IPN Journal of Research and Practice in Public Sector Accounting and Management
Vol. 10, No. 1, 2020, pp. 97 - 115

How Do Interest Rate Changes Affect Islamic Banks? Empirical Evidence on Islamic Banks in Malaysia

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https://doi.org/10.58458/ipnj.v10.01.06.0066

Received: 28 September 2020 *Reviewed: 20 October 2020* *Accepted: 5 November 2020*

Abstract

Purpose: Little empirical evidence has shown that financial systems with dual-banking systems are relatively more resilient against many financial crises, especially to changes in interest rate levels. In the same vein, this study investigates the impact of interest rates on Malaysian Islamic banks by analysing the relationship between changes in interest rates on Islamic banks' deposits and financing.

Design: The objective is investigated using the ARDL bounds test with 144 observations of monthly data from 2007 to 2018. The unit root tests of Augmented Dickey and Fuller (ADF) and the Phillips-Peron (PP) were conducted, followed by the diagnostic tests of serial correlation and heteroscedasticity, and Cumulative Sum of Recursive Residuals or CUSUM and CUSUM Square stability test to ensure robustness of the results. The robustness of the findings is confirmed with diagnostic tests.

Findings: The study finds that interest rates have a relationship with both deposits and financing of Malaysian Islamic banks in the long run. This means that in the long run, when interest rates increases, both deposits and financing of an Islamic bank are still increasing. Furthermore, the religious factor is found to play a role in Malaysian's banking decisions.

Practical Implication: Firstly, the study highlights that the dual banking system is more resilient than the single banking system as the Islamic banking system is not affected by the conventional interbank rates. However, it also provides evidence that Islamic banks are not entirely independent from the effect of conventional interest rates. Therefore, the Islamic banks need to be attentive to interest rates risk in their risk management, as it could influence

the value of their assets and obligations. It also highlights the necessary timing for market to revert back for both institutions' and investors' discretion. Secondly, due to all reasons above, the Bank Negara Malaysia needs to be cautious in designing monetary policies as such both government and public sectors can strategize the financing of the country.

Originality and Value: Providing the most recent sets of data, this study is invaluable to the government, public sector, financial institutions, investors, and fellow academicians. It also adds value to Islamic Bank literature.

Keywords: Interest Rates; Islamic Banks; Dual-Banking System; ARDL Bound Test, Monetary Policy, Malaysia

JEL Classifications: E51, E52, E58

1.0 Introduction

A country's authority regarding monetary matters, as such the central bank, uses monetary policy in effort to combat inflation or recession. Monetary policy influences interest rates or money supply to ensure the stability of a country's currency value (Federal Reserve Board, 2006). Theoretically, a lower discount rate would encourage banks to borrow more, thus increasing the money supply, liquidity in the financial system and consequently boosting the economy out from recession. The opposite strategy is used to combat inflation.

A low interest rates or near zero interest rates is not an uncommon practice in the modern economy of today. Commonly, central bank applies this practice on country's real interest rate. Japan's lending interest rates went to -0.1 percent in 2016 and has remained at about the same level in current times. However, this strategy has seen modest impact in stimulating growth to the Japanese economy. Moreover, in 2009, Sweden lowered their lending interest rates to -0.25 percent to provide a short-term shock in stimulating their economy. However, the strategy to increase borrowing by banks and spending by household, has seen little impact. A similar predicament happened in the US. Based on the data provided by World Bank, the country has maintained low real interest rate since 2011, but has seen little success in combatting its economic recession.

Alternatively, economies with dual-banking systems have been resilient in many financial crises. A dual-banking system is a structure where conventional and Islamic banking institutions operating in parallel in an economy. Countries like Turkey, Bahrain, Jordan, Kuwait, Indonesia, the UAE, Yemen, and Malaysia practice this dual-banking system. This system offers healthy competition among banks and innovations in products and services to meet wider customers' demands. The involvement of an interest-free banking by Islamic banks is believed to contribute towards financial stability (Ergec and Arslan, 2013). It provides protection from the fluctuation of interest rates (Khan, 1986; Kassim et al., 2009; Ergec and Arslan, 2013), due to the fact that Islamic bank nature is asset-linked while conventional banking is interest-based. The asset-linked nature of Islamic banks is resistant to financial

crisis as empirically supported by Samad (1999), Kaleem (2000), and Samad and Hassan (2000).

According to Kassim et al. (2009), in theory, Islamic banks are more stable than conventional banks. Operations-wise, being free from interest makes Islamic banks impervious to interest rates risk, resulting in a more stable demand for money and monetary policies (Kia and Darrat, 2007). The absence of interest rates may 'mitigate structural breaks in the underlying demand relationships resulting from exogenous shocks' (Kia and Darrat, 2007, p. 105). Furthermore, Ergec and Arslan (2013) state that Islamic banks do not have to reassess their balance sheet due to the absence of interest rates effect.

