

Macroeconomic Variables' Impact on Rental Rate in the United Kingdom Islamic Home Financing Using Bound Cointegration Test

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ABSTRACT

Rental rate has been suggested as a better alternative to replace the interest rate in Islamic home financing. However, the suggested alternative has to be free from the influence of any form of interest rate. This paper examines the long-run influence of macroeconomic variables on the rental rate in the United Kingdom housing market. The aim is to investigate whether the rental rate is free from the influence of both long-term and short-term interest rates in order to substitute the interest rate in Islamic home financing. The study employs Autoregressive distributed lags (ARDL) model to empirically estimate a long-run relationship between the rental rate and some selected macroeconomic variables. Using the United Kingdom housing market data from the first quarter of 1990 to the last quarter of 2016. The results show that rental rate is free from the influence of both short-term and long-term interest rate. Hence it could be recommended as an alternative to interest for Islamic home financing. The results further show that GDP, inflation rate, and share price positively influence rental rate.

Keywords: Rental rate, interest rate, Islamic home finance, and ARDL

INTRODUCTION

Financing based on interest rate is fundamentally unsound and insecure. It contributed to the financial economic crisis from an initial level of a regional economy to the global economy. As a result of this issue of the economic crisis caused by the interest, Islamic financial scholars recommend rental rate as an alternative to the interest rate in Islamic home financing. Similarly, the recommendation of the alternative of interest rate is as a result of the issue of destruction of the financial system caused by the interest rate as experienced in the resent global financial crisis in 2007. The interest rate is generally prohibited in Islam, despite its prohibition, it is still considered in Islamic financing. Therefore, this created a room for coming up with an alternative in Islamic home financing.

Rental rate has been recommended as an alternative to the interest rate in Islamic home financing due to the issue of the interest rate in Islam. Hence there is a need to conduct an empirical study to ensure that rental rate as the recommended alternative is free from any influence of interest rate. Another issue is that there is a scarcity of literature in Islamic financing compared to conventional financing and similarly, an inadequate empirical study in Islamic home financing. Therefore, the significance of the present study is to contribute to the body of knowledge in the field of Islamic financing. In addition, the study empirically proves whether the rental rate is free from the influence of the interest rate.

The main purpose, which motivates the present study to focus on the United Kingdom Islamic home financing is that the United Kingdom Islamic financial institutions accept the mode of home financing that is determined by rental rate rather than interest rate (Smolo & Hassan, 2011). Likewise, the United Kingdom is the first developed nation that agreed to practice Islamic home financing based on the rental rate rather than the interest rate. According to the global financial Islamic report (2016), the Kingdom is regarded as the Islamic financial center in the whole western world (Yusof, Bahlous & Haniffa, 2016) with more than 20 international banks that operate Islamic finance in the country. Therefore, the study focuses on macroeconomic determinants with more emphases on short-term and long-term interest rates to hypothesize that rental rate is free from their influence in the long run. Thus, based on this main hypothesis the research question is generated for the purpose of achieving the general objective of illuminating interest rate in Islamic finance. Hence, the objective

of replacing interest rate with rental rate could be achieved, if the rental rate is free from the influence of interest rates both long term and short term. For the purpose of achieving the objectives, the study employed the ARDL model to identify the long-run relationship between the macroeconomic variables and the rental rate in the United Kingdom Islamic home financing.

After an introductory section of the paper, the second section presents the literature review that contains an overview of Islamic home finance in the United Kingdom and empirical review on the rental rate. The third section present methodology and the discussion of the data analysis. Lastly, the paper concludes the implications of the findings and the recommendation for future research.

LITERATURE REVIEW

Overview of Islamic home financing in the United Kingdom

Islamic finance serves as a great agenda for financing in the countries with high number of Muslims. The United Kingdom adopted the system with twin aims; one is to encourage Muslims to participate in the financial market due to their faith of avoiding the conventional financial market that is interest based (Ainley, Mashayekhi, Hicks, Rahman & Ravalia, 2007). Secondly is to achieve the economic development objectives of making London the center of global Islamic finance (Tameme & Asutay, 2011). Hence, this motivates the present study to focus on the United Kingdom Islamic home financing.

The history of Islamic finance in the United Kingdom sketches as per back in 1980. The country has been leading in the development of Islamic finance in the western world and contributed a lot to support the development of the global Islamic financial industry. The Islamic Bank of Britain, presently known as Al Baraka Bank, was the first United Kingdom Islamic bank and it was established in 1982. The bank is owned by Al Baraka, an Investment Company with origins in Saudi Arabia. The Islamic bank serves as the foundation for the implementation of *shari'ah* compliance in leasing and home financing. The bank started with a long-term Islamic mortgage as Islamic home financing in 1988 (Wilson, 1999).

The bank practices Islamic home financing as equity financing. The share is based on the percentage of the contribution between the bank and the client with a high percentage share coming from the bank. The customer would pay a fixed profit for the period of the mortgage including monthly or quarterly repayments to Al Baraka (Tameme & Asutay, 2011). The problem of diversification of ownership resulted in an unsuccessful operation, to the point that it had to surrender its license and close the bank in 1993, which later the bank return to operations as the Al Baraka Investment Company (Belouafi & Chachi, 2014).

Apart from the Saudi Arabian based investment company (Al Baraka) which initiated the implementation of Islamic home financing in the United Kingdom, another Gulf country based bank contributed to the development of the system in the country. The United Bank of Kuwait introduced home purchase finance through its Islamic division in the United Kingdom named as the Islamic Investment Banking Unit in 1997 (Belouafi & Chachi, 2014). The bank merged with Al Ahli Bank and became Al Ahli United Bank. The initial home purchase product gave birth to a new product named as "*Manzil*" which is an Arabic word that means dwelling. Later in 1999, the bank introduced another Islamic mortgage known as *Ijarah*. The word is an Arabic word that means leasing. The *Ijarah* version of Islamic mortgage was believed to be more popular compared to the previous Islamic home financing product operated by the bank.

In 2003, HSBC (Hongkong and Shanghai Banking Corporation) the giant international bank, joined the two Gulf-based financial institutions in the development of Islamic home financing in the United Kingdom. The bank introduced Islamic home purchase financing with the commencement of the Islamic current account in the country (Belouafi, & Chachi, 2014). The two Islamic finance products (home purchase and current account) operated under an Islamic division of the bank called *Amanah*. The *Amanah* is an Arabic word that means trust. The bank operated all over the nation, which contributed to the spread of Islamic banking and financing in the United Kingdom. The Islamic home purchase was initially based on the *Ijara* contract and later changed to the *Musharakah Mutanaqisah* contract. Unfortunately, in 2013, the bank terminated its operation of Islamic finance in the country (Islamic Finance Solution, 2018).

However, despite the termination of HSBC Islamic banking, there are six fully Islamic banks operating in the Islamic finance industry in the country. The banks include Al Rayan Bank, the European Islamic Investment Bank, the Bank of London and the Middle East, Qatar Islamic Bank (United Kingdom), Gatehouse Bank and Abu Dhabi Islamic Bank (Belouafi & Chachi, 2014). The government involvement in Islamic finance enhances the success of the Islamic banks in the country.

Since home financing is the foundation of Islamic financing in the United Kingdom, and the rental rate is the backbone of home financing, the present study reviews the determinants of rental rate.

Review of The Determinants Of Rental Rate

The present study reviews the previous papers that are relevant to the determinants of rental rate in the housing market. The papers include the study of D'Arcy, McGough and Tsolacos (1997) which investigated the rent determinant of five major European cities over the period of 1980 to 1994. The cities include Amsterdam, Brussels, Hamburg, London, and Paris. The study considers time series cross-sectional methodology to test the influence of rental across the five European cities. The study considers the gross domestic product, real consumer expenditure and real value of retail sales as the determinant of rent in the five study areas. The results of the time series cross-sectional analysis confirmed that GDP is the significant variable that determined rent in the whole five cities. The issue of the study in relation to Islamic home financing for the purpose of investigating the impact of interest rate, the conclusion could not be generalized whether the rental rate is free from the influence of interest rate.

Yusof, Kassim, Majid and Hamid (2011) focused on the macroeconomic determinants of rental price and the lending rate to analyze the possibility of relying on rental rate for Islamic home financing product. The study covered data for the Malaysian housing market from 1990 until 2006 using quarterly data. The independent variables are a gross domestic product (GDP), inflation rate, exchange rate, and interest rate. The study considered Treasury bills as a proxy of interest rate, which is the component of short-term interest rate. The study employed Autoregressive distributed lags (ARDL), Granger causality and multivariate causality. The purpose of the study is to investigate whether the rental price could serve as a benchmark for Islamic home financing compared to the lending rate. The result of the findings pointed out that the rental price is significantly affected by the GDP and Treasury Bills. One of the issues of the study is that the result will not be generalized on the impact of interest rates on the rental rate because it is restricted to Treasury bills which are only a single component of short-term interest rate rather than the long-term interest rate. Another issue is that the result showed that the rental price relied on the short-term interest rate in the Malaysian housing market for the period of the study. The study also compared the rental rate and lending rate that is not sharia-compliant despite that it is trying to come up with sharia-compliant in Islamic home financing.

Simon, Achsani, Manurung and Sembel (2015) examined the macroeconomic factors that affect office rental rates and selling prices. The study considered Indonesian quarterly data covering the first quarter of 1996 to the last quarter of 2012. The result of the Vector Error Correction Model (VECM) shows the existence of a long-run relationship between the macroeconomic variables and office rental rate. The long-run results of the VECM further showed that interest rate, inflation rate, exchange rate, and employment service positively influenced the office rental rate. The result of the Impulse Response Function (IRF) indicated that office rental rate positively responded to the variables such as interest rates, inflation, exchange rate, and employment rate. At variance decomposition, the result proved that the office rental rate is predominantly influenced by the employment services sector, exchange rate, inflation, interest rates, and GDP respectively. The issue of the study is that the focus of the study is limited to the office rental rate which did not include the entire rental rate that consists both office rent and residential rental rate.

