Is islamic bank financing related to interest rate ? Malaysian evidence based on ARDL approach

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Abstract

Over time the current world financial markets have become more closely correlated and dependent due to increased market integration. Islamic banking and finance had a rapid growth during the last two decades. This study applies Autoregressive Distributed Lag (ARDL) method to assess the relationship between the total financing of Malaysian Islamic Banks and interest rate, and it results that total financing is relatively a bit insensitive to changes in interest rate. The variance decompositions of two relevant variables such as, interest rate (DTB) and total financing (DFA) tend to indicate that they are fairly explained by themselves because the contributions of their own shocks to explaining their variances are 78% and 73% respectively. It shows that Islamic banks are relatively a bit resistant to interest rate as compared to the findings of some other researchers and also, debt-based financing by the conventional banks. Our study finds that the Islamic banking and finance can achieve the relative independence from the conventional banks and interest rate through Islamic financing and practices. This is rather a unique contribution of the paper with strong policy implications.

Keywords: Islamic banks, total financing, interest rate, ARDL, Malaysia

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2. Introduction

The growth of Islamic banks has been tremendous through the past decades, a crucial part of which is financing with all its diverse types. There are various factors impacting the volume of financing extended into a financial market. The fact that Islamic finance is said to be interest-free yet operating in interest based systems poses subjectivity and it is often argued that if that principle holds true, then Islamic banks shall be immune to financial turbulences resulting from interest rate fluctuations. While in practice, this is often untrue due to the complexity of the financial and economic systems. However, the study of the relationship between interest rates and financing volumes has become a necessary area of research. Considerable amount of Islamic financial practices were justified at the initial stages on the basis that customers were accustomed to conventional banking and its fixed-cost instruments (Bacha, 2004; 2008). These initial activities were deemed necessary for the industry to gain commercial significance and market share. The trajectory, however, has not been free of cost. Islamic banks in dual banking systems have, as a result, been exposed to problems of conventional banks. This includes, but is not limited to, interest rate risk (Ibrahim and Sufian, 2014). Indeed, if Islamic banks continue issuing more debt-creating instruments, which are interest rate benchmarked and are substantially indifferent from conventional loans - excepting forms, they run the risk of undermining their potential stability and amplifying their interest rate exposure (Haneef and Mirakhor, 2014; Bacha, 2004, 2008).

This raises the central question of this paper, the extent to which interest rate impacts total financing provided by Islamic banks and what does it imply relative to the Islamic finance principles that are taught in theory. A number of empirical studies have been done and resulted that Islamic finance and interest rate are positively correlated. Our study however, resulted quite different and showed the opposite. The methodology used to derive our results will be discussed in section 4 in further detail.

The following sections of the paper will be organized as follows. The third section would provide a literature review. The fourth section will discuss the data and methodology. Followed by an analysis of the data in the fifth section where empirical results will be discussed. Finally, the sixth section would conclude the paper with policy implications and recommendations derived from the findings.

3. Literature Review

The short history of Islamic finance is a core reason for its limited literature. Hence, despite the differences, conventional literature is used as a base point for financial analysis. In understanding the factors contributing to financing provided by banks, the determinants could be looked at from two broad aspects, microeconomic and macroeconomic. While the former focuses on bank-specific factors such as deposits, bank size, bank capitalization, collateral security, capital ratios...etc. While the latter include broader variables such as GDP, interest rates, exchange rates, inflation, industrial indices and others. Various studies were conducted in both aspects. In analysing microeconomic factors contributing to banks' lending, Chernykh & Theodossiou (2011) in his study done in Russia, concluded that capitalizations, bank size, and provision for losses positively impact long-term business loans while ownership was found insignificant. Abdul Karim et al (2011) studies Malaysian commercial banks and found no relation between the bank size on loan supply. In Addition, Constant and Ngomsi (2012) in a cross-country study of six Central African Economic and Community (CEMAC) members also found positive affect of bank size and capitalization on long-term liabilities. On the contrary, Karim et al. (2014) conducted a study on 186 conventional and 52 Islamic banks in 14 OIC member countries where they found that bank size negatively impact the lending for both Islamic as well as conventional banks. Similarly, Hossain et al. (2013) studied the same relationship in RAKUB bank in Bangladesh and found that deposits positively impact loans. The causal relationship between interest rates and total financing provision has been established and thoroughly studied in conventional financing literature. Creating the bases of various economic and fiscal theories through which policies have been developed and implemented. The extent of this relationship was also studied in the light of various economies and markets (D'Auria, Fogila, & Reedtz, 1999). Empirical studies have also been done on it such as (Barro 1976, Berger and Udell 1990).

Although this research focuses on bank-specific determinant, macroeconomic determinants remain to be a crucial point. The effect of interest rate fluctuations have also been examined in the light of various funds and institutions in the financial markets (OECD 2011, Peter Nduati Irungu 2013, BIS 2015). Other empirical studies also investigated the relationship between capital and earnings in banking systems (Berger, 1995). Studies have also been conducted to investigate the macroeconomic determinants. Kim and Moreno (1994), Kader and Leong (2009), and Ergec and Arslan (2013), all found that interest rates inversely impact

conventional banks' lending across various countries. On the other hand, Ibrahim (2006) found positive impact in his study conducted on Malaysian banks.