However, does interest rate really possess no threat to Islamic banks' performance? This question weighs highly, especially, for Islamic banks in a dual-banking system. According to Kassim et al. (2009), the influence of interest rates on Islamic banks bear a huge impact to risk management of the bank and its performance. This view is supported by various empirical literature from different economies (Haron and Azmi, 2008; Hakan and Gulumser, 2011; Anthony, 2012; Ojeaga et al., 2013; Eriemo, 2014; Ergec and Arslan, 2013; Mushtaq and Siddiqui, 2016). Henceforth, investigating the impact of interest rates' fluctuations on Islamic banks' performance in a dual-banking system, such as Malaysia is of the utmost importance. This study is imperative to government's monetary policies plans, bank's risk management and consequently, the financial stability of a country.

A study on the impact of interest rates on Islamic banks' performance is interesting, especially from a country with a dual-banking system such as Malaysia. According to MIDF Economic Review (2018), the Malaysian economy remains robust after being hit by multiple external crises. This is proven in the aftermath of the 2008 global financial crisis; Malaysia recorded a trade surplus of 43.1 billion US Dollars in late 2018. Malaysia current account surplus is 16.9 percent of its gross domestic product (GDP). It is safe to say that the Malaysian economy is unperturbed by the contagion effect of global financial crisis. However, in 2019 there were alarming symptoms that began to arise in the Malaysian market, such as an increase in government debt, budget deficit, and the weakening of its currency (Ringgit) against the US Dollar. According Despite the action of US Federal Reserves to increase interest rates within range of 2.00-2.25 percent in September 2018, Malaysia has been steadily decreasing its short-term and long-term interest rates (CEIC Data, 2019).

Malaysian dual-banking system has existed since 1983. In the aftermath of the Asian financial crisis, the government decided to further enhance and develop the country's Islamic banking system. For this reason it could provide unique advantages in withstanding external economic and financial shocks in the future. Subsequently, it offers the country a more stable financial environment and protection against interest rates risk (Khan, 1986; Kassim et al., 2009; Ergec and Arslan, 2013). In Malaysia, Islamic banking was first introduced in 1983 with the founding of Bank Islam Malaysia Berhad (BIMB), followed with Islamic banking-window scheme by the conventional banks in 1993. By the end of 2006, there were ten different Islamic banks operating in Malaysia. This rapid growth goes concurrently with Bank Negara Malaysia

(BNM)'s ongoing efforts in creating a competitive banking avenue. BNM granted license to Middle-Eastern Islamic banks to operate in the country in 2006, hoping that the effort will spur a positive effect in the banking industry as a whole. As of March 2020, Malaysia has sixteen Islamic banks, five of them owned by foreign banks and the remaining eleven banks are local. According to data from Bank Negara, as of December 2019, Islamic banking has total assets of RM835.19 billion (Jalil, 2020).

Due to the dual nature of the banking system in Malaysia, the development and growth of the Islamic banks are expected to have a spill-over effect on the conventional banking system. Further pushing the competition healthily among all banks. Both banking systems compete in providing a vast array of products to meet innumerable demands of a multi-racial background. Both Muslim and non-Muslim customers are free to choose, or switch, between the two systems. Haron and Ahmad (2000) state that customers' will only pay for deposit equivalent to their perceived-benefits, or they will go to other banks for better offers. Malaysian customers need to weigh their options in financing and deposit rates that suit to their financial appetites. Hence, banks have to compete for customers' constancy. Theoretically, both banking systems operate within their own domains, however, given the same macro environment, both systems should interact with one another. Thus, movement of interest rates could affect households' flow of funds and subsequently, banks' level of total deposit and financing. This conception is further supported by Bacha (2004).

Banks require inflow of funds from depositors and provide loans to the borrowers resulting in economic growth for the country and profit for the banks. According to Edmister (1982), fluctuations of banks' deposit prices have many impacts, among them are banks' yield spread between loan and deposit rates, customers' deposits decisions, banks' growth and banks' profitability. Rose (1991) also states that deposits pricing is the most effective tool to increase and shelter banks' profit. The levels of total deposit are shown to have an impact on banks' profitability in line with Haron and Azmi (2008) and Kassim et al. (2009) findings, where Islamic banking deposits are found to be influenced by conventional banks' deposit interest rate and monetary policy. Thus, this instigates the need to identify factors affecting Islamic banks' deposit and financing levels.

Given the country's setting of a dual-banking system, this could indirectly expose the risk of interest rates to Islamic banks, despite operating on an interest-free principle. Therefore, this study argues whether or not the performance of Islamic banks in Malaysia is affected by interest rates' movements. This study seeks to identify how fluctuations of interest rates affect the deposits and financing held in Malaysian Islamic banks. Studies on this relationship are scarce in literature (Mushtaq and Siddiqui, 2017).

The remaining part of this paper is organised as follows: Section 2 explains the literature review of both theoretical and empirical studies. Section 3 presents the methodology of this paper while Section 4 discusses the findings. Section 5 summarizes the whole paper and highlights recommendation as well as the future research.

2.0 Literature Review

2.1 Theoretical Literature Review

In theory, interest rate has two effects on savings which are (1) income effect and (2) substitution effect. Income effect solicits a negative relation between interest rate and savings, while substitution effect solicits a positive effect. In a classical literature on interest rate, Keynes (1936) states that interest rate influences customers' spending and tendency to them to save in the long run, i.e., from the excess of money after consumptions. Friedman (1957) further finds customers' ability to spend is determined by several factors namely; interest rate, wealth to income ratio, dispersion of transitory income's components, and age and structure of consumer units'. Many previous literatures have found inverse relationship between interest rate and customers' ability to spend (Wright, 1967; Taylor, 1971; Juster and Watchel, 1972; Juster and Taylor, 1975). Modigliani (1977) concludes that the negative effect of interest rate of demand is significantly universal. These classical literatures' empirical findings encouraged a plethora of research on the effects of interest rates on customers' savings behaviour. Notionally, the higher the interest rates, the more customers will save and thus reduce spending.

Deposit is vital to banks' profit and growth (Edmister, 1982; Rose, 1991; Haron and Ahmad, 2000; Haron and Azmi, 2008; Kassim et al., 2009; Abduh et al., 2011). It is the objective of a conventional bank to maximize profit and shareholders' wealth. With that, Islamic banks are under scrutiny when they share a similar intent as their conventional counterparts. This is due to the fact that one of the pillars of Islamic finance is to uphold maslahah, or the wellbeing of the masses. In the context of deposit and borrowing, any deposit to an Islamic financial institution will be channelled back in the form of financing for the betterment of Muslim communities. Therefore, deposit placement in an Islamic bank should not be motivated by profit, but rather to obtain the blessings of Allah. The Muslims' wealth should be used to strive in Allah's cause (The Qur'an, 9:20).

The business model of Islamic finance prohibits the practice of usury (riba) and emphasises on the transfer of physical assets. Furthermore, asset- and liability-based Shari'ah-compliant financing are grounded in the concept of profit-, loss-, and risk-sharing. Based on this notion, it would infer that Islamic banks are independent of conventional interest rate risks (Beck, Demirguc-Kunt, and Merrouche; 2010).

2.2 Empirical Literature Review

An Islamic bank's operation is asset-based as compared to a conventional's profit-based, resulting a more stable resistance against fluctuations and external shocks (Khan, 1986; Samad, 1999; Kaleem, 2000; Samad and Hassan, 2000; Kia, 2002; Kia and Darrat, 2007; Kassim et al., 2009; Ergec and Arslan, 2013). Following the fallout of the 1998 Asian financial crises, Malaysia has rigorously developed its Islamic banking industry as a protection mechanism against future crises, thus, becoming a country with a dual-banking system.

Darrat (1988) highlights that the Tunisian banking system is more stable without interest-related assets, signifying that the profit-and-loss-sharing system is better in comparison to the conventional system. This verdict is further supported by the studies of the Iranian economy that find the short- and long-run interest-free system more stable and impervious to external shocks (Kia, 2002; Darrat, 2002). In contrast, according to Kassim et al. (2009) despite using an asset-based and interest-free framework, Islamic banking is not free from interest rates fluctuations, especially in a dual-banking system. Empirical literature from different economies have highlighted mixed findings of conventional rates' affecting Islamic banks' deposits and financing.

Hassan et al. (2016) find that interest rates have no impact on deposits of Nigerian commercial banks. Mobin and Masih (2014) demonstrate that religious factors exists in Muslim customers' banking decisions and this is further supported by Tariq and Masih (2016) who use Generalized Method of Moments in investigating the impact of interest rates on risk-sharing deposits of 32 Islamic banks from 28 countries worldwide. The result highlights that there is no significant impact of interest rates on risk sharing deposits. In another study, Mushtaq and Siddiqui (2016) investigate interest rate impact on savings and investments in 17 Muslim and 17 non-Muslim countries. They conclude that interest rate has a positive insignificant impact on savings in Muslim countries, while it has a positive significant relationship with savings in non-Muslim countries.

On the contrary, studies of the dual-banking system in Turkey that uses Vector Error Correction (VEC) model show that interest rates affect both deposits and financing of conventional and Islamic banks (Hakan and Gulumser, 2011; Ergec and Arslan, 2013). While studies in the Nigerian economies have presented positive impact of interest rates on banks' deposits (Anthony, 2012; Ojeaga et al., 2013; Eriemo, 2014). Nigeria has the largest Muslim population among Western African countries.