Latif (2015) studied the impact of immigration flow on the residential rent in Canada using annual data from 1983 to 2010. The independent variables are Gross Domestic Products (GDP), unemployment rate and immigration flow. The study employed Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS). The result indicated suggested that immigration flow has a significant influence on property rent. The result also shows that employment rate positively influences the housing rent. The result of the study further indicates that the middle-class housing rent is significantly tied to their

employment compared to other classes of housing rental rate. The issue of this study is that it did not consider interest rate among the determinants, hence, there will be no conclusion on the influence of interest rate on the rental rate. The study suggested for further investigation of the relationship between macroeconomic variables and house rent.

Salihu and Yusof (2017) analyzed the impact of some selected macroeconomic variables on house price in the South African housing market. The study employed ARDL cointegration techniques to empirically examine the determinants of house prices in the study area. The study considers the quarterly data from the first quarter of 2006 to the last quarter of 2015. The result of the ARDL bound test indicates the presence of long-run cointegration in the model. The analysis focuses more on the impact of interest rates both long term and short term. The results indicate interest rates significantly influence the house price. But the direction of the influence differed, the long-term interest rate positively affects the house price while the short-term interest rate negatively affects the house price. Similarly, Inflation rate negatively affects the house price. However, GDP and exchange rate reported an insignificant relationship with the house price. From the sharia point of view, the interest rate should not play a significant role to determine the house price.

Therefore, the present study tries to empirical investigate whether the rental rate is influenced by interest rate or it free from its influence.

METHODOLOGY

The present study considers cointegration analysis to test the relationship between the macroeconomic variables and rental rate. The study employs Autoregressive distributed lags (ARDL) model due to its advantage over various cointegration analysis techniques that consist of the residual-based Engle and Granger (1987), and the maximum likelihood-based Johansen (1991). The ARDL model provides consistent estimates of coefficient irrespective of the integration order of the variables, provided that none of the variables is integrated as the second order of integration (Pesaran & Pesaran, 1997). The model accommodates the variables that are either integrated of order 0 or integrated of order 1 or even a mixture of the two orders (Pesaran, Shin, & Smith, 1996, 2001). The model also provides robust result irrespective of the limited period of data or a limited number of samples of the cointegration analysis. Furthermore, the ARDL model takes a sufficient number of lags to reduce the strength of the serial correlation of residuals (Laurenceson & Chai, 2003).

The basic assumptions of the ARDL bound test states that all variables under examination are integrated at level, first difference or mixed order (Pesaran et al., 2001). The study (Pesaran et al., 2001) reported two sets of critical value; the first assumption states that all variables are integrated at level ($I(0)$) and the second assumption states that all the variables are integrated at first difference ($I(1)$). Hence, the study proposed to consider Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests to ensure that none of the variables is integrated at the second order. The justification of the unit root test is to avoid violation of the two assumptions stated above. ADF and PP unit root tests are commonly used in the stationary test (Abd Karim & Gee, 2008).

The study uses quarterly time series data for the United Kingdom housing market from the first quarter of 1990 to the last quarter of 2016. The data are obtained from the International Monetary Fund (IMF) and the Organization for Economic Co-operation and Development (OECD) database. Most of the time series data contained unit roots, hence, the first stage of the analysis starts with the unit root test. Hence, there is a need to conduct the unit root test to ensure that none of the variables is integrated at second order, otherwise, the result will be spurious. The study adopts the Augmented Dickey-Fuller (ADF) unit root tests. The equation is defined as:

$$\Delta Y = \alpha_0 + \alpha y_{t-1} + \sum_{t=1}^{k1} \Delta Y_{t-1} + \epsilon_t$$

where Y_t is the value of series in quarter t (time trend), ΔY represents changes in Y ($y_t - y_{t-1}$) and t is a pure

white noise error term. The null hypothesis for a one-tailed test of Dickey-Fuller is $H_0: p = 0$ (this shows that the data is non-stationary or contains unit root), the null hypothesis cannot be rejected. The alternative hypothesis is $H_1: p < 0$ (this shows that the data is stationary, or there is no unit root), the null hypothesis can be rejected.