Another key macroeconomic determinant is output, reflecting the economic cycles faced by the industry. Ibrahim (2006) found to have a positive impact on lending in Malaysia. Similar impact was found in various other studies such as Pruteanu-Podpiera (2007) for Czech Republic, by Du (2011) for China, by Constant and Ngomsi (2012) for CEMAC, and by Karim et al. (2014) for OIC member countries. On the contrary, Kim and Moreno (1994) found negative impact in Japanese banks.

In the context of Islamic finance microeconomic determinants, Kader & Leong (2009) found positive relationship between conventional lending rate and base lending rate as determinant of BBA property financing in Malaysia. On the contrary, Rama and Kassim (2013) studied Murabahah financing, which is a debt creating instrument, of Indonesian Islamic Banks where they found that Islamic financing rates, Islamic and conventional lending rates are not significant determinants of Murabahah financing in the short-term. Nevertheless, the fact that Islamic banking does not rely on interest poses a central question of the extent to which interest rates affect the amount of financing extended by Islamic financial institutions. While several studies have attempted to conceptualise the understanding of Islamic banks and their operations (Ahmed 1981, Karsen 1982, Fakaruddin et al. 2014), the question of the causal relationship in question has not been sufficiently addressed in the existing literature. Earlier studies in Islamic finance have attempted to analyse and develop a theory of a banking system without interest (Siddiqi, 1984). Moreover, other studies examined the effect of eliminating interest rates from the financing equation altogether (Khan 1986, Khan and Mirakhor 1987, and Bashir 1996), while most empirical works were inconclusive (Bashir, Darrat, and Suliman 1993, Bashir 1999, Hassan 1999, and Zahir and Hassan 2001). Other studies have also looked at the comprehensive analysis of identifying and highlighting the key determinant of Islamic banking profitability (Hassan & Bashir, 2001).

With respect to their relation in Islamic finance, empirical findings include the study of the impact of interest rate on Islamic financing. Kader and Leong (2009) and Ergex and Arslan (2013) found a positive impact. On the contrary, Adebola et al. (2011), Ibrahim and Sukmana (2011) and Ibrahim and Sufian (2014) concluded a negative relationship in their study that was conducted in Malaysian context.

As for outputs impact, Ibrahm and Sukmana (2011) and Adebola et al (2011) found that there is no significant impact between output and banks' lending. However, more recent studies such as Karim et al (2014) and Ibrahim and Sufian (2014) concluded that output has positive impact on lending. In addition, the effect of inflation was found to be positive for Islamic banks as found by Karim et al (2014) and Ibrahim and Sufian (2014).

This paper hence aims to contribute to the investigation of the causal relationship between interest rates and total financing volumes extended by Islamic banks which is a pertinent contribution to the existing literature through which Islamic banks can derive policy recommendations and to enhance the understanding and the argument of Islamic banks with respect to interest rates in the markets.

4. Data and Methodology

4.1 Data

The empirical study employs monthly time series date for approximately 10 years, starting from January 2007. The data covers six variables:

i. total financing (FA)
ii. total assets (TA)
iii. total equity (TE)
iv. three-month T-bills (TB)
v. industrial price index (IPI)
vi. consumer price index (CPI)

The total financing (FA) is the aggregate of all Islamic Banks and windows in Malaysia. In other words an aggregate of the overall Islamic Banking system. Other variables include all types of assets, equity, and consumer price index. Interest rate is measured by the three-month Treasury bill rate (TB). Furthermore, we used industrial production index (IPI) as a measure of real output because the monthly data on real GDP is not available in the system and online. Therefore, I used IPI instead of real GDP and it is justifiable because the IPI data that I extracted from the system is indicator for Malaysia's real activities. The last variable stated above is the consumer price index (CPI) and it is representing the price level; and it has been sourced out from the Bank Negara Malaysia's (BNM) website.

4.2 Model and methodology

Autoregressive Distributed Lags (ARDL) bound test proposed by (Pesaran et al., 2001) is used to test the long run relationship and integration of total financing of Islamic Banks in Malaysia with interest rate and other four variables as stated in section 4.1 The AEDL test has some advantages over the Engle-Granger (1987) and co-integration techniques (Ajide & Lawanson, 2012). Furthermore, this test classifies the variables into dependent or explanatory.

Firstly, we started to run the 8 steps Time Series test via Microfit but we could not move forward from the first step because the result from selection of the order of the VAR model showed zero lag. We could not go ahead with the time series therefore, we used ARDL approach to test the long run theoretical relationship among the variables.

The ARDL procedure has two (2) stages:

1st stage is where we are testing the existence of the long-run relation between the variables by computing the F-statistic for testing the significance of the lagged levels of the variables in the error correction form of the underlying ARDL model.

2nd stage is where we are estimating the coefficients of the long-run and making inferences about the values using the ARDL option.

Further to the ARDL procedure, this method has 4 steps. Staring from run unit root tests, test for long-run relationship between the variables, ARDL test and lastly the Impulse Response analysis. The order of the distributed lag on the dependent variable and the regressors can be selected by using Akaike Information Criterion (AIC) or the Schwartz Bayesian Criterion (SBC). In our study we used SBC as a lag selection criterion. The AIC lag selection criterion can be found in the Appendix with the rest data results from the ARDL test.

4.3 Unit Root Test:

Before we proceed to analyse the relationship between FA, TA, TE, TB, IPI and CPI, we can conduct the unit root test on the variables. This is to test if the variables are stationary or non-stationary since the stationary and non-stationary of the series can stiffly influence its behaviour and properties. There are two tests that are used to check whether it is stationary or non-stationary in their log and difference forms:

i) Augmented Dickey-Fuller (ADF) – is an extension of DF (Dickey-Fuller) regression.

Null: Non-stationarity

ii) Phillips- Perron (PP) – makes a correction to the t-statistic of the γ coefficient. This test is used in time seirs analysis to test the null hypothesis that a time series is integrated of order.

Null: Non-stationarity

Aside from the two (2) tests above there is a Kwiatkowski-Phillips-Schmidt-shin (KPSS) – this test is used for testing a null hypothesis that an observable time series is stationary around ta deterministic tend against the alternative of a unit root.[1]

Null: Stationarity

Autoregressive Distributive Lag (ARDL) Method:

The first step in ARDL method is to test the existence of a long run relationship among the variable (Pesaran et al., 2001). In our case it is as following:

[1] https://en.wikipedia.org/wiki/KPSS_test

The long run multivariate ARDL model employed in this study can be written as follows:

Total Financing:

$$\Delta FA_t = a_0 + \sum_{i=1}^{p} b_i \Delta FA_{t-1} + \sum_{i=1}^{p} c_i \Delta TA_{t-1} + \sum_{i=1}^{p} d_i \Delta TE_{t-1} + \sum_{i=1}^{p} e_i \Delta TB_{t-1} + \sum_{i=1}^{p} f_i \Delta IPI_{t-1} \sum_{i=1}^{p} e_i \Delta CPI_{t-1} + \delta_1 FA_{T-1} + \delta_2 TA_{t-1} + \delta_3 TE_{t-1} + \delta_4 TB_{t-1} + \delta_5 IPI_{t-1} + \delta_6 CPI_{t-1} + \varepsilon_t$$

Total Asset:

$$\Delta TA_t = a_0 + \sum_{i=1}^{p} b_i \Delta FA_{t-1} + \sum_{i=1}^{p} c_i \Delta TA_{t-1} + \sum_{i=1}^{p} d_i \Delta TE_{t-1} + \sum_{i=1}^{p} e_i \Delta TB_{t-1} + \sum_{i=1}^{p} f_i \Delta IPI_{t-1} \sum_{i=1}^{p} e_i \Delta CPI_{t-1} + \delta_1 FA_{T-1} + \delta_2 TA_{t-1} + \delta_3 TE_{t-1} + \delta_4 TB_{t-1} + \delta_5 IPI_{t-1} + \delta_6 CPI_{t-1} + \varepsilon_t$$

Total Equity:

$$\Delta TE_t = a_0 + \sum_{i=1}^{p} b_i \Delta FA_{t-1} + \sum_{i=1}^{p} c_i \Delta TA_{t-1} + \sum_{i=1}^{p} d_i \Delta TE_{t-1} + \sum_{i=1}^{p} e_i \Delta TB_{t-1} + \sum_{i=1}^{p} f_i \Delta IPI_{t-1} \sum_{i=1}^{p} e_i \Delta CPI_{t-1} + \delta_1 FA_{T-1} + \delta_2 TA_{t-1} + \delta_3 TE_{t-1} + \delta_4 TB_{t-1} + \delta_5 IPI_{t-1} + \delta_6 CPI_{t-1} + \varepsilon_t$$

Three-month Treasury bill:

$$\Delta TB_t = a_0 + \sum_{i=1}^{p} b_i \Delta FA_{t-1} + \sum_{i=1}^{p} c_i \Delta TA_{t-1} + \sum_{i=1}^{p} d_i \Delta TE_{t-1} + \sum_{i=1}^{p} e_i \Delta TB_{t-1} + \sum_{i=1}^{p} f_i \Delta IPI_{t-1} \sum_{i=1}^{p} e_i \Delta CPI_{t-1} + \delta_1 FA_{T-1} + \delta_2 TA_{t-1} + \delta_3 TE_{t-1} + \delta_4 TB_{t-1} + \delta_5 IPI_{t-1} + \delta_6 CPI_{t-1} + \varepsilon_t$$