Studies in the Malaysian setting beginning with Rosly (1999) find in the case of Bank Islam Berhad, a rise in interest rates causes its profitability to reduce, due to high reliance on fixed-rate financing. This highlights the fact that Islamic bank's liabilities are sensitive to interest rate changes. Findings by Kassim et al. (2009) support Rosly (1999) in which they use vector auto-regression method in examining the impact of interest rates on Malaysia's conventional and Islamic banks' deposits and financing. The study uses monthly data from 1999 to 2006 and concludes that Islamic deposits and financing are more sensitive to interest rate fluctuations compared to conventional banks. Haron and Ahmad (2000) find a negative relationship between the interest rate of conventional banks and deposits' rate of return of Malaysian Islamic banks, confirming a substitution effect. This result is supported by the findings of Kasri and Kasim (2009) for the Indonesian market.

Bacha (2004) uses Granger Causality in investigating causality (1) between conventional bank interest rate with Islamic banking rate of return and (2) between conventional fixed-deposit and Islamic bank's deposits. This study uses monthly data from 1994 to 2003 and finds causality for both objectives. The findings of How et al. (2005) surprisingly, highlight that

commercial banks with interest-free financing have lower credit and liquidity risks, but higher interest-rate risk compared to the banks without Islamic financing. Kaleem and Isa (2006) claim that Malaysian dual-banking system has allowed conventional banks to make higher profit due to the interest rate spread between two markets of conventional and Islamic. Haron and Azmi (2008) predict Malaysian banks' deposits behaviour using macroeconomic variables and find that interest rates influence deposit volume positively and negatively for conventional banks and Islamic banks respectively.

Chong and Liu (2009) conduct a time series study in Malaysia with data from 1995 to 2004. This study investigates the relationship between Islamic bank deposit rates with conventional fixed deposit rate. It highlights that Malaysian Islamic banks' deposits are not interest-free and majority of them are not using profit-and-loss-sharing modes. Another study in the Malaysian market, Zainol and Kasim (2010) use data from 1997 to 2008 and finds Islamic banks' rate of return and deposits are cointegrated and have a long-run equilibrium with conventional interest rates. Sukmana and Kassim (2010) also find a negative relationship between interest rates with Islamic deposits and financing, further highlighting that Malaysian customers are not hesitant in switching to conventional banks if the circumstances benefit them financially. Abduh et al. (2011) conclude that depositors believe Islamic banks to be more resilient compared to conventional banks. This study uses cointegration test and vector error correction model, with data from 2000 to 2010. The findings highlight that interest rate, profit rate and production growth have no significant effects on total deposits. However, inflation is found to have negative effect on total deposits.

Even though past empirical literatures from different economies show mixed findings, it is safe to say that interest rates' influence on Islamic banks exist. This study provides new perspective from the dual-banking system of Malaysia on the impact of interest rates' fluctuations on Malaysian Islamic banks. This study examines the influence of interbank rates, consumer price index, real exchange rates and industrial production index on Malaysian Islamic banks' total deposits and total financing. The Auto-Regressive Distributive Lag (ARDL) bound testing is applied to identify the short-term and long-term relationships of the investigated variables.

3.0 Methodology

The classical literatures of Keynes (1936) and Friedman (1957) are used as underpinning theories in developing the econometric model. The specification model is adapted from Ergec and Arslan (2013). This model uses Malaysian Islamic banks' total deposits and total financing as proxy for their performance. While for measure of interest rates, four independent variables are preferred; interbank rates (proxy for conventional interest rates), consumer price index (proxy for inflation rate), real exchange rates (proxy for value of currency) and industrial production index (proxy for industry's growth).

$$TD_t = \beta_0 + \beta_1 IBR_t + \beta_2 CPI_t + \beta_3 RER_t + \beta_4 IPI_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$TF_t = \beta_0 + \beta_1 IBR_t + \beta_2 CPI_t + \beta_3 RER_t + \beta_4 IPI_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where:

TD	=	Total deposits	*RER*	=	Real exchange rates
TF	=	Total financing	*IPI*	=	Industrial production index
IBR	=	Interbank rates	ε_t	=	Error term
CPI	=	Consumer price index			

The data of Malaysian Islamic banks' total deposits (*TD*) and total financing (*TF*) are obtained from the website of BNM. Data for interbank-rates (*IBR*), consumer-price index (*CPI*), real exchange rate (*RER*) and industrial production index (*IPI*) are obtained from the IHS database through official statistics. This study uses 12 years of monthly data from the period 2007 to 2018. The final sample of the study includes 144 observations. The study notes that the sample includes data from the time of a global financial crisis. The inclusion of data from this time frame is based on various past empirical literature that show the crisis has very little impact on Malaysian banking industry, both conventional and Islamic. Malaysian banking industry remained resilient and efficient during the 2008 global financial crisis (Abduh, Omar, and Duasa, 2011; Bourkhis and Nabi, 2013; Sarifuddin, Ismail, and Kumaran, 2015).

The development of hypotheses for this study are based on past literature. Firstly, an increase in interbank rates will make borrowing more expensive between bank, hence *IBR* is hypothesized to have a significant positive relationship with *TD* and a significant negative relationship with *TL*. Secondly, an increase in consumer price index indicates the country is experiencing inflation, hence *CPI* is hypothesized to have a significant positive relationship with *TD* and a significant negative relationship with *TL*. Thirdly, an increase in real exchange rates signify a decrease in the country's currency value, hence *RER* is hypothesized to have a significant negative relationship with *TD* and a significant positive relationship with *TL*. Lastly, an increase in industrial production index signals a high output production of the country's industries, hence *IPI* is hypothesized to have a significant negative relationship with *TD* and a significant positive relationship with *TL*.

The investigation starts with transforming all the variables into natural logarithms and later checked for stationarity. Stationary test is to assure that the variables' mean and covariance are constant over time. This test is imperative in avoiding spurious regression and affirming dependability of the results. The unit root tests of Augmented Dickey and Fuller (ADF) and the Phillips-Peron (PP) are employed for this purpose. The variables need to be stationary at I(0) and I(1), but not I(2).

$$lTD_t = \beta_0 + \beta_1 lIBR_t + \beta_2 lCPI_t + \beta_3 lRER_t + \beta_4 lIPI_t + \varepsilon_t \ldots\ldots\ldots\ldots (3)$$

$$lTF_t = \beta_0 + \beta_1 lIBR_t + \beta_2 lCPI_t + \beta_3 lRER_t + \beta_4 lIPI_t + \varepsilon_t \ldots\ldots\ldots\ldots (4)$$

Next, ARDL (Pesaran and Shin, 1999; Pesaran et al., 2001) is done. ARDL is developed from Ordinary Least Squares (OLS) estimation of the conditional Unrestricted Error Correction Model (UECM). The ARDL bounds test derivation are as follows:

$$\Delta lnTD_t = \alpha_1 + \alpha_T T + \alpha_{TD} lnTD_{t-1} + \alpha_{IBR} lnIBR_{t-1} + \alpha_{CPI} lnCPI_{t-1} + \alpha_{RER} lnRER_{t-1} + \alpha_{IPI} lnIPI_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta lnTD_{t-i} + \sum_{j=0}^{q} \alpha_j \Delta lnIBR_{t-j} + \sum_{k=0}^{r} \alpha_k \Delta lnCPI_{t-k} + \sum_{l=0}^{s} \alpha_l \Delta lnRER_{t-l} + \sum_{m=0}^{u} \alpha_m \Delta lnIPI_{t-m} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

$$\Delta lnTF_t = \alpha_1 + \alpha_T T + \alpha_{TD} lnTF_{t-1} + \alpha_{IBR} lnIBR_{t-1} + \alpha_{CPI} lnCPI_{t-1} + \alpha_{RER} lnRER_{t-1} + \alpha_{IPI} lnIPI_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta lnTF_{t-i} + \sum_{j=0}^{q} \alpha_j \Delta lnIBR_{t-j} + \sum_{k=0}^{r} \alpha_k \Delta lnCPI_{t-k} + \sum_{l=0}^{s} \alpha_l \Delta lnRER_{t-l} + \sum_{m=0}^{u} \alpha_m \Delta lnIPI_{t-m} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Δ is the difference operator and μt is the error term, which is assumed to be independent and identically distributed. All estimated coefficients of the lagged level variables are restricted to zero in order to identify the presence of integration.

The bounds test is to test the existence of a long-run relationship through comparing the F-statistic value with the critical value. If the F-statistic is higher than the upper bound's critical value, there is a long-run relationship. If the F-statistic is below the lower bound, there is no long-run relationship. If the F-statistic is between the upper critical bound and the lower critical bound, the results are inconclusive. These conditions are as indicated by Pesaran et al. (2001). Finally, robustness check of the model is done with a serial correlation test, heteroscedasticity test and stability test.

4.0 Findings & Discussion

4.1 Stationarity Tests

The unit root tests of Augmented Dickey and Fuller (ADF) and the Phillips-Peron (PP) are conducted to test for stationarity within the data sample. The results presented in Table 1 indicate that *lTD* and *lTF* are stationary at level. While, the other variables (*lIBR, lCPI, lRER, lIPI*) are stationary at first difference. The absence of I(2) indicates that ARDL cointegration is suitable to be further employed.

Table 1: Unit Root Tests

Variables	ADF Test		PP Test		Decision
	Level	1st Difference	Level	1st Difference	
lTD	-3.3601 **		-3.3951 **		I(0)
lTF	-4.2019 ***		-4.7640 ***		I(0)
lIBR	-0.9285	-8.1212 ***	-0.8291	-7.8591 ***	I(1)
lCPI	-2.6776	-5.8281 ***	-2.1473	-5.7825 ***	I(1)
lRER	-0.9285	-8.1786 ***	-0.7787	-8.1214 ***	I(1)
lIPI	0.5445	-3.5139 ***	-1.4818	-39.3992 ***	I(1)

Note: *. **. and *** denotes rejection of null hypotheses at 10%, 5% and 1% significance levels.

4.2 Bounds Test

The ARDL bounds test is employed to confirm the existence of cointegration among the investigated variables, using the F-statistics of the coefficients. The findings are presented in Table 2. The first model with *lTD* as the dependent variable, reports an F-statistic that exceeds critical value at 1% (16.3295>4.787), which implies the existence of cointegration between interbank-rates, consumer-price index, real exchange rate, and industrial production index with Islamic banks' total deposits. In addition, the second model with *lTF* as the dependent variable also reports an F-statistic that exceeds critical value at 1% (8.4775>4.787), implying the existence a cointegration between interbank-rates, consumer-price index, real exchange rate and industrial production index with Islamic banks' total financing.

Table 2: Bounds Tests

Bounds test to cointegration				
Dependent Variable		*lTD*		*lTF*
F-statistics	16.3295***		8.4775***	
Cointegration	Yes		Yes	
ARDL	ARDL(1, 0, 3, 4, 2)		ARDL(2, 1, 2, 0, 0)	
Maximum Lag	4		4	
Diagnostic test				
R-squared	0.9990		0.9994	
Adj R-squared	0.9990		0.9994	
Durbin Watson stat	2.0435		1.9618	
Significant Level	**Critical Values**		**Critical Values**	
	Lower Bounds I(0)	Upper Bounds I(1)	Lower Bounds I(0)	Upper Bounds I(1)
1% level	3.602	4.787	3.602	4.787
5% level	2.688	3.698	2.688	3.698
10% level	2.303	3.22	2.303	3.22

Note: *. **. and *** denotes rejection of null hypotheses at 10%, 5% and 1% significance levels.

4.3 Diagnostic Tests

Table 3 reports the evidence of cointegration for both models of *lTD* and *lTF*. The findings for *lTD* model show that all variables (*lIBR, lCPI, lRER, lIPI*) are significantly related to *lTD*. *l*IBR is found to be positively significant to *lTD*. The result shows a 1% increase in interbank rates, Islamic banks' deposit will increase by 4.0840%. This positive relationship indicates that depositors in Malaysia are not keen to transfer their deposits to conventional banks despite the higher return, signifying that the religious factor plays a role in Malaysian's banking decisions. This finding is in line with past empirical literatures (Haron and Ahmad, 2000; Bacha, 2004; Kassim et al., 2009; Kasri and Kasim, 2009; Zainol and Kasim, 2010; Abduh et al., 2011). Secondly, *lCPI* is found to be negatively significant to *lTD*. The result shows a 1% increase in consumer price index, Islamic banks' deposit will decrease by 0.5750%. This result indicates that Malaysian depositors withdraw more money from their deposits during inflation due to high expenses. Haron and Azmi (2008) and Abduh et al. (2011) found similar findings. Thirdly, *lRER* is found to be negatively significant to *lTD*. The result shows a 1% increase in interbank rates, Islamic banks' deposit will decrease by 1.4476%. This implies that the value of the country's currency increases during high trade competition, making imports cheaper, resulting in depositors withdrawing their money for excess spending. This finding echoes with past literatures of Kassim and Majid (2010) and Karim et al. (2012). Lastly, *lIPI* is found to be positively significant to *lTD*. The result shows a 1% increase in interbank rates, Islamic banks' deposit will increase by 1.8478%. The finding indicates that an increase in banks' productivity lead to higher deposits from customers for investment purposes. This finding is supported by Abduh et al., (2011).

Next, the findings for *lTF* model show that only three variables (*lIBR, lCPI, lRER*) are significantly related to *lTF*. *l*IPI is found to be a non-significant influence of Islamic bank's total financing. The *lTF* model is reported using Newey-West's coefficient covariance matrix to correct for heteroscedasticity problems. Firstly, *lIBR* is found to be positively significant to *lTF*. The result shows with a 1% increase in interbank rates, Islamic banks' financing will increase by 1.3204%. This positive relationship implies that Malaysian customers opt to Islamic banks during high interest rate, to capitalize on the fixed-rates. Ergec and Arslan (2013) support this finding. Secondly, *lCPI* is found to be negatively related to *lTF*. The result shows a 1% increase in consumer price index will decrease Islamic banks' financing by 0.5822%. This result indicates that Malaysian customers borrow less during high inflation period due to the trade-off between the value of borrowed money and the cost of borrowing. This finding is in line with Boyd et al. (2001) and Haron and Azmi (2008). Lastly, *lRER* is found to be negatively related to *lTF*. The result shows a 1% increase in interbank rates will decrease Islamic banks' financing by 0.2680%. A high exchange rate signifies an increase in value and demand of the country's currency due to high trade. This causes interest rate to rise and borrowing become expensive, hence reducing financing needs from customers. These results are comparable with Kassim and Majid (2010) and Karim et al. (2012).

Table 3: Long-run and Short-run ARDL

Dependent Variable	*lTD*		*lTF*
Long-run Model			
Constant	-12.2699*** (-7.6124)	*Constant*	7.5182*** (5.2544)
lIBR	4.0840*** (5.2062)	*lIBR*	1.3204*** (3.0432)
lCPI	-0.5750*** (-3.3244)	*lCPI*	-0.5822*** (-4.2176)
lRER	-1.4476 (-6.4993)	*lRER*	-0.2680*** (-2.0582)
lIPI	1.8478*** (3.0690)	*lIPI*	-0.1997 (-0.9918)
Short-run Model			
$\Delta lIBR_t$	-0.1600 (-0.5645)	ΔlTF_{t-1}	0.5018*** (8.1104)
$\Delta lIBR_{t-1}$	-0.2076 (-0.6554)	$\Delta lCPI_t$	-0.0282*** (-2.0461)
$\Delta lIBR_{t-2}$	-0.7550*** (-2.3483)	$\Delta lCPI_{t-1}$	0.0433*** (3.0652)
$\Delta lIBR_{t-3}$	-0.5511** (-1.8060)	$\Delta lRER_t$	0.0262 (1.443)
$\Delta lRER_t$	-0.0644 (-0.8541)	ECM_{t-1}	-0.0365*** (-7.2658)
$\Delta lRER_{t-1}$	-0.0566 (-0.7076)		
$\Delta lRER_{t-2}$	0.2714*** (3.5796)		
$\Delta lIPI_t$	0.0017 (0.0458)		
$\Delta lIPI_{t-1}$	-0.0657** (-.1796)		
ECM_{t-1}	-0.0841*** (-10.0944)		

Note*: *. **.* and ***** denotes rejection of null hypotheses at 10%, 5% and 1% significance levels.

The model also measures long-run cointegration through the coefficients of the Error Correction Model (*ECM*) i.e. ECM_{t-1}. *ECM* measures the speed of adjustment to restore equilibrium in the dynamic model, from short-run disequilibrium to long-run equilibrium. A negative and highly significant *ECN* coefficient signifies the presence of long-run cointegration.

The first model with *lTD* as the dependent variable has an ECM_{t-1} with a magnitude of -0.0841 and it is statistically significant at 1%. This implies that the speed of adjustment to equilibrium is 8.41%, which means Malaysian Islamic banks total deposits will be adjusted by 8.41% percent of previous year's deviation from the equilibrium. This implies that any short-

run deviation will take approximately 11.9 months before converging back to the equilibrium path.

The second model with *lTF* as the dependent variable has an ECM_{t-1} with a magnitude of -0.0365 and it is statistically significant at the 1% level. This result implies that the speed of adjustment to equilibrium is 3.65%, which means Malaysian Islamic banks total financing will be adjusted by 8.41% percent of previous year's deviation from the equilibrium. This result also suggests that it will take about 27.4 months to move back towards long-run equilibrium from any short-run deviation.

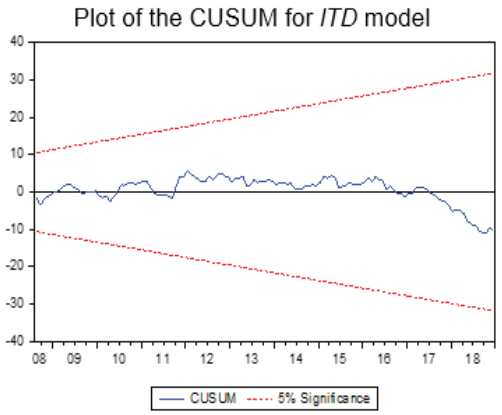
4.4 Robustness Check

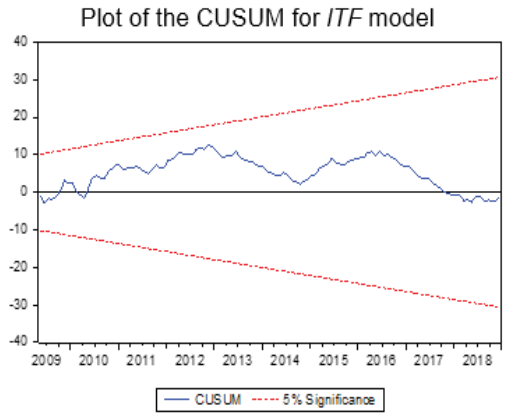
Table 4: Diagnostic Tests (LM)

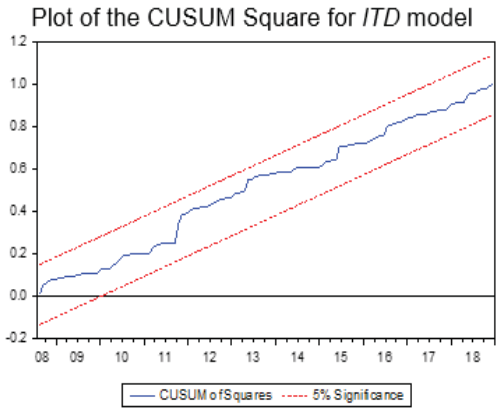
Dependent Variable	*lTD*	*lTF*
Serial Correlation	0.7422 (0.5006)	0.8005 (0.4831)
Heteroscedasticity	0.6302 (0.8160)	6.1587 (0.0000)
CUSUM	Stable	Stable
CUSUM Square	Stable	Stable

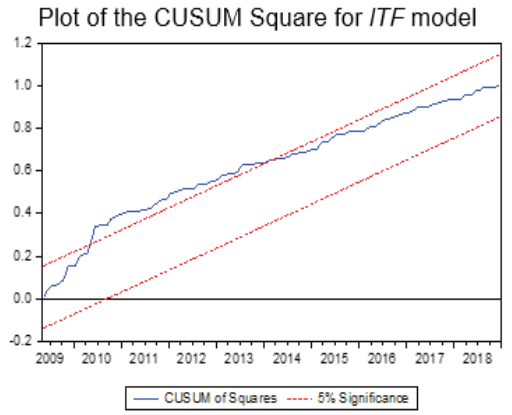
Note: Probability of the diagnostic test is reported in parenthesis (…).

Further diagnostic tests are done to check the robustness of the study. The diagnostic tests are serial correlation and heteroscedasticity, and Cumulative Sum of Recursive Residuals (CUSUM) stability tests of the CUSUM and CUSUM Square. The tests are performed based on the models' ARDL estimations. Table 4 shows that the model with *lTD* as dependent variable has no problem of serial correlation and heteroscedasticity. However, the model with *lTF* as dependent variable has no problem of serial correlation, but a heteroscedasticity problem is present. Hence, the *lTF* model is reported using Newey-West's coefficient covariance matrix to correct this problem. Furthermore, based on the CUSUM and CUSUM Square tests, both models are found to be stable since the sample paths were within the critical region. The stability test results are further illustrated in Figure 1 and Figure 2.









1.0 Conclusion

Central bank of a country uses interest rates in influencing money supply to combat recession or inflation. Currently, most developed economies are pushing for lower interest rates to boost short-term growth. However, this strategy has yet to show any significant impact. Fluctuation of interest rates have not always yield results that it was theoretically intended. Alternatively, economies with dual-banking systems have empirically proven to be resilient against many financial crises, providing protection from interest rates risk (Khan, 1986; Kassim et al., 2009; Ergec and Arslan, 2013). Notionally, Islamic banks' nature of asset-linked basis should be independent of interest rates' movements (Samad, 1999; Kaleem, 2000; Samad and Hassan, 2000).

The question of whether interest rates bear no hazard to Islamic banks' performance has been investigated. This study investigates the impact of interest rates on Malaysian Islamic banks' deposits and financing. Interbank-rates, consumer-price index, real exchange rate, and industrial production index, are selected as measures of conventional interest rates. The data consisted of 144 observations of monthly data from 2007 to 2018. ARDL bounds test is

used to study if the cointegration property existed.

The findings highlight that interest rates do affect Malaysian Islamic banks' deposits and financing, which is in line with Abduh et al. (2011) and Ergec and Arslan (2013). Interest rates are found to have a long-run cointegration relationship with both deposits and financing. Interbank rates are found to be significant in affecting both deposits and financing positively. This result signifies that Malaysian are (1) not keen to switch banks despite the higher return offered by conventional counterparts and (2) prefer the fixed-rate financing. This result implies unwavering loyalty of Malaysian towards Islamic banks and provide some evidence that the religious factor plays a role in Malaysian banking decisions.

This study provides further understanding on the behaviour of Malaysian Islamic banks' customers. Other proxies of inflation, value of currency and industry's growth are also found to significantly affect Islamic banks' deposits, while only proxy of industry's growth is not significant in affecting Islamic banks' financing. Inflation and value of currency tend to reduce Islamic banks' deposits and financing. The growth of banking industry is found to positively affect only Islamic banks' deposits.

Additionally, any short-run deviation will take about 11.9 months and 27.4 months before Islamic banks' total deposits and total financing converge back to the equilibrium path respectively. This study proves that Islamic banks' deposits and financing are susceptible to conventional interest rate changes, especially in dual-banking system. The implication of this research is that the government should pay attention on the design of monetary policies as it could influence both conventional and Islamic banks. Islamic banks can exploit these findings from their risk management perspective. This study also contributes indirectly to the public sector as such they can strategize their borrowing in case, they need more capital. As for future research, the methodology of this study can be applied in a different dual-banking economies and different statistical methods can be used to provide a deeper understanding on the subject matter.

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