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Is there any causality between Islamic banks' return on depositors and conventional banks' deposit interest? Evidence of causality from Bahrain's financial market

Abdus Samad

Department of Finance and Economics, Utah Valley University, USA

corresponding e-mail: abdus(dot)samad[at]uvu(dot)edu
address: Department of Finance and Economics, Utah Valley University,
800 West University PKY, Orem, UT 84097, USA

Abstract: Unlike conventional banks' interest payment on deposits, Islamic banks do not pay interest to depositors. What they pay to depositors is called the rate of return to depositors. Does the rate of return of Islamic banks on deposits follow conventional banks' interest rates? This paper empirically investigates the relationship of causality and the causal direction between conventional banks' interest rate and Islamic banks' return applying VEC model. The results of the VAR Granger Causality/Block Exogeneity Wald Tests fail to reject the null hypothesis of bidirectional causality between Islamic banks' rate of return and conventional banks' interest. The pairwise Granger causality also confirms the same results. This suggests that Islamic banks' rate of return and the conventional banks' interest rate are not independent of each other rather they follow each other in the Bahrain financial market.

JEL Classifications: G21, F31

Keywords: Bahrain, conventional bank, interest rate, Islamic bank, rate of return, Granger causality
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1. Introduction

Conventional banks and the Islamic banks operate side by side. The objective function of both conventional bank and the Islamic bank is to maximize profits subject to mobilizing deposits and financing investments. Deposit is an important liability for a bank. Financing investments or loans are mostly carried out through deposit mobilization of the bank.

Although the objective functions of both banks are the same and the deposit mobilizations are key factor for both conventional banks and the Islamic banks, the mode of operation is different. While interest is the key element of conventional banks, the avoidance of interest leading to profits and loss sharing (PLS) is a distinguished feature of Islamic banks. Interest incentive is the principal element for conventional banks' in deposit mobilizations. The interest rate is fixed over the period irrespective of economic situation and borrowers' economic condition.

In mobilizing deposits, Islamic banks also offer financial incentives but the financial incentive is not the fixed rate of interest. The depositors of the Islamic banks do not get fixed return for their deposits. It is the pre-agreed rate of returns, if there are profits generated through the investment of deposits. In Islamic banks, current account deposits are based on two principles: al Amanah and al Wadiah. In Amana deposits, interest-free

deposits are held by the banks in trust (Amanah). Under Amanah arrangement, the Islamic bank treats the funds as a trust and cannot use these funds for its operations; it does not guarantee the refund of the deposit in case of any damage or loss to the Amanah resulting from circumstances beyond its control. The Wadiah deposits are the safe-keeping (Wadiah) deposits. In Wadiah, the bank is considered as a keeper and trustee of funds and has the depositors' permission to use the funds for its operations in a Shari´ah compliant manner. Deposits under Wadiah take the form of loans from depositors to Islamic banks and the bank guarantees refund of the entire amount of the deposit. While these deposits can be withdrawn at any time, the depositors have no right to any return/profit on such deposits. However, depositors, at the bank's discretion, may be rewarded with a profits

Mudarabah saving deposit. Savings deposit accounts of the Islamic banks operate in a different way. The depositors allow the banks to use their money invested in profitable business ventures which are legal and Shari´ah compliant. Generally, deposits in savings accounts are accepted by Islamic banks on the basis of Mudarabah where the depositor is rabb-ul-mal (investor) and the bank is the Mudarib (fund manager). The profit will be shared as per a pre-determined ratio upon, while loss will be borne by the rabb-ul-mal. Profit distribution amongst the depositors and the shareholders will be made according to the prearranged contract made at the beginning of each month to their investments. Savings deposits are generally paced in a joint investment pool with other deposits mobilised by the Islamic banks.

Muderabah investment deposits. Deposits are accepted for a fixed period of time or term and are governed by the Mudarabah contract with the bank. It is similar to fixed deposits of the conventional banks. When deposits are agreed for the fixed term no withdrawal is normally allowed until the end of the deposit term. However, some banks are allowing early withdrawals in an agreed notice period. Term deposits are arrangement where depositors seek some return on their investments; they are taken on a Mudarabah basis. These deposits are allocated to a number of investment pools and the Islamic banks invest the pooled amount in Shari´ah-compliant businesses. The profits from the assets are shared between the depositors and the bank according to a pre-determined ratio agreed upon at the beginning of contract. The profit sharing weightages are assigned based on the various tenures and the amount invested under the arrangement. And as required under Mudarabah, depositors have to be informed in advance of the formula used for sharing the net earnings of the investment pool with the bank. In case of the unlikely event of loss, the depositors have to bear the loss on a pro-rata basis while bank goes un-rewarded for all its efforts. If a bank contributes its equity capital in a pool at the time of setting up an investment pool, the relationship will be a combination of Musharakah and Mudarabah, and the bank would be entitled to a proportionate profit on its own investment in relation to the total Mudarabah investment pool. Islamic banks can also open may announce Murabaha and leasing funds in which the risk-averse investors may purchase units and be treated as rabbul-mal and get the quasi fixed-return from profits or rentals earned by the respective funds from the trading and leasing activities*.

In summary, there is no fixed rate of return to any types of deposit accounts of the Islamic banks. As the depositors undertake risk of their deposits under the Muderabah saving deposits and the Muderabah investment deposits, they earn money on their deposits as per prearranged contract. The key feature of this liability contract is that Islamic banks neither guarantee the safety of depositors' capital nor any fixed return on

* www.financislam.com/depositw.html

deposits. In this sense, Islamic banks', Muderabah investment deposits are more risky than those of conventional banks' fixed deposits and as such deserve more earnings.

The operation of conventional banks is centuries old whereas the Islamic bank is a new phenomenon. As the Islamic banks are new comers in the market, it is a common allegation that the rates of return to the depositors of Islamic banks or PLS investment financing simply follow conventional banks' interest rates. The rate of return or PLS of the Islamic banks is 'back door interest rate' (Chong & Liu, 2009).

First, for examining whether the two incentive rates, the conventional banks' deposit interest rates and the Islamic banks' rates of return on deposits, are correlated, the 3-month deposit interest rates of the conventional banks and 3-month the rate of return on deposits of the Islamic banks of Bahrain during 2005-2012 were presented in Figure 1.

FIGURE 1. CONVENTIONAL BANKS' DEPOSIT INTEREST RATE AND ISLAMIC BANKS' RATE OF RETURN TO DEPOSITORS

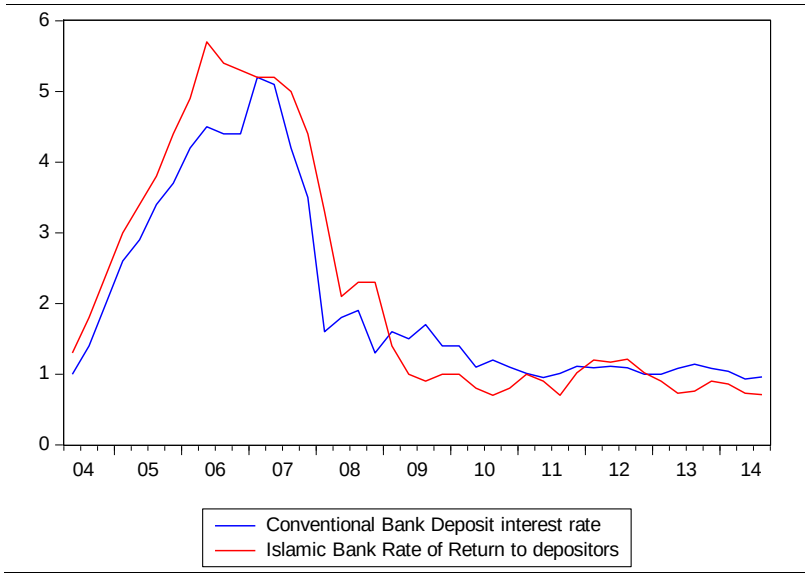

TABLE 1. CORRELATION

CORRELATION	CONVENTIONAL BANK DEPOSIT INTEREST	ISLAMIC BANK DEPOSIT RETURN	t-statistic
CONVENTIONAL BANK DEPOSIT INTEREST	1.00		
ISLAMIC BANK DEPOSIT RETURN	0.964	1.00	34.5*

Note: * - Significant at 1 percent level.

The correlation matric of the conventional banks' deposit rate and the Islamic banks' return on deposits is presented in Table 1.

The visual examination of Figure 1 demonstrates the pattern of cyclical fluctuations between the conventional banks' deposit interest rate and the Islamic banks' rate of return to depositors was similar. The correlation matrics of Table 1 shows the strong positive correlation, 0.96.4 percent and the correlation is statistically significant.

The pattern of cyclical fluctuations, demonstrated in the figure, and the significantly positive correlation (Table 1) indicate the existence of causality between the two rates on deposits. It is alleged that the Islamic banks' rate of return on investment and rates of return to depositors follow the conventional banks' interest rate. The allegation is based on the lack of well-regulated functioning financial system determining interest rate which is found in the conventional system. Although it is alleged that the Islamic banks rates of return simply follow the conventional banks' interest rate, there was no empirical evidence to substantiate the claim. The exploration and the direction of causality between the conventional banks' deposit interest rate and the Islamic banks' rate of return to depositors is an important contribution of this paper in the banking literature.

This paper is organized as: Section 2 describes the unique characteristics of Islamic bank products. Section 3 provides the case for studying the Bahrain' banking. Section 4 outlines a short survey of literature. Section 5 provides the descriptions of data, methodology, and model. Empirical results and conclusions are presented in Section 5.

2. Islamic bank products and characteristics

First, all activities including the banking business are guided by the Quran, and the Shariah, the sunnah of Prophet Mohammad (SAS). Islam prohibits its followers to get involved in certain harmful activities such as the production and consumption of alcohol, gambling, prostitution, and pork. As these activities are prohibited in Islam, Islamic banks are not allowed to engage in financing these activities. Islamic banks do not finance these activities.

Second, the most unique feature of Islamic banking is the avoidance of riba (usury) in all financial transactions. The term "riba' is currently interpreted as interest rate. The Quran, the Divine book of Islam, strongly prohibits riba. The Quran says: …"whereas Allah permitted trading and forbidden riba" (Quran: Surah 2, Ayah 275). However, neither the Quran nor the Prophet of Islamic did define what riba is[*]. The present scholars of Shariah agreed that the predetermined fixed rate of return is not permitted in Islamic banking business transactions.

The prohibition of interest in banking business gives rise to the development of innovative mode of financial products by the Islamic banks. The products, on the asset side of the balance sheet of the Islamic bank, are: (i) Musharakah (ii) Muderabah (iii) Murabahah (iv) Bai Baithaman Ajil' (v) bai al-salam (vi) Ijarah (vii) Istisna.

[*] Umar b. al-Khattab said: "There are three things: If God's Messenger had explained them clearly, it would have been dearer to me than the world and what it contains: (These are) *kalalah*, *riba*, and *khilafah*." (*Sunan Ibn Majah*, Book of Inheritance, Vol. 4, #2727.

There are two types of the financing contracts. They are equity type and debt type contracts. Musharakah' (partnership) and 'Mudarabah'(trust financing) are equity type contracts (Hamwi & Aylward, 1999).

Musharakha is a partnership and joint venture contract between the Islamic bank and the investor where both parties provide capital and manage funds and projects. Profits or losses accruing from the venture are distributed based on the proportion of capital and pre-determined agreement.

Mudarabah is a trust financing contract between Islamic banks and investors where Islamic banks provide all funds for a project and investors provide physical labor, intellectual, and management skills. Profits from the projects are distributed based on a pre-agreed (ratio) arrangement. However, in cases of losses, banks, the providers of fund (called rab al maal), will bear the losses of fund and investor will bear the loss of his labor. The key feature of this contract is that there is no predetermined fixed rate of returns for bank; and both parties share the risk of investment.

The key features of the *Musharakha* and *Muderaba* contract are:

a) Profit and loss sharing (PLS). Both parties share profits or loss. Unlike conventional bank equity contracts where banks do not bear the risk of financing investments, Islamic banks share the risk of investment.

b) Unlike conventional banks' equity contracts where banks enjoy the fixed rate of return from investments, even when there are losses for the project, there is no predetermined rate of returns on investments for Islamic banks. Thus, PLS, avoiding of fixed interest, is a key feature of Islamic financing. Justice requires that both share the risk of business.

Murabaha financing is a debt type contract. Murabaha mode of financing is based on a 'mark-up' arrangement in which goods or assets are purchased by the bank on behalf of a client, and are sold to the client at a price equal to the cost of the item(s) plus a profit margin. Under the Murabaha financing contract, a client wishing to buy goods or assets approaches an Islamic bank to buy them on their behalf. The Islamic bank then buys the product at the current market price and adds a profit margin to it, and then re-sells the product to the client. The key feature is that there is no fixed interest involved, although the critiques of Islamic banks do not admit it. They call it a "back door for interest-based financing" (Chong & Liu, 2009).

Bai Baithaman Ajil' is a variant of the Murabah (cost plus) financing contract. The difference is that the delivery of goods is immediate but the payment of goods is deferred. The payment may be made at installment. However, the price of the product is agreed to by both parties at the time of the sale but should not include charges for the deferred payment.

Bai al-salaam is a forward sale contract where an entrepreneur sells some specific goods to the Islamic bank at a price agreed upon and paid at the time of contract but the delivery of goods is deferred for the future.

Al-Ijera is a lease financing contract and is similar to a conventional bank lease contract. Under this contract, the Islamic bank purchases an asset for a customer and then leases it out to him for a fixed period at a fixed rental charge agreed upon at the time of purchase. A key difference with conventional bank leases is that the lessor, i.e. Islamic bank, retains

the risk of property ownership. It is noted that Shariah permits fixed rental charges for the use of asset/property services.

Istisna is a financing contract under which a manufacturer or a producer produces specific goods for future delivery at a predetermined price.

The key feature of Bai Baithaman Ajil', bai al-salam, Ijarah, and Istisna* is that financing is fully securitized and asset based. Unlike conventional banks, Islamic banks own the ownership of the goods until full payment is made.

The products, on the liability side of the balance sheet of the Islamic bank, are: (i) current account called Al Amana/wadiah deposits; (ii) Saving deposits called Mudarabah saving deposits; and (iii) Muderabah investment deposits.

Current account deposits are similar to demand deposits of the conventional banks. In Islamic banks, current account deposits are based on two principles: al Amanah and al Wadiah. In Amana deposits, interest-free deposits are held by the banks in trust (Amanah. Under Amanah arrangement, the Islamic bank treats the funds as a trust and cannot use these funds for its operations; it does not guarantee the refund of the deposit in case of any damage or loss to the Amanah resulting from circumstances beyond its control. The Wadiah deposits are the safe-keeping (Wadiah) deposits. In Wadiah, the bank is considered as a keeper and trustee of funds and has the depositors' permission to use the funds for its operations in a Shari´ah compliant manner. Deposits under Wadiah take the form of loans from depositors to Islamic banks and the bank guarantees refund of the entire amount of the deposit. While these deposits can be withdrawn at any time, the depositors have no right to any return/profit on such deposits. However, depositors, at the bank's discretion, may be rewarded with a profits

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* see Samad,Gardner, & Cook (2005) and (Chong & Liu, 2009) for definition and features.

And as required under Mudarabah, depositors have to be informed in advance of the formula used for sharing the net earnings of the investment pool with the bank. In case of the unlikely event of loss, the depositors have to bear the loss on a pro-rata basis while bank goes un-rewarded for all its efforts. If a bank contributes its equity capital in a pool at the time of setting up an investment pool, the relationship will be a combination of Musharakah and Mudarabah, and the bank would be entitled to a proportionate profit on its own investment in relation to the total Mudarabah investment pool. Islamic banks can also open may announce Murabaha and leasing funds in which the risk-averse investors may purchase units and be treated as rabbul-mal and get the quasi fixed-return from profits or rentals earned by the respective funds from the trading and leasing activities*.

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3. Reasons for studying Bahrain

Although Bahrain is a small Gulf State in the Middle East with a total population of 630,744 Bahrainis†, it has many interesting financial features that deserve this country to be studied.

First, Bahrain's financial sector is well-developed and diversified, consisting of a wide range of conventional and Islamic financial institutions and markets, including retail and wholesale banks, specialized banks, insurance companies, finance companies, investment advisors, money changers, insurance brokers, securities brokers and mutual funds. The financial sector is the largest single employer in Bahrain in terms of employment and contribution to GDP. The sector provides 80 percent employment to Bahraini work-force and contributes 27 percent to the GDP of Bahrain.

Second, Bahrain's financial sector is not only developed and diversified but also stable which made Bahrain a leading financial center in the in the Gulf region.

Third, the banking system of Bahrain plays a vital role in the financial sector of Bahrain. Bahrain's banking system consists of both conventional and Islamic banks and is the largest component of the financial system, accounting for over 85 percent of total financial assets. According to the report of Bahrain Central Bank, 2014, 'the conventional segment includes 23 retail banks, 69 wholesale banks, 2 specialized banks as well as 36 representative offices of overseas banks. The Islamic segment, offering a host of Sharia compliant products and services include 6 retail banks and 18 wholesale banks'. The banking sector assets stood at over US$180 billion, more than twelve times annual Gross Domestic Product of Bahrain.

* www.financislam.com/depositw.html
† Source: Central Informatics Organization, Kingdom of Bahrain

Fourth, industry growth of the country has been supported by an open market economy; stable and prudent macro-economic and fiscal policies; a credible regulatory framework in line with international standards; and a notably strong and well qualified local workforce. All these factors have combined to cement Bahrain's position as a regional banking hub, successfully attracting numerous foreign banking organizations to establish a physical presence in the country.

Fifth, Bahrain has recently become a global leader in Islamic finance, hosting the largest concentration of Islamic financial institutions in the Middle East. Presently, there are 7 Islamic insurance companies (Takaful) and 2 Re-Takaful companies operating in the Kingdom. In addition, Bahrain is at the forefront in the market for Islamic securities (sukuk), including short-term government sukuk as well as leasing securities.

Sixth, the growth of Islamic banking in particular has been remarkable. According to Bahrain Central Bank's report, the total assets of the Islamic banking sector jumped from US$1.9 billion in 2000 to US$25.4 billion by August 2012, an increase of over 12 times. The market share of Islamic banks correspondingly increased from 1.8% of total banking assets in 2000 to 13.3% in August 2012. Islamic banks provide a variety of products, including Murabaha, Ijara, Mudaraba, Musharaka, Al Salam and Istitsna'a, restricted and unrestricted investment accounts, syndications and other structures used in conventional finance, which have been appropriately modified to comply with Shari'a principles.

4. Survey of the literature

The extent of past scholarly research on Islamic banking includes Khan (1986), Mannan (1968), Iqbal & Mirakhor (1987), and Ahmad (1984). These authors discuss the theoretical development of institutional issues and concepts, including Arabic concepts, and principles that are subject to interpretation.

Khan (1986) provides an important theoretical model of Islamic banking and compared the model with conventional banking. He argues that Islamic banks "treat deposits as shares and accordingly does not guarantee their nominal value" (p. 19). Since profit and loss is equity, account depositors would be treated like shareholders of a bank and, therefore, "no official reserve requirement would be necessary for these investment deposits" (p.20-21). Chapra (1982) and Siddiqi (1983) argue for Islamic banking as the primary alternative of interest based conventional banking. They also argue that Islamic banks are efficient to generate economic growth without getting involved interest.

Khan (1986) provides a good description of the development of Islamic banks in Egypt, Kuwait, UAE, and Pakistan. Kazarian (1993) compares two Egyptian Islamic banks with Egypt conventional banks taking ratio of long-term financing and finds that the two Islamic banks occupie a third position in Egypt during 1979-1990. Aggarwal & Yousef (2000) examine Islamic banks mode of operations and find that the profit and loss sharing mode of Islamic banks was minimum and the agency problem of Islamic banks was more severe. Samad, Gardner, & Cook (2005) study the Bahrain and Malaysia Islamic banking finances and find that the Muderabah and Musharak, the distinct mode of Islamic banks that distinguished Islamic banks from the conventional banks are less than 4 percent of total financings. Debt type financing such as Murabah and Ijarah appeared to be most popular and dominant of all other modes of financing.

Samad (2004) compares the performance of Islamic banks and conventional commercial banks of Bahrain with respect to (a) profitability (b) liquidity (c) capital management. Eleven financial ratios are compared for the period 1991-2001. Researcher finds that there is no difference in profitability and liquidity performance between Islamic and conventional banks. Fayed (2013) compares the profitability, liquidity, credit risk, and solvency performance of three Egyptian Islamic banks with six conventional banks during 2008-2010 and finds superiority of conventional banks' performance over Islamic banks. Chong & Liu (2009) examine Malaysian Islamic banks and find that the profit and loss sharing mode of finance was minimal in this period of time. The growth of Islamic banking was largely driven by the Islamic resurgence rather than by advantage of the profit and loss sharing mode of production.

Cevik & Charap (2011) examine the empirical behavior of conventional bank deposit rates and the rate of return of Islamic banks in Malaysia and Turkey and find that there was a long run co-integration between the series.

Samad (2013) investigates whether the global financial crisis (GFC) has had its impact on the efficiency of Islamic banks by using the time varying stochastic frontier function on the Islamic banks of 16 countries. The efficiