to earnings measure in explaining housing affordability. By using the Augmented Mean Group (AMG), the results of the study captured the positive coefficient and statistically significant interest rate while there is insignificant relationship for the unemployment rate and population toward UK housing affordability.

Similar with Montagnoli and Nagasayu (2013), Worthington and Higgs (2013) also used the house price over earnings ratio in interpreting the values of housing affordability as dependent variables. They also employed a housing affordability index as their dependent variable. They found that housing affordability is very much in the long run and interest rate has a relatively more substantial influence in short run effect. They also found that economic growth only has negative effects on housing affordability in the short run. The previous literature seems to suggest that income factor has the most influence on housing affordability (Bramley, 2012; Luffman, 2006; Rea et al., 2008). Arimah (1997) used logistic regression and found that income has positive impact and was the key determinant of home ownership affordability. Recently, a study done by Nwuba, Kalu, and Umeh (2015) revealed a highly significant positive correlation between household income and home ownership affordability in Nigeria.

In this study, we examine the influence of home financing offered by both Islamic and conventional banks and affordability of home ownership and at the same time assess the effects of employment and interest rate as measured by OPR on home ownership affordability.

4. DATA SOURCES AND METHODOLOGY

The summary of the measurement of the variables used in this study is illustrated in the following Table 2:

TABLE 2
Measurement of Variables

Variables	Measurement	Sources
Affordability of Home Financing	Median House Price over GDPPC (Proxy for Household Income)	National Property Information Center (NAPIC), and BNM Monthly Statistical Bulletin
Employment	Labor force size	BNM Monthly Statistical Bulletin
Total Home Financing	Amount of Islamic Home Financing	BNM Monthly Statistical Bulletin
Total Home Loan	Amount of Conventional Home Loan	BNM Monthly Statistical Bulletin
Overnight Policy Rate (OPR)	BNM Overnight Policy Rate - Middle Rate (OPR)	BNM Monthly Statistical Bulletin

Note: All variables are collected from 2007:Q1 to 2014:Q4.

4.1 EMPIRICAL MODEL

In examining the existence of a long-run relationship among variables, several methods can be used. These methods include the two-step residual-based procedure proposed by Engle and Granger (1987), the system-based reduced rank regression approach introduced by Johansen (1991), and autoregressive distributed lag (ARDL) model proposed by Pesaran, Shin, and Smith (1996). The pre-condition of the first two approaches are the underlying variables must be integrated of order $I(0)$ or $I(1)$.

We use the Autoregressive Distributed Lag (ARDL) model which includes standard procedures for testing the stationarity of the variables in the models. We first tested for unit roots using the Augmented Dickey-Fuller test. After confirming that the variables are integrated of the same order, we estimate the long-run relationship using cointegration analysis. The basic ARDL models used in this study are expressed as follows:

$$(1) \qquad AFIB_t = \alpha_0 + \alpha_2 EMPL_t + \alpha_3 HF_t + \alpha_4 OPR_t + e_t$$

(2) $$AFCB_t = \alpha_0 + \alpha_2 EMPL_t + \alpha_3 HL_t + \alpha_4 OPR_t + e_t$$

where,
AFIB = Affordability (Islamic Home Financing)
AFCB = Affordability (Conventional Home Financing)
EMPL = Employment
HF = Islamic Home Financing
HL = Conventional Home Loan
OPR = Overnight Policy Rate

Given that the study uses quarterly data, the ARDL model is determined to be the most appropriate method. It is applicable to studies with small sample size and is robust against simultaneous equation bias and autocorrelation problems if the orders of the ARDL model are properly selected based on a priori knowledge or estimated using a model selection process such as the Akaike Information Criterion (AIC) or Schwarz–Bayesian Criterion (SBC).