The first one is to establish the presence of long-run cointegration among the variables. Once the presence of cointegration is confirmed, the second stage is to estimate the long run relationship between macroeconomic variables and house price. The third stage is to estimate the associated ARDL-ECM. The last stage is to conduct diagnostic and stability test in order to determine the goodness of fit of the ARDL model. The ARDL theoretical model is presented as:

$$RR_t = \alpha_0 + \alpha_1 GDP_t + \alpha_2 CPI_t + \alpha_3 REER_t + \alpha_4 SHPI_t + \alpha_5 UER_t + \alpha_6 LTIR_t + \alpha_7 STIR_t + \mathcal{E}_t \quad (2)$$

where α_0 is a constant and $\alpha_1 \dots \alpha_n$ represent the coefficient of specific macroeconomic variables and \mathcal{E}_t is the error term. RR represents the rental rate as the dependent variable. The macroeconomic variables employed as independent ones are real GDP which represents real gross domestic products, CPI represents consumer price index, REER represents real effective exchange rate, LTIR represents long-term interest rate and STIR is the short-term interest rate. The error term is defined as the residual error of the regressions and $t = 1 \dots n$; T refers to the time series period. The variables α_6 and α_7 are expected to be an insignificant relationship based on Islamic home finance in order to ensure that rental rate is free from the influence of interest rates on the objective to be achieved. Table 1 shows the variables and their measurement as well as the sources of data used in the present study.

Table 1. Measurement of Variables

Variables	Measurement	period	Sources
Rental rate	Rental price index	1990Q1-2016Q4	stats.oecd.org
Interest rates	Short-term/ long-term	1990Q1-2016Q4	stats.oecd.org
Income	real GDP	1990Q1-2016Q4	imf.org
Inflation rate	Consumer price index	1990Q1-2016Q4	stats.oecd.org
Exchange rate	Real effective exchange rate	1990Q1-2016Q4	imf.org
Unemployment rate	Harmonized unemployment rate	1990Q1-2016Q4	data.oecd.org
Share price	Share price index	1990Q1-2016Q4	data.oecd.org

Source: IMF and OECD Data

The present study employed the ARDL bound test, proposed by Pesaran et al. (2001) to test the existence of long-run cointegration between the variables. The cointegration test is based on the null hypothesis which states no cointegration and the alternative hypothesis that states the existence of cointegration. The null hypothesis of the ARDL states that there is no long-run cointegration and this can be expressed as $H_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = 0$ which was tested against the alternative hypothesis that can be expressed as $H_A \neq \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq \alpha_7 \neq 0$. The F -statistics is compared to Narayan (2004) two critical values (upper and lower values). If the result is above the upper critical value, the null hypothesis is rejected. This indicates the existence of cointegration. Whereas if the result is below the lower critical value, it indicates nonexistence of cointegration. However, if the result is between the two critical values, it indicates the inconclusive result.

The further stage after establishing the existence of cointegration is long-run equilibrium and short-run dynamic. The last step of ARDL is to estimate the associated ARDL ECM. The lag error correction term (ect_{t-1}) measures the speed of the adjustment that stabilized disequilibrium of the model by converging to equilibrium. The significant negative relationship of the coefficient of error correction model confirms the existence of long-run relationship and adjustment of disequilibrium to ensure convergence of the dynamics to the long-run equilibrium in the model (Narayan, 2004). The high magnitude of the ECT indicates the high speed of adjustment. Therefore, the short run elasticity is estimated using the ARDL error correction term (ECT). Therefore, a dynamic error-correction model (ECM) can be derived from the ARDL model equation

3.1 through a simple linear conversion (Banerjee, Dolado, Galbraith, & Hendry, 1993). The error correction model representation of the ARDL models can be presented in the equation below:

$$\Delta RR_t = + \sum_{j=1}^{k1} \alpha_1 \Delta RR_{t-j} + \sum_{j=0}^{k2} \alpha_2 \Delta GDP + \sum_{j=0}^{k3} \alpha_3 \Delta CPI_{t-j} + \sum_{j=0}^{k4} \alpha_4 \Delta REER_{t-j} + \sum_{j=0}^{k5} \alpha_5 \Delta SHPI$$

$$+ \sum_{j=0}^{k6} \alpha_6 \Delta UER_{t-j} + \sum_{j=0}^{k7} \alpha_7 \Delta LTIR_{t-j} + \sum_{j=0}^{k8} \alpha_8 \Delta STIR_{t-j}$$

$$+ \beta_1 RR_{t-1} + \beta_2 GDP_{t-1} + \beta_3 CPI_{t-1} + \beta_4 REER_{t-1} + \beta_5 SHPI_{t-1} + \beta_5 UER_{t-1} + \beta_6 LTIR_{t-1} + \beta_7 STIR_{t-1} + \beta_8 ECT_{t-1} + \epsilon_t$$

(3)

where the used variables are as defined in equations 3.1, k is the maximum number of lags in levels of the variables, Δ is the first difference operator, and α_0 is constant, the parameters α_s correspond to the short run relations. Whereas β_s correspond to the long run relations; ect is the error correction term, and ϵ_t is the error terms. The short-run dynamics added to the above equation (3) is represented by the terms with summation signs.

The last stage of the ARDL model is the stability test proposed by Brown, Durbin and Evans (Brown, Durbin, & Evans, 1975). The test consists of the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of square recursive residuals (CUSUMSQ). The tests are presented in the form of graphs. The graph is examined with the two critical boundaries (upper and lower) of five percent significance level. If the graphs of CUSUM and CUSUMSQ fall inside the upper and lower boundaries, it indicates that the coefficients of the dependent variable in the ECT of the ARDL model are stable. Hence, the null hypothesis cannot be rejected. Conversely, the null hypothesis can be rejected if the graph is found to be across the boundary of critical value. The test examines the stability of short-term movement within the long-term parameter. The CUSUM test shows whether the coefficient of regressions are changing systematically and the CUSUMSQ shows whether the coefficient regressions are changing suddenly.

RESULT

The analysis of the present study begins with the unit root test to ensure that none of the variables are integrated in the second order of integration. The regression of the model that consists of the second order integrated variables could produce a spurious result in the cointegration analysis (Narayan, 2004 and Pesaran et al., 2001). Table 2 shows the result of the ADF unit roots and Table 3 shows the result of PP unit roots test. The result of ADF shows that LTIR and STIR are integrated at the initial level. Whereas all the variables with the exception of CPI are integrated at first difference. Therefore, due to the importance of CPI in determining price, the study considers PP unit roots to test whether CPI could be integrated at the initial level or first difference for the avoidance of important variable. According to Abd Karim and Gee (2006), the ADF and PP are commonly used to test unit roots. The use of two different unit roots test comes up with a robust conclusion regarding the stationary of the variables. The result of PP shows that CPI is integrated at first difference and LTIR and STIR are integrated at the initial level. Hence it resulted to the mix order of integration. Therefore, the result of the unit root tests justified the use of ARDL.

Unit Root Tests

Table 2. Augmented Dickey-Fuller (ADF) Stationary Test Result

	Constant	Without Trend	Constant	With Trend
Variables	Level	1 st Difference	Level	1 st Difference
CPI	0.42(6)	-2.66(5)*	-2.32(6)	-2.77(5)

UER	-1.53(1)	-4.21(0)***	-1.98(1)	-4.26(0)***
LTIR	-2.47(2)	-7.47(1)***	-4.31(1)***	-7.61(1)***
GDP	-0.53(3)	-4.93(2)***	-2.23(1)	-4.91(2)***
RR	-2.18(1)	-6.44(0)***	-3.27(3)*	-6.72(0)***
REER	-2.08(1)	-6.81(0)***	-2.29(1)	-6.73(0)***
SHPI	-1.90(1)	-7.40(0)***	-2.30(1)	-7.40(0)***
STIR	-2.99(1)**	-5.62(0)***	-3.98(1)**	-5.75(0)***

Notes: Figures are the t-statistics for testing the null hypothesis that the series are non-stationary. * denote significance at 10%, ** denote significance at 5% and *** denote significance at 1%.

In addition to ADF, the study also considers the Phillips-Perron (PP) test (1988), in order to come up with a robust conclusion regarding the stationary of the variables.

Table 3. Philips-Perron (PP) Stationary Test Result

Variables	Constant	Without Trend	Constant	With Trend
	Level	1 st Difference	Level	1 st Difference
CPI	0.57(8)	-11.50(8)***	-1.68(8)	-11.46(8)***
UER	-1.34(7)	-4.17(2)***	-1.69(7)	-4.23(2)***
LTIR	-2.04(4)	-7.71(2)***	-2.84(3)	-7.78(4)***
GDP	-0.11(6)	-4.50(2)***	-1.79(6)	-4.49(2)***
RR	-2.52(7)	-6.74(6)***	-5.07(6)***	-7.15(6)***
REER	-1.89(5)	-6.72(2)***	-2.05(5)	-6.69(2)***
SHPI	-1.76(5)	-7.39(3)***	-2.18(5)	-7.38(2)***
STIR	-2.83(3)*	-5.67(2)***	-3.15(3)**	-5.81(2)***

Notes: Figures are the t-statistics for testing the null hypothesis that the series are non-stationary.

*denote significance at 10%, ** denote significance at 5% and *** denote significance at 1%.

The study proceeds to identify the maximum lag order since ARDL is sensitive to the lag order (Bahmani, Oskooee & Ng, 2002). The study considers Akaike, Schwarz, and Hannan-Quinn information criteria to come up with the optimum lag. The present study consists of large observation number of 104. Akaike Information Criteria (AIC) is more superior to Schwarz information criteria (SIC) in the large observation (Harvey & Harvey, 1993). Therefore, the study considers four as the optimum number of lags as selected by the Akaike information criteria. According to (Liew, 2004), the lag with the smallest value is the appropriate lag for regression. Another justification for selecting lag four as the optimum is lag is that the lag agreed with both Akaike and Hannan-Quinn selection criteria, as indicates in Table 4.

Table 4. Lag-length selection Criteria for rental rate model

Lag	AIC	SIC	HQIC
1	0.056946	0.363905	0.181275
2	0.005707	0.314527	0.130759
3	-0.006897	0.303811*	0.118887
4	-0.104069*	0.443016	0.117346*

N.B: * indicates the lowest value under each criterion.

Considering lag 4 selected by AIC and HQIC, the study proceeds to determine the optimum of the ARDL model for the purpose of the analysis. The result of the ARDL came up with the model (1, 0, 2, 0, 1, 2, 3, 4) as the optimum model as indicated in Table 5 below.

Table 5. Optimal ARDL Model Section

Selected Model: ARDL (1, 0, 2, 0, 1, 2, 3, 4)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
RI(-1)	0.833704	0.030031	27.76153	0.0000
REER	-0.010516	0.007352	-1.430476	0.1565
RGDP	0.023982	0.064275	0.373120	0.7101
RGDP(-1)	-0.048239	0.106606	-0.452496	0.6522
RGDP(-2)	0.129402	0.070695	1.830422	0.0710
HUEMPR	0.024479	0.041020	0.596758	0.5524
SHPI	-0.000474	0.004877	-0.097243	0.9228
SHPI(-1)	0.006592	0.004772	1.381378	0.1711
LGTINTR	-0.019389	0.087835	-0.220738	0.8259
LGTINTR(-1)	-0.152648	0.131376	-1.161920	0.2488
LGTINTR(-2)	0.217298	0.090898	2.390574	0.0192
SHTINTR	-0.116886	0.075148	-1.555413	0.1238
SHTINTR(-1)	0.363820	0.095529	3.808468	0.0003
SHTINTR(-2)	-0.382208	0.093331	-4.095180	0.0001
SHTINTR(-3)	0.109160	0.053836	2.027632	0.0460
CPI	0.078332	0.052842	1.482389	0.1422
CPI(-1)	-0.011725	0.072055	-0.162725	0.8712
CPI(-2)	-0.122296	0.064127	-1.907098	0.0601
CPI(-3)	-0.011680	0.065420	-0.178546	0.8588
CPI(-4)	0.178263	0.054570	3.266706	0.0016
C	-4.052990	0.913069	-4.438866	0.0000

Akaike info criteria -0.104069, Schwarz info criteria 0.443016, Hannan Quinn info criteria 0.117346, F-statistics 36831.09 Prob. (F-Statistics) 0.0000000 Durbin Watson Stat 2.024627

After determining the maximum lag length, the study proceeds to the cointegration test. As the model is unrestricted, the linear trend term is omitted in the equation. This is because the constant coefficient value is negative and significant as indicated in Table 5 above. In this case, there is no need to include the linear trend in the model. The ARDL bound test is aimed to establish the existence of cointegration among the independent variables and the dependent variable. The study performed the ARDL bound cointegration test using the rental rate as the dependent variable as illustrated in Table 6 below.

ARDL Bound Cointegration Test

Table 6. ARDL Bound Test Results Rental Rate Model

Variables	F-Statistics	Cointegration	CV	I(0)	I(1)
FRR(CPI,UER,LTIR,REER,GDP,SHPI,STIR)	10.99597**	Present of cointegration	1%	2.96	4.26
			5%	2.32	3.5
			10%	2.03	3.13

** represent five percent

The bound test is conducted to test the existence of a cointegration relationship against the null hypothesis of the non-existence of the cointegration relationship between the dependent variable and independent variables. The result is reported based on Narayan (2004) critical value. The bound test result of F -statistics is 10.99597. The value of F -statistics is above the upper bound of the critical value which is an indication of the presence of cointegration in the model. The result of the model provides a strong evidence of the existence of long-term cointegration relationship over the period of analysis. Therefore, the null hypotheses that state no cointegration is rejected which indicate the existence of long-run cointegration. Hence, the findings suggest that rental rate in the United Kingdom is significantly linked to the selected macroeconomic variables. The bound test cointegration result is consistent with the study findings of Salihu and Yusof (2017).

Estimation of the Long-Run Relationships

The model indicates that GDP, SHPI, and CPI have a significant relationship with the rental rate in the United Kingdom housing market in the long run. The three variables positively affect the rental rate at one percent significant level. The result indicates that one unit increase in GDP resulted in 0.63 unit increase in the rental rate as shown in Table 7. The result is consistent with the studies of Salihu (2018) and Yusof et al. (2011). Economists argue that an increase in the level of income enhances the level of spending and thus raises the demand for goods and services and simultaneously increases their prices (Yusof et al., 2011).

For the SHPI independent variable, the result indicates that unit increase in SHPI resulted in 0.04 unit increase in the rental rate as shown in Table 7. Equity investment and housing investment are alternatives to one another (Sim & Chang, 2006). Therefore, they are expected to have a negative relationship with one another. According to the theory of user cost-rent equivalent, renting and buying a house are also alternatives to one another. Hence, they are expected to have a negative relationship. Therefore, the share price would positively influence the rental rate indirectly. However, the study of Clark and Daniel (2006) conducted in the South African housing in the period from 1980 to 2005, found that share price positively influences house price. The study concludes that rises in the house price would increase the rental price in the long run. Consequently, the share price could positively influence rental price indirectly.

For CPI variable, the result indicates that one unit increase in CPI resulted in 0.67 unit increase in the rental rate as shown in Table 7. The positive relationship between inflation and rental rate is consistent with the studies of Salihu (2018) and Simon et al. (2015) which found a significant positive correlation between inflation rate and rental rate. The result is also consistent with the universal aspect of the real economy which indicates that inflation affects the price of goods and services (Tze, 2013).

The results of the ARDL long-run relationship indicates that rental rate is free from the influence of interest rates both long term and short term as shown in Table 7. The results indicate an insignificant relation between rental rate and the interest rates both long term and short term. The result is consistent with the study's result of Salihu (2018). Hence, the rental rate can serve as an alternative to the interest rate in Islamic home finance.

Table 5, represents the short run estimate that expresses the dynamic behavior of the ARDL model. The coefficient of the error correction term is negatively significant at one percent. The result confirms the

presence of the long run relationship between the rental rate and the fundamental variables. Hence, it represents the speed of adjustment at which the model attains the long run stable state of equilibrium following an exogenous shock in the short run. The coefficient of ECM is -4.05 which indicates that the deviation from long-run equilibrium will be corrected by a speed of 40.5 percent for every quarter.

Table 7. Long Run Elasticity for rental rate model ARDL (1, 0, 2, 0, 1, 2, 3, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REER	-0.063238	0.039541	-1.599293	0.1137
RGDP	0.632278	0.050340	12.560070	0.0000***
HUEMPR	0.147202	0.256906	0.572978	0.5683
SHPI	0.036787	0.013825	2.660881	0.0094***
LGTINTR	0.272176	0.358167	0.759913	0.4496
SHTINTR	-0.157031	0.272434	-0.576399	0.5660
CPI	0.666840	0.056982	11.702736	0.0000***
C	-24.372133	6.867703	-3.548804	0.0007***

Note: *** represent 1% significance level.

Diagnostic Checks

Diagnostic checks were undertaken to test normality, serial correlation, heteroskedasticity and model specification tests. The normality test on error terms confirmed that the model is normally distributed. The result of normality in Table 8 indicates that the result failed to reject the null hypothesis which states that error terms are normally distributed. Secondly, the result of the serial correlation as per Lagrange Multiplier pointed out that the residual is not serially correlated. The result shows that the test failed to reject the null hypotheses for the model which states that the error terms are not serially correlated. The existence of serial correlation could lead to the wrong specification of the model (MacKinnon, 1992). On the hand, the nonexistence indicates a good specification of the model. The third diagnostic test of heteroskedasticity test of error failed to reject the null hypothesis which states the existence of homoskedasticity. The result confirmed the presence of homoskedasticity which is an indication of the absence of heteroskedasticity (Breusch & Pagan, 1979). Hence, this indicates that the model is free from the problem of underestimating the variables and standard error. The fourth test that consists of Ramsey's regression equation specification error test (RESET) confirmed the goodness specification and functionality of the model (Ramsey, 1969). Therefore, as illustrated in Table 8 below, the ARDL error correction term confirmed that the model is normally distributed, serially uncorrelated, and the existence of homoskedasticity is well specified and formulated. Hence, this creates room for BLUE estimates.

Table 8. ARDL Diagnostic Test Results

Diagnostic tests	Normality	Serial Correlation	Heteroskedasticity	Model Specification
F-statistics	0.324747	0.269336	1.189447	0.094280
Probability	(0.8501)	(0.8968)	(0.2857)	(0.7596)

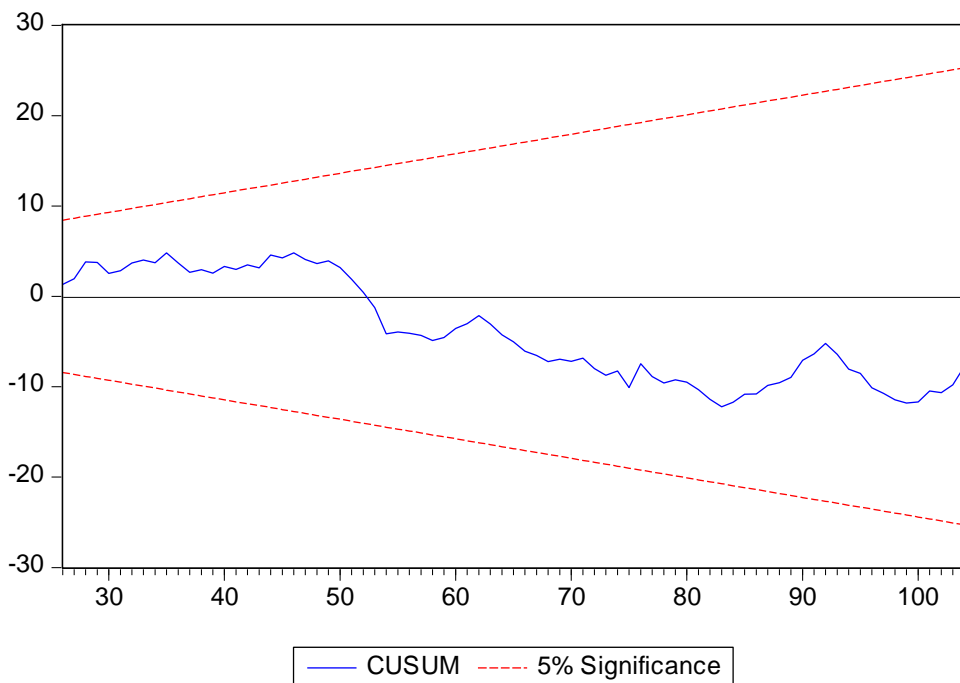
Note: None of the tests are significant even at 10 percent level.

Stability Test

Finally, the last stage of the ARDL model is to conduct the stability test. The test is conducted to examine the stability of short-run movement within the long-run parameter using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests. The two stability tests

were proposed by Brown, et al. (1975). The tests are usually applied to the residuals of the estimated model. The purpose of the CUSUM test is to show whether the coefficient of regression are changing systematically, while CUSUMSQ is used to show changes suddenly. According to Tanizaki (1993), CUSUMSQ is more potent than CUSUM. If the plot of CUSUM falls inside the upper and lower critical limit of five percent significance level (Brown et al., 1975) which are portrayed by two straight lines, it shows that the coefficients of the dependent variable in the ECM of the ARDL model are stable. The same procedure is applied to CUSUMSQ that is based on square recursive residuals. The tests were conducted for the three models of this study which are the rental price index, house price index and rental rate models. The plotted CUSUM and CUSUMSQ of the rental rate model are within the upper and lower critical bound at five percent significance level. These confirmed the stability of the models as depicted in Figure 5.1 and Figure 5.2.

(a)



(b)

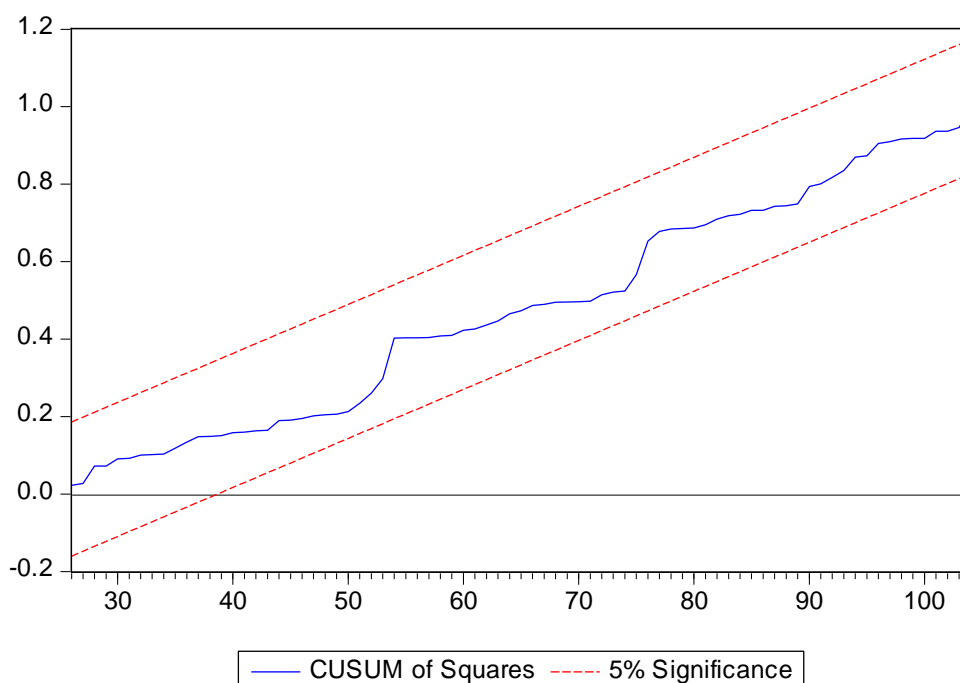


Fig. 1. (a) CUSUM; (b) CUSUMSQ.

CONCLUSION

The results of the ARDL long-run relation for the model indicates that rental rate is free from the influence of interest rates both long term and short term as shown in Table 7. Therefore, the result shows that rental rate is empirically qualified to substitute interest rate in benchmarking Islamic home financing. Hence, the objectives of the present study based on the hypothesis that hypothesized that rental rate is free from the influence of long-term and short-term interest rates have been achieved.

The findings suggest that home financing institutions should either provide free interest debt financing or should consider rental rate to determine the equity home financing. Rental rate is nondiscriminatory to both financial institutions and their customers in the contract that is based on risk sharing mechanism rather than the contract which is based on the interest that is prohibited in Islam.

The present study has some limitation, and thus recommends the future study to focus on them. The study focuses only on some macroeconomic factors, it did not include taxation in the independent variables used in the study despite that it plays a role in determining both house price and rental rate. In addition, the study did not investigate the physical attributes which include the structure and location of the housing property that determines both the housing price and rental rate. Therefore, the recommends the future study to fill these gaps.

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