Industrial Price Index:

$$\Delta IPI_t = a_0 + \sum_{i=1}^{p} b_i \Delta FA_{t-1} + \sum_{i=1}^{p} c_i \Delta TA_{t-1} + \sum_{i=1}^{p} d_i \Delta TE_{t-1} + \sum_{i=1}^{p} e_i \Delta TB_{t-1} + \sum_{i=1}^{p} f_i \Delta IPI_{t-1} \sum_{i=1}^{p} e_i \Delta CPI_{t-1} + \delta_1 FA_{T-1} + \delta_2 TA_{t-1} + \delta_3 TE_{t-1} + \delta_4 TB_{t-1} + \delta_5 IPI_{t-1} + \delta_6 CPI_{t-1} + \varepsilon_t$$

Consumer Price Index:

$$\Delta CPI_t = a_0 + \sum_{i=1}^{p} b_i \Delta FA_{t-1} + \sum_{i=1}^{p} c_i \Delta TA_{t-1} + \sum_{i=1}^{p} d_i \Delta TE_{t-1} + \sum_{i=1}^{p} e_i \Delta TB_{t-1} + \sum_{i=1}^{p} f_i \Delta IPI_{t-1} \sum_{i=1}^{p} e_i \Delta CPI_{t-1} + \delta_1 FA_{T-1} + \delta_2 TA_{t-1} + \delta_3 TE_{t-1} + \delta_4 TB_{t-1} + \delta_5 IPI_{t-1} + \delta_6 CPI_{t-1} + \varepsilon_t$$

Δ is the first differenced operator, a_0- the drift component and the residual (errort term) is denoted by ε_t. The corresponding long run multipliers of the underlying ARDL models (δ_n) are also added as proxy for lagged error terms.

The null hypothesis of no long-run relationship between the variables is denoted by using F-test models and comparing them with Critical Values in Pesaran et al (2001) to determine the joint significance of the lagged levels of all the variables as following:

- F (LFA| LTA, LTE, LTB, LIPI, LCPI)
- F (LTA| LFA, LTE, LTB, LIPI, LCPI)
- F (LTE| LFA, LTA, LTB, LIPI, LCPI)
- F (LTB| LFA, LTA, LTE, LIPI, LCPI)
- F (LIPI| LFA, LTA, LTE, LTB, LCPI)
- F (LCPI| LFA, LTA, LTE, LTB, LIPI)

4.5 Hypothesis Testing:

H_0 : No co-integration or no long- run relationship among variables i.e. $\delta_1 = \delta_s = \delta_3 = \delta_4 = 0$

H_a: Existence of co-integration or long-run relationship among variables i.e. : $\delta_1 \neq \delta_s \neq \delta_3 \neq \delta_4 \neq 0$

We need to compare the F-statistic from the output with the values from F Table of Pesaran. If the *F* test statistic exceeds their respective upper bound of critical values, we can conclude that there is evidence of a long-run relationship between the variables regardless of the order of integration of the variables. If the test statistic is below the lower bound of critical value, we fail to reject the null hypothesis of no co-integration and if it lies between the bounds, a conclusive inference cannot be made without knowing the order of integration of the underlying regressors. (Pesaran et. all, 2001) This will be represented further in Section 5 via Empirical Result based on our test.

Furthermore, we need to define the order of distributed lag on the dependent variable and the regressors using Akaike Information Criterion (AIC) or Schwartz Bayesian Criterion (SBC). Once the integration is established the coefficients of the long-run relations are estimated using Error Correction Model, knows as ECM. Last but not least, we have to stimulate the Variance Decomposition (VDC), which indicates the percentage of variable's forecast error variance attributed to its own innovations and innovations in other variables. Based on VDC we can measure the relative importance of the index variable. Further to VDC, the last step would be the Impulse Response function (IRF). The IRF produces the same information as VDC but it

is presented in graphical form. In our research, we study the Generalized IR graph of each variable shocked into the system.

5. Empirical Results

Each of the 6 variables (FA, TA, TE, TB, IPI & CPI) are tested for non-stationarity and stationarity in their level and differenced forms respectively using both ADF and PP tests.

The results of the ADF and PP tests are reported in Table 1 and Table 2.

	VARIABLE	ADF RESULT	VALUE	T-STAT	C.V	RESULT
LOG FORM	LFA	ADF(1)=AIC	398.0966	.30000	-3.4544	NON-STATIONARY
		ADF(1)=SBC	392.5894	.30000	-3.4544	NON-STATIONARY
	LTA	ADF(1)=AIC	328.0198	-.74877	-3.4544	NON-STATIONARY
		ADF(1)=SBC	322.5126	-.74877	-3.4544	NON-STATIONARY
	LTE	ADF(1)=AIC	319.5622	-2.3832	-3.4208	NON-STATIONARY
		ADF(1)=SBC	313.4397	-2.0818	-3.4544	NON-STATIONARY
	LTB	ADF(1)=AIC	171.5888	-2.7192	-3.4208	NON-STATIONARY
		ADF(1)=SBC	164.7049	-2.7192	-3.4208	NON-STATIONARY
	LIPI	ADF(1)=AIC	215.0432	-2.0812	-3.4208	NON-STATIONARY
		ADF(1)=SBC	208.2891	-2.5928	-3.4544	NON-STATIONARY
	LCPI	ADF(1)=AIC	463.4079	-3.8837	-3.4544	STATIONARY
		ADF(1)=SBC	457.9007	-3.8837	-3.4544	STATIONARY

	VARIABLE	ADF	VALUE	T-STAT	C.V	RESULT
DIFFERENCE FORM	**DFA**	ADF(1)=AIC	390.2397	-6.5540	-2.9242	STATIONARY
		ADF(1)=SBC	386.1223	-6.5540	-2.9242	STATIONARY
	DTA	ADF(1)=AIC	322.4552	-8.4970	-2.9242	STATIONARY
		ADF(1)=SBC	318.3378	-8.4970	-2.9242	STATIONARY
	DTE	ADF(1)=AIC	315.9641	-7.1545	-2.9242	STATIONARY
		ADF(1)=SBC	311.8467	-7.1545	-2.9242	STATIONARY
	DTB	ADF(1)=AIC	167.6627	-6.1110	-2.9242	STATIONARY
		ADF(1)=SBC	163.5453	-6.1110	-2.9242	STATIONARY
	DIPI	ADF(1)=AIC	212.1093	-11.7949	-2.9242	STATIONARY
		ADF(1)=SBC	207.9919	-11.7949	-2.9242	STATIONARY
	DCPI	ADF(1)=AIC	454.2279	-6.5632	-2.9242	STATIONARY
		ADF(1)=SBC	450.1105	-6.5632	-2.9242	STATIONARY

Table 2. PP Test results

	VARIABLES	T- STAT.	C.V	RESULT
DIFFERENCE FORM	DFA	-10.1641	-2.8304	STATIONARY
	DTA	-13.0361	-2.8304	STATIONARY
	DTE	-13.1041	-2.8304	STATIONARY
	DTB	-9.9915	-2.8304	STATIONARY
	DIPI	-29.7257	-2.8304	STATIONARY
	DCPI	-5.8990	-2.8304	STATIONARY

	VARIABLES	T- STAT.	C.V	RESULT
LOG FORM	LFA	1.3141	-3.4619	NON-STATIONARY
	LTA	-.85588	-3.4619	NON-STATIONARY
	LTE	-2.3300	-3.4619	NON-STATIONARY
	LTB	-1.9930	-3.4619	NON-STATIONARY
	LIPI	-6.3677	-3.4619	STATIONARY
	LCPI	-1.7938	-3.4619	NON-STATIONARY

Based on the results above we can see that most of the variables are integrated of order one (stationary after first difference except *LCPI in AFD test* and *LIPI in PP test*, which are stationary in the level form. This results support us to use the ARDL test approach to determine the long-run relationship among the variables.

Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test

The Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test figures out if a time series is stationary around a mean or linear trend, or is non-stationary due to a unit root. A stationary time series is one where statistical properties — like the mean and variance — are constant over time.

- The null hypothesis for the test is that the data is stationary.
- The alternate hypothesis for the test is that the data is *not* stationary.

	VARIABLES	T STATISTICS	C.V	RESULT
DIFFERENCE FORM	DFA	.15123	.13785	NON- STATIONARY
	DTA	.092017	.13785	STATIONARY
	DTE	.084935	.13785	STATIONARY
	DTB	.080715	.13785	STATIONARY
	DIPI	.094527	.13785	STATIONARY
	DCPI	.10598	.13785	NON-STATIONARY

	VARIABLES	T STATISTICS	C.V	RESULT
LOG FROM	LFA	.17564	.13785	NON-STATIONARY
	LTA	.17917	.13785	NON-STATIONARY
	LTE	.10189	.13785	NON-STATIONARY
	LTB	.088615	.13785	STATIONARY
	LIPI	.16192	.13785	NON-STATIONARY
	LCPI	.081165	.13785	STATIONARY

Based on our test and result, DFA and DCPI were non-stationary in a difference form while other variables were stationary. And in a log form, LTB and LCPI resulted as stationary while the rest were non-stationary. Therefore in this case the Critical values of the LTB and LCPI are greater than t-statistics, so we fail to reject the null.

Co-integration Analysis

We applied 2 lags in our tests, as suggested by Pesaran and Shin (1998). The calculated F statistics for the co-integration test that shows the ARDL bound tests can be seen in Table 3.

When LFA is kept as dependent variable, there is co-integration among the variables which indicates a theoretical long run relationship. The estimated F-statistic for the model is 4.0306, which is significant at the 5 percent significance level; or in other word we can say it exceeded the upper bound of critical value at 90% significance level. This represents a significant and strong long-run relationship among the variables. In other 5 variables, we fail to reject the null hypothesis that there is a long-run relationship.

Table 3: Test for Long-run relationship

SN	Models	F-statistics	Outcome
1	F (LFA | LTA, LTE, LTB, LIPI, LCPI)	4.0306*	Co-integration
2	F (LTA | LFA, LTE, LTB, LIPI, LCPI)	3.2434	Inconclusive
3	F (LTE | LFA, LTA, LTB, LIPI, LCPI)	2.4007	No Co-integration
4	F (LTB | LFA, LTA, LTE, LIPI, LCPI)	3.5128	Inconclusive
5	F (LIPI | LFA, LTA, LTE, LTB, LCPI)	1.8170	No Co-integration
6	F (LCPI | LFA, LTA, LTE, LTB, LIPI)	1.6523	No Co-integration

*Intercept and trend *Significance Level 90%, * Critical Bound = (2.578 - 3646), Table Case III (with intercept and trend).

Furthermore we can say that two variables results as Inconclusive because they fall between the two critical values, e.g. Model 2 and 3 with F-statistic at 3.2434 and 3.5128 respectively, falls between 2.578 and 3.646 at 90% significance level. Therefore the outcome for the long-run relationship is inconclusive. The other three models (model 3, 5 and 6) do not have co-integration between the variables (meaning they fall below the critical value at 90% significance level).

Results of the long-run ARDL models

Once we test the long-run relationship and obtain the co-integration, we can proceed with another step in which we will obtain the lagged level of variables and estimate our equation based on the ARDL model by Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC). AIC and SBC indicate the number of lag to be zero which could be due to the data type. However, there should be at least 1 one lag, therefore in our case we put the lag length to be 2.

From the table below (table 4.) it shows there is a long-run relationship among our variables. The negative coefficients shows that the variables are competing each other while the positive coefficients shows that they are complementary in nature (Ibrahim, 2003). It shows that at 5 percent significance level Model 1 have impact on total assets (LTA) and industrial price index (LIPI). The total asset's impact on total financing can be attributed to the economic linkages, asset pricing and purchase. While Model 2 & 5 have impact on only one variable which is Total financing (LTA). This shows that there is a long-run relationship between LFA & LTA and LFA & IPI respectively.

Furthermore, Total equity (TE) is has a significant impact on total financing, meaning that the profitability of the Islamic banks are positively correlated with equities.

However, the test we conducted shows that interest rate (LTB) has no impact on total financing at the 5% significance level. This is on contract with other papers where they state that there is a significant relationship between the total financing and interest rates. Seho et al (2015) can assist and supports the findings in regard to the relationship between total financing in Islamic banks in Malaysia and interest rates. Furthermore, the Model 2, 5 and 6 have negative coefficient in regards to interest rate. Therefore, it shows that these 3 models are competing with Interest rate which is in this case an independent variable.

Lastly, we can mention that Industrial price index has an impact on total financing at the 5% significance level. The industrial price index measure the gross monthly change in the trading price of industrial product (e.g. construction and services, commodities). So we can say the demand for the industrial products in manufacturing industries and commodities market have impact on total financing of Islamic Banks in Malaysia. While the consumer price index (model 6) does not have impact on total financing, neither industrial price index. According to Yusuf et al. (2017) there is a positive relationship between the IPI and CPI and they affect one another. In our case (table 4.) it shows that there is no relationship between these two variables.

Table 4: Estimated ARDL models, long run coefficient based on Schward Bayesian Criterion (SBC)

Independent Variable	Dependent variable					
	MODEL 1 **LFA**	**MODEL 2** **LTA**	**MODEL 3** **LTE**	**MODEL 4** **LTB**	**MODEL 5** **LIPI**	**MODEL 6** **LCPI**
LFA	/	.72614* [.15922]	.17404* [.082813]	-.42869 [.29606]	1.3114* [.48099]	.032979 [.026458]
LTA	.15596* [.026585]	/	-.075332 [.065901]	.37218 [.24415]	-.058707 [.16984]	-.0053359 [.020638]
LTE	.021779 [.023584]	-.063514 .042904	/	.19513 [.18059]	.39318* [.12062]	-.021040 [.015472]
LTB	-.0083037 [.0043531]	.0058013 [.0083820]	-.015180 [.0094446]	/	-.10849 .063482	-.6631E-3 [.0028262]
LIPI	.042842* [.013482]	.041753 [.030099]	-.0067550 [.030131]	-.12048 [.12044]	/	.016404 [.0088052]
LCPI	.045803 [.063727]	-.11570 [.48124]	-.15864 [.13985]	-.17503 [.49867]	.43493 .34112	/
INPT	-.72183* [.26143]	1.3938* [.48124]	1.0726 [.59424]	-1.8252 [2.0923]	-1.4085 [1.4131]	.44387* [.19686]

* significance level 5%

Results of the short-run ARDL models

After we tested the long-run ARDL model, we will not proceed with testing the short run error correction model (ECM). This ECM is used to ensure the stability of the long run among the variables.