The ARDL approach to cointegration (see Pesaran, Shin and Smith, 2001) involves estimating the conditional error correction (EC). The ARDL model for affordability and its determinants are:

(3) $$\Delta AFIB_t = a_0 + \sum_{j=1}^{k1} b_j \, \Delta \, AFIB_{t-j} + \sum_{j=0}^{k2} c_j \, \Delta \ln EMPL_{t-j} + \sum_{j=0}^{k3} d_j \, \Delta \ln HF_{t-j} + \sum_{j=0}^{k4} e_j \, OPR_{t-j} + n_1 \, AFIB_{t-1} + n_2 \ln EMPL_{t-1} + n_3 \ln HF_{t-1} + n_4 OPR_{t-1} + \epsilon_t$$

(4) $$\Delta AFCB_t = a_0 + \sum_{j=1}^{k1} b_j \, \Delta \, AFCB_{t-j} + \sum_{j=0}^{k2} c_j \, \Delta \ln EMPL_{t-j} + \sum_{j=0}^{k3} d_j \, \Delta \ln HL_{t-j} + \sum_{j=0}^{k4} e_j \, OPR_{t-j} + n_1 \, AFCB_{t-1} + n_2 \ln EMPL_{t-1} + n_3 \ln HL_{t-1} + n_4 OPR_{t-1} + \epsilon_t$$

where *AFIB* represents the Affordability level when Islamic home financing is offered and *AFCB* when the conventional home financing is offered. The error-correction dynamics are captured by the terms with the summation signs, while the long-run relationship is captured by the remaining terms. The term ϵ_t refers to the random error.

The presence of long-run dynamics among the variables is determined by estimating the error correction models (ECM). Once cointegration among the variables is confirmed, the next step is to estimate the relevant ARDL ECM. Finally, diagnostic and stability CUSUM tests are performed to determine the goodness of fit of the ARDL models.

Based on Narayan (2005), two sets of critical values for the lower and upper bounds are considered. The first set assumes that all the independent variables are *I*(1) while the second set assumes that they are all *I*(0). If the computed value of the *F*-test exceeds the upper bound, then the null hypothesis that there is no cointegration among the variables is rejected. In contrast, if the computed value of the *F*-test is less than the lower bound, the null hypothesis cannot be rejected. If the computed value of the *F*-test falls within the upper and lower bounds, then the result becomes inconclusive. Consequently, the order of integration, *I*(d), for the explanatory variables has to be ascertained before any conclusion is made. We also carried out the stability tests proposed by Brown, Durbin and Evans (1975), namely, CUSUM (Cumulative Sum) and CUSUMSQ (CUSUM of Squares) of recursive residuals. To examine the causality and the direction of influence of one variable to another, we employ the bi-variate Granger causality test based on Granger (1969).

In addition to the abovementioned methodology, we conduct an innovation accounting by examining the Impulse Response Functions (IRFs) and variance decompositions (VDCs). IRFs and VDCs are useful as tools for evaluating the dynamic interactions and the strength of causal relations among the variables. The VDCs show the percentage of a variable's forecast error variance attributable to its own innovations and innovations in other variables. Thus, from the VDCs we can evaluate the relative importance of employment, OPR and loan/financing fluctuations in influencing the fluctuations in affordability. In addition, IRFs trace the directional responses of a variable to a one standard deviation of a shock in another variable. This means that we may observe the effect on the direction, magnitude and persistence of affordability as a result of variations in employment, OPR and loan/financing.

5. RESULTS AND ANALYSIS

5.1 UNIT ROOT TESTS

The unit root test is arguably the most vital test in time series analysis. The test is carried out on all the selected variables to check for stationarity of the variables. The null hypothesis indicates the presence of a unit root while the alternative hypothesis indicates the absence of a unit root.

TABLE 3
Summary of Unit Root Test; H_0: There is a unit root

Variables	Level		First Difference	
	Intercept	Trend and Intercept	Intercept	Trend and Intercept
Affordability	0.0308	-1.819691	-2.179868	-2.047850
Number of Employment	-0.5407	-3.573551**	-7.002385***	-6.820822***
Total of Home Financing	0.6194	-3.713841**	-2.212274	-2.276262
Total of Conventional Loan	-0.4581	-1.620826	-6.437669***	-6.865757***
Overnight Policy Rate	-2.2257	-2.558552	-3.589998***	-3.651021**

Note: *, **, and *** indicate significant at 10, 5, and 1 percent level, respectively.

Table 3 presents the results of the unit root test for the variables in the study. At the 5 percent significance level, the Augmented Dickey-Fuller (ADF) unit root test indicates that Total of Home Financing and Number of Employment are stationary at level, $I(0)$. On the other hand, the Total of Conventional Home Loan and Overnight Policy Rate are non-stationary at level, but become stationary at first difference, $I(1)$. Based on Pesaran, Shin and Smith (2001), the ARDL approach is suitable for testing hypotheses for variables that are integrated of order 0 or 1.

5.1.3 RESULTS OF THE ARDL MODEL

Table 4 shows the results of the ARDL model approach after choosing a maximum of 6 lags. However, only lag 2 has been selected since

there is an insufficient number of observations in our study to choose a lag higher than 2. The lag length selection uses the Akaike Information Criterion (AIC) for model selection.

TABLE 4
Results of Bound Testing Procedure

Cointegration Hypotheses	ARDL Model	*F*-Statistics
$AFIB = \alpha_0 + \alpha_2 EMPL + \alpha_3 HF + \alpha_4 OPR + e_t$	(1, 0, 0, 1)	10.0351***
$AFCB = \alpha_0 + \alpha_2 EMPL + \alpha_3 HL + \alpha_4 OPR + e_t$	(1, 0, 0, 1)	7.2911***

Note: *** indicates that *F*-statistics exceeds the 1 percent upper bounds; the relevant critical value bounds are taken from Narayan's (2005).

As is evident in Table 4, the computed *F*-statistics for both models suggest that cointegrating relationships exist among all the selected variables at the selected lag length. The findings also imply that housing affordability is significantly influenced by total employment, amount of financing offered by both Islamic and conventional banks and interest rate (OPR) in the long run.

The next step is to estimate the long-run coefficients of the ARDL models. Table 5 present the findings for each model.

TABLE 5
Results of Long-run ARDL Model

	Affordability	*t*-statistics
	Islamic Home Financing	
Constant	-70.6893**	-2.3861
Employment	2.1349	0.8865
Islamic Home Financing	1.8436***	4.4067
OPR	0.0843	0.7734
	Conventional Home Loan	
Constant	-146.8780	-6.2573
Employment	4.9351*	1.6039
Conventional Home Lon	2.8637**	2.5846
OPR	0.3040**	2.1535

Note: *, **, and *** indicate significant at 10, 5, and 1 percent level, respectively.

As evidenced in Table 5, OPR is found to be significantly and positively related in conventional home financing but not significant in Islamic home financing. This finding is consistent with Montagnoli and Nagasayu (2013); Wilson and Callis (2013) and Worthington and Higgs (2013) who have documented evidence that interest rate is positively and statistically significant in determining housing

affordability. The finding that OPR is less significant in Islamic home financing could be attributed to Islamic banks offering products mostly based on *mushārakah* and therefore focused on profit-margin which is not subjected to interest rate fluctuations. Table 6 shows the products of home financing offered by Islamic banks in Malaysia and the contract used.

TABLE 6
Home Financing Products Offered by Islamic Banks in Malaysia

Banks	Products Offered	Concept
Bank Islam Malaysia Berhad	1. Baiti Home Financing-i 2. Wahdah Home Refinancing-i	▪ *Tawarruq*
Bank Muamalat Malaysia Berhad	1. Smart Pembiayaan Perumahan 1 Hutang	▪ Not stated in their website
RHB Islamic Bank Berhad	1. Equity Home Financing-i	▪ *Mushārakah Mutanāqiṣah*
CIMB Islamic Bank Berhad	1. Variable Home Financing-i 2. Ijarah Property Financing-i 3. Flexi Home Financing-i	▪ *Tawarruq* or Commodity *Murābaḥah* ▪ *Ijārah Muntahiyah Bi Al-Tamlīk*
Maybank Islamic Berhad	1. Commodity Murabahah Home Financing-i 2. HomeEquity-i	▪ *Murābaḥah* via *Tawarruq* or Commodity *Murābaḥah* ▪ *Mushārakah Mutanāqiṣah*
Public Islamic Bank Berhad	1. Home Equity Financing-i 2. ABBA Financing-i	▪ *Mushārakah Mutanāqiṣah* ▪ BBA
AmIslamic Bank Berhad	1. Home Financing-i 2. Flexi Home Financing-i	▪ BBA
HSBC Amanah Malaysia Berhad	1. HomeSmart-i	▪ *Mushārakah Mutanāqiṣah*
Hong Leong Islamic Bank Berhad	1. CM Flexi Property Financing-i	▪ *Murābaḥah* via *Tawarruq*

TABLE 6 (*continued*)

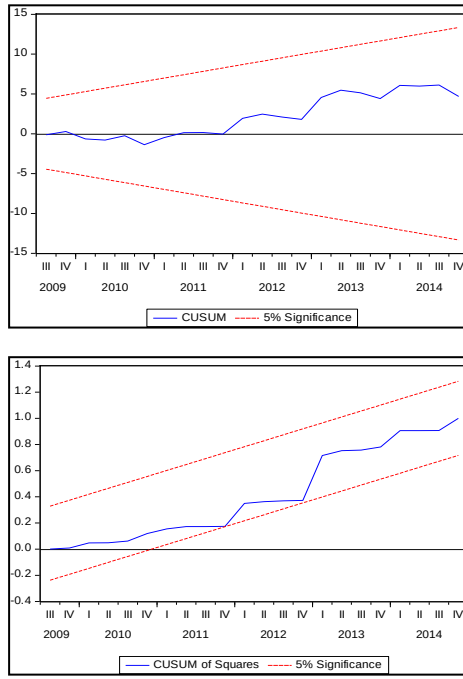
Banks	Products Offered	Concept
Affin Islamic Bank Berhad	1. Affin Home Invest-i 2. Affin Home Assist Plus-i 3. Affin BNM Priority Sector Home Financing-i (For low and low medium cost housing) 4. Affin Premier Corporate Home Financing-i 5. Affin Tawarruq Home Financing-i (Under construction)	▪ *Mushārakah Mutanāqiṣah* ▪ *Tawarruq*
OCBC Al Amin Bank Berhad	1. Manarat Home-i	▪ *Ijārah Muntahiyah Bi Al-Tamlīk* ▪ *Mushārakah Mutanāqiṣah*
Alliance Islamic Bank Berhad	1. i-Wish Home Financing-i 2. i-Wish Flexi Home Financing-i	▪ BBA
Kuwait Finance House (Malaysia) Berhad	1. Ijarah Muntahia Bi Al Tamlik Asset Acquisition Financing-i 2. Ijarah Mawsufah Fi Al-Zimmah Asset Acquisition Financing-i	▪ *Ijārah Muntahiyah Bi Al-Tamlīk* ▪ *Ijārah Mauṣūfah Fī Al-Dhimmah*
Asian Finance Bank Islamic	1. Home Financing-i	▪ Not stated in their website
Standard Chartered Saadiq Berhad	1. Saadiq My Home-i 2. Saadiq My HomeOne-i	▪ *Mushārakah Mutanāqiṣah*
Al Rajhi Banking & Investment Corporation (Malaysia) Berhad	1. Home Financing-i	▪ BBA

Source: Websites of all related banks.

Meanwhile, Mohd. Yusof et al. (2011) have suggested that rental price is better than lending rate in pricing Islamic home financing. They further suggested that rental rate can be used as an alternative benchmark for Islamic home financing instead of the conventional interest rate as they fluctuate less and reflect the true

value of the property (i.e., the physical attributes) and thus more linked to the real sector of the economy. This rental rate can also be regarded as a return on investment as the yield to owning property. The findings of this study are consistent with Mohd Yusof et al. (2011) where the OPR is found to be less significant in affecting the amount of Islamic home financing.

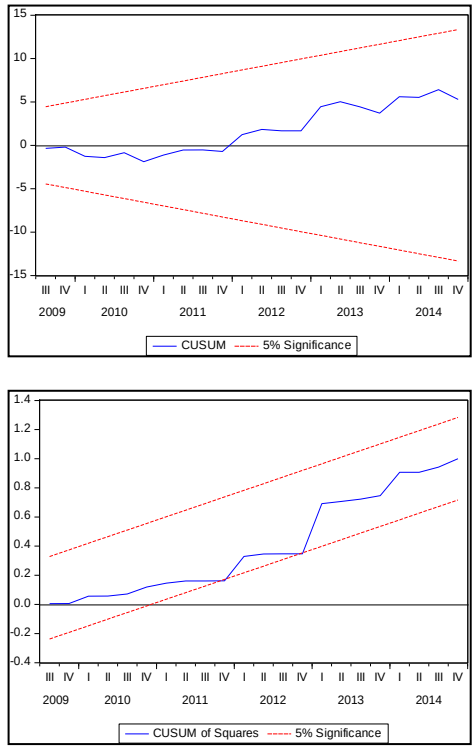
FIGURE 2
CUSUM and CUSUMSQ Tests for Housing Affordability
(Islamic Home Financing)



The findings also indicate that in the long run, the number of employed is positively related to housing affordability in both models though it does not significantly affect housing affordability as far as Islamic home financing is concerned. Our finding parallels those of Davenport (2003) and Berry and Hall (2001) who affirmed that employment affects housing affordability in the long run. In the case of Malaysia, according to the Department of Statistics Malaysia (DOSM), home ownership dropped from 67.3 percent to 59 percent despite a decrease in the unemployment rate from 3.5 percent to 3.0 percent from 2000 to 2014. To test for the long run stability of both

models, the CUSUM and CUSUMQ tests are applied on both models. The results (Figures 2 and 3) suggest that there is no evidence of any significant structural instability.

FIGURE 3
CUSUM and CUSUMSQ Tests for Housing Affordability
(Conventional Home Loan)



The results of the Granger Causality test shown in Table 7 and indicate four uni-directional relationships. First, there is a uni-directional relationship between Employment and Affordability suggesting that Affordability of Islamic Home Financing and Conventional Home Loans are significantly affected by Employment. This result provides support of our earlier findings based on the results of the ARDL Models. Second, there is also a uni-directional relationship between Islamic Home Financing and Conventional Home Loan with Affordability. The results are also consistent with our ARDL models which show that the loan and financing offered by Conventional and Islamic banks are significant in causing

Affordability. Next, there is a uni-directional relationship between OPR and Conventional Home Loan. This result is expected since previous studies suggest that interest rate is significant in determining affordability.

TABLE 7
Granger Causality Test Results

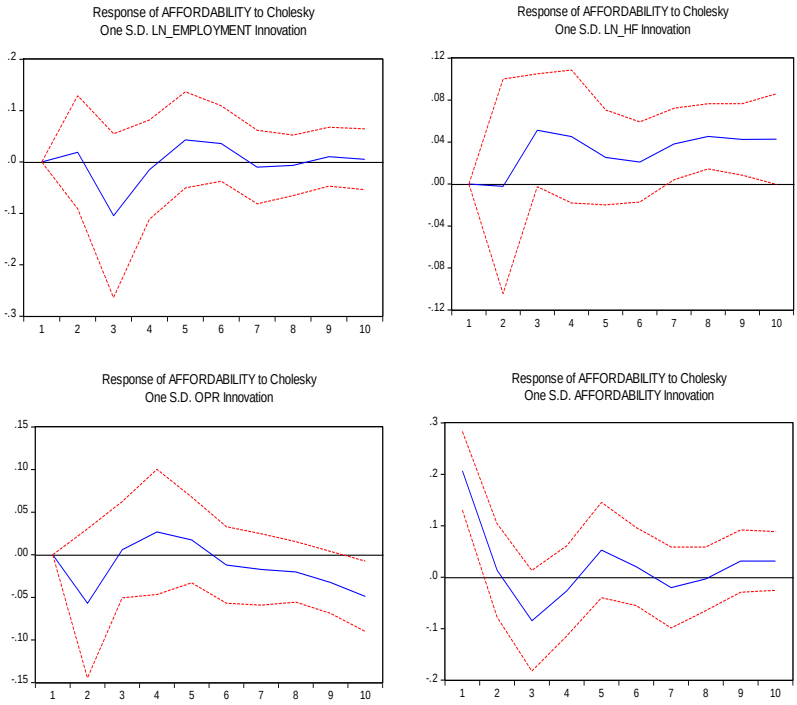
Null Hypothesis:	*F*-Statistic	Prob.
Islamic Home Financing		
LN_EMPLOYMENT does not Granger Cause AFFORDABILITY	4.1860**	0.0270
AFFORDABILITY does not Granger Cause LN_EMPLOYMENT	0.9858	0.3872
LN_HF does not Granger Cause AFFORDABILITY	3.4468**	0.0476
AFFORDABILITY does not Granger Cause LN_HF	0.1731	0.8420
OPR does not Granger Cause AFFORDABILITY	1.0189	0.3755
AFFORDABILITY does not Granger Cause OPR	0.6670	0.5222
LN_HF does not Granger Cause LN_EMPLOYMENT	1.8316	0.1810
LN_EMPLOYMENT does not Granger Cause LN_HF	0.7930	0.4635
OPR does not Granger Cause LN_EMPLOYMENT	1.6397	0.2142
LN_EMPLOYMENT does not Granger Cause OPR	0.7521	0.4817
OPR does not Granger Cause LN_HF	0.4898	0.6185
LN_HF does not Granger Cause OPR	0.1088	0.8974
Conventional Home Loan		
LN_EMPLOYMENT does not Granger Cause AFFORDABILITY	4.1860**	0.0270
AFFORDABILITY does not Granger Cause LN_EMPLOYMENT	0.9858	0.3872
LN_HL does not Granger Cause AFFORDABILITY	8.0586***	0.0020
AFFORDABILITY does not Granger Cause LN_HL	5.3622	0.0115
OPR does not Granger Cause AFFORDABILITY	1.0189	0.3755
AFFORDABILITY does not Granger Cause OPR	0.6670	0.5222
LN_HL does not Granger Cause LN_EMPLOYMENT	0.6868	0.5124
LN_EMPLOYMENT does not Granger Cause LN_HL	2.4524	0.1065
OPR does not Granger Cause LN_EMPLOYMENT	1.6397	0.2142
LN_EMPLOYMENT does not Granger Cause OPR	0.7521	0.4817
OPR does not Granger Cause LN_HL	4.1623**	0.0275
LN_HL does not Granger Cause OPR	6.1811	0.0066

Note: *, **, and *** indicate significant at 10, 5, and 1 percent level, respectively.

5.1.4 RESULTS OF THE IMPULSE RESPONSE FUNCTION (IRF) ANALYSIS

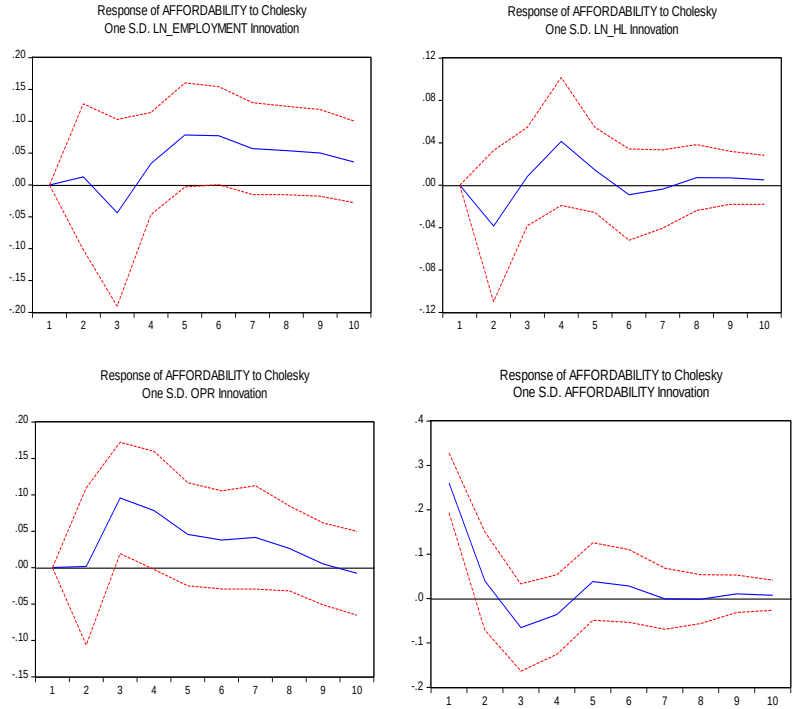
To perform the IRF analysis, this study applies the following orders of selected variables: number of employment, Islamic home financing and OPR in both models.

FIGURE 4
Impulse Responses of Housing Affordability
(Islamic Home Financing)



Figures 4 and 5 show the impulse responses of both models. From the results, it can be seen that responses of Islamic home financing, conventional home loan, employment and interest rates to housing affordability are not statistically significant. Thus, it can be concluded that there is no significant short-run effect of the selected variables on housing affordability.

FIGURE 5
Impulse Responses of Housing Affordability
(Conventional Home Loan)



5.1.5 RESULTS OF VARIANCE DECOMPOSITION ANALYSIS

Table 8 provides evidence that OPR is not a significant variable in the case of Islamic home financing. From the results, it is evident that the immediate effect of a movement in the OPR has the smallest effect on housing affordability.

The findings of the study that OPR has a relatively more substantial effect in the short run is consistent with Worthington and Higgs (2013). The findings show that OPR is not an important variable in explaining housing affordability for Islamic home financing. On the other hand, Islamic home financing is the most important variable as it explains 7 percent of the variance in housing affordability as compared to conventional home loan which only explains 4.93 percent. Meanwhile, the number of employment has more pronounced

effect in the short run for both models. This implies that employment affects housing affordability in the short-run.

TABLE 8
Variance Decomposition of Home Affordability

Period	S.E.	DAFFIB	DEMPL	DHF	DOPR
Islamic Home Financing					
1	0.316455	100.0000	0.000000	0.000000	0.000000
2	0.334924	96.54391	0.019890	3.025832	0.410367
3	0.380396	90.38240	0.261927	6.604475	2.751198
4	0.392310	88.73873	1.246173	7.212050	2.803051
5	0.408993	82.69476	6.842052	7.131796	3.331387
6	0.410227	82.26071	7.283353	7.109679	3.346262
7	0.413482	82.33163	7.281494	7.079247	3.307624
8	0.415399	82.22015	7.342582	7.158970	3.278302
9	0.416358	81.92261	7.521202	7.205383	3.350802
10	0.416477	81.91058	7.526987	7.212535	3.349894
Conventional Home Loan					
1	0.302326	100.0000	0.000000	0.000000	0.000000
2	0.316389	97.89019	0.778820	0.421485	0.909507
3	0.365292	87.39361	1.425924	2.087982	9.092483
4	0.373570	87.04851	1.674550	2.001376	9.275560
5	0.390543	80.33393	6.562935	4.222133	8.881006
6	0.401532	76.13514	10.08525	4.283863	9.495747
7	0.410249	74.55551	11.32784	4.980028	9.136619
8	0.417499	74.12437	11.80484	4.973240	9.097544
9	0.419159	73.64266	12.36423	4.955655	9.037462
10	0.422178	72.61422	13.42708	4.931346	9.027354

In contrast to the Islamic home financing model, OPR seems to be important in the conventional home loan model, accounting for about 9 percent of shocks in housing affordability at the 10-quarter horizon. Meanwhile, number of employment explains about 13 percent of the variations in housing affordability. This means that employment is the most important variable in explaining the fluctuations in housing affordability. On the other hand, conventional home loan only explains about 4.9 percent of the variations in housing affordability.

From the results of both models, we can conclude that OPR is not directly linked to housing affordability in the case of Islamic home financing because Islamic financing is linked to real movements in economic activity. Number of employment however is the most important variable in both models in the short run. As explained by

Linneman and Megbolugbe (1992), low level of employment because of low job skills and education of household members will lead to stagnation in income, resulting in inability to cope with rising house prices. Employment is therefore directly related to household income and it will determine the ability of the household to pay the deposits and maintain the monthly instalments for a house.

6. CONCLUSION

The issue of housing affordability is not solely an economic problem but is a social problem as well. Housing programs that offer reasonable and affordable house prices for all household income levels still remain a target for the government. However, this demands the cooperation of many parties including financial institutions, housing developers, various policy makers and the government itself. Issues pertaining to housing affordability have been among the major concerns among households particularly those living in Kuala Lumpur and other major cities in Selangor and Pulau Pinang.

In this study, we analyze the influence of home financing on affordability of home ownership in Malaysia along with other selected variables namely the number of employment and OPR. We also formulate two models to compare the cases where Islamic home financing and conventional home loans are being offered. The set of methodologies employed in this study includes graphical illustrations, ARDL approach, IRFs and VDCs. In both models, this study finds that there is a cointegrating relationship between housing affordability and the selected variables such as employment, amount of financing and interest rate.

Islamic and conventional home financing are found to be significant in influencing housing affordability. These results reflect that Islamic and conventional home financing play important roles in promoting affordability of home ownership in Malaysia. Hence, policy interventions to stimulate home financing are needed in realizing housing affordability. This is required as it helps society to reduce the hardship faced by the low and middle income group in owning homes. With the use of rental rate as a benchmark of Islamic home financing, it is hoped that affordability is promoted as prices of homes will be cheaper and the rate more sustainable as risk sharing is applied. In the event of default, customers can get another person to continue paying the rental which also serves as the instalment to the bank.

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