The relationship between the variables is determined by the significance of the error correction model in each model. If ECM is significant, it entailed that the dependent variable in the model is an endogenous variable and if the ECM is insignificant, it implies that the dependent variable of the model is exogenous. Again, we tested both AIC and SBC, but we will give a focus on the SBC as per table below:

Table 5: Estimated ARDL models, short run error correction model based on Schwarz Bayesian Criterion (SBC) results

Independent Variable	Dependent variable					
	LFA	**LTA**	**LTE**	**LTB**	**LIPI**	**LCPI**
ECM (-1)	-.15324* [.034539] -4.4367 [.000] ENDO	-.23691* [.055837] -4.2430 [.000] ENDO	-.14287* [.051307] -2.7847 [.006] ENDO	-.092116* [.034581] -2.6638 [.009] ENDO	-.23646 [.090436] -2.6147 [.070] EXGO	-.13775* [.043961] -3.1334 [.002] ENDO

**Significance Level 5%*

ENDOGENOUS (ENDO)

EXGOGENOUS (EXGO)

Out of six (6) variables, five (5) variables show the significance at the 5% level with the expected negative sign shows that there is a long-run relationship between the variables. In our case LFA, LTA, LTE, LTB AND LCPI are endogenous while LIPI is exogenous. This shows that IPI tend to lead other variables. Moreover, it supports our long-run test (table 4), where it shows that Model 5 (LIPI) depends on Total financing by the Islamic Banks. It is possibly due to the power of the bank and the market and the ability of the banks to protect the value franchise of a level of higher credit risk by holding a higher level of own capital.

Variance Decomposition (VDC)

Table 6: Variance decomposition (VDC) results

VARIABLES	HORIZON	DFA	DTA	DTE	DTB	DIPI	DCPI	TOTAL
DFA	5	73%	16%	1%	4%	5%	2%	100%
DTE	5	1%	3%	90%	1%	3%	2%	100%
DTA	5	14%	76%	1%	1%	8%	0%	100%
DTB	5	2%	2%	5%	78%	7%	6%	100%
DIPI	5	9%	5%	0%	3%	82%	1%	100%
DCPI	5	1%	1%	13%	0%	2%	82%	100%

VARIABLES	HORIZON	DFA	DTA	DTE	DTB	DIPI	DCPI	TOTAL
DFA	10	73%	16%	1%	4%	5%	2%	100%
DTE	10	1%	3%	90%	1%	3%	2%	100%
DTA	10	14%	76%	1%	1%	8%	0%	100%
DTB	10	2%	2%	5%	78%	7%	6%	100%
DIPI	10	9%	5%	0%	3%	82%	1%	100%
DCPI	10	1%	1%	13%	1%	2%	82%	100%

VARIABLES	HORIZON	DFA	DTA	DTE	DTB	DIPI	DCPI	TOTAL
DFA	20	73%	16%	1%	4%	5%	2%	100%
DTE	20	1%	3%	90%	1%	3%	2%	100%
DTA	20	14%	76%	1%	1%	8%	0%	100%
DTB	20	2%	2%	5%	78%	7%	6%	100%
DIPI	20	9%	5%	0%	3%	82%	1%	100%
DCPI	20	1%	1%	13%	1%	2%	82%	100%

VARIABLES	HORIZON	DFA	DTA	DTE	DTB	DIPI	DCPI	TOTAL
DFA	30	73%	16%	1%	4%	5%	2%	100%
DTE	30	1%	3%	90%	1%	3%	2%	100%
DTA	30	14%	76%	1%	1%	8%	0%	100%
DTB	30	2%	2%	5%	78%	7%	6%	100%
DIPI	30	9%	5%	0%	3%	82%	1%	100%
DCPI	30	1%	1%	13%	1%	2%	82%	100%

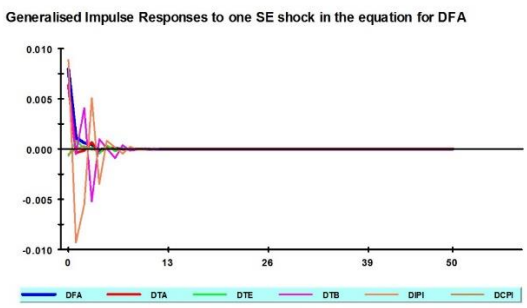
Table 6 shows he results of variance decomposition analysis.

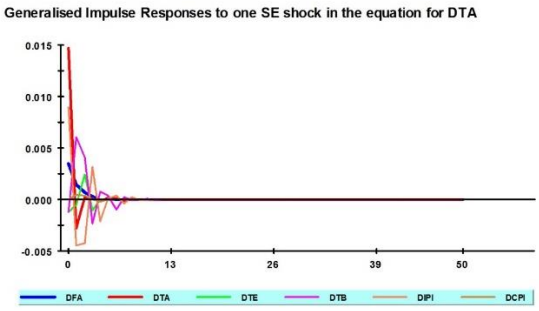
We did four horizons: horizon 5, horizon 10, horizon 20 and horizon 30. We expected the result would differentiate if more horizons are included. But based on the results that we got the results were the similar. Therefore, we included all four tables for the review.

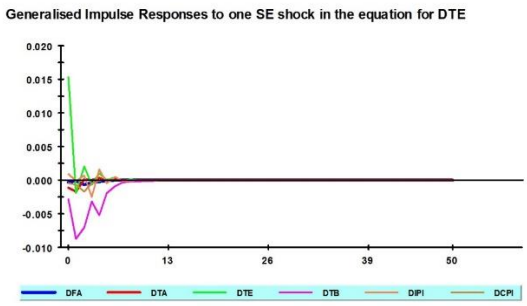
From this table we can see that Industrial Price Index and Consumer Price index, 82% of the variation is explained by itself and shocks explained by other variables range between 2-8% in all horizons conducted. The CPI and IPI are the most exogenous respectively. The two variables, interest rate (DTB) and total financing (DFA) tend to indicate that they are fairly explained by themselves for their own shock 78% and 73% respectively. The DTB is the 2nd most exogenous and DFA is 3rd most exogenous. FA was expected to be the most influential leader which is not as per the results. In this case the most influential would be DIPI and DCPI at 82%.

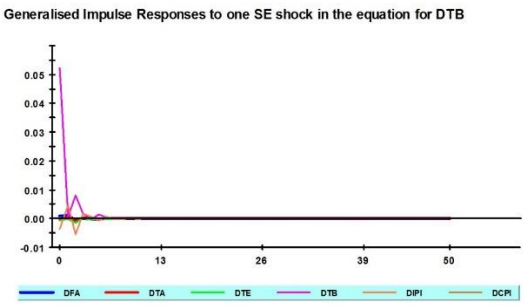
Impulse Response Function (IRF):

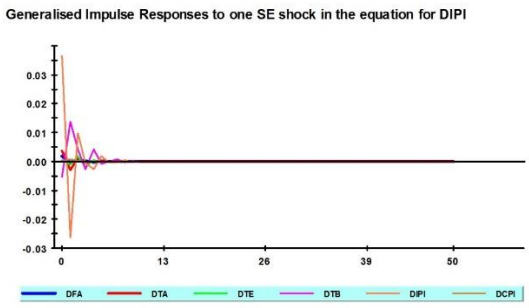
The IRF produces the time path of dependent variable to shocks from all explanatory variables. It is represented in graph form as table 7 below:

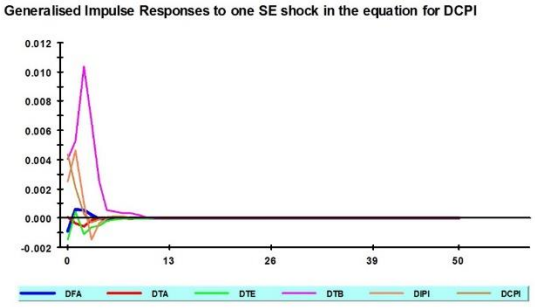












Any shock of the explanatory variables make the IR dies out to zero. The effect of each variable on other when shocked is more or less equal as seen in the graph above. In general, when all variables in the system are shocked, they effect is seems to be significant up till year 10 years (approximately) and then slowly goes to equilibrium after year 13. From the graph 1 we can see that Industrial production index reacts significantly to Total financing shock followed by interest rate. Total asset and total equity did not show much reaction to the shock. Consumer price index, in this case reacts most negatively.

6. Conclusion and Policy Implications

In this paper, we studied the co-movement or the long run theoretical relationship of total financing by Islamic banks in Malaysia, interest rate and other variables. The monthly data of variables from year 2007 to 2017 were used. By pursuing the ARDL approach the variables were tested for their long-run theoretical relationship and it is found that total financing, which is the main variable is co-integrated with other variables. In our finding the total financing of the Islamic banks in Malaysia seems to be a bit resistant to interest rate. Which is actually a

good result, since Islamic banks should not include and practice the use of the interest rate (riba)[2]. This can help the Islamic banks to gain the independence from the conventional banking.

Furthermore, in our ARDL model, total equity (TE) has a significant impact on total financing, meaning that the profitability of the Islamic banks are positively correlated with equities. This is due to the equity-based financing by the Islamic banks and its system. Because the Islamic banks operate more on the equity-based financing rather than debt-based financing which is deemed prohibited in Islamic practice by Shari'ah law. This would also lead to the limitation of our study on the relationship between the total financing and interest rate. We could have included additional variable which is risk-sharing financing of the Islamic Banks in Malaysia and not just the total financing of the Islamic banks in Malaysia.

Moreover, our findings are not in line with some previous findings where it is stated that Islamic banks have the same practice as conventional banks and it is not just a replacement. Hence, the Islamic banks in Malaysia show they are a bit resistant to interest rate which has been confirmed in Seho et al (2015) paper. Therefore, we would suggest that Islamic banks in Malaysia should engage more in financing and expand their practices not just domestically but also internationally. It still needs to have some restricted regulations in order to operate properly and not put a huge pressure on Islamic banks. This will help Islamic banks to expand and compete with the conventional banks. Which is actually one of the main goals of Bank Negara Malaysia.

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[2] Riba- Unjustified increment in borrowing or lending money, paid in kind or in money above the amount of loan, as a condition imposed by the lender or voluntarily by the borrower. Riba defined in this way is called in fiqh riba al-duyun (debt usury).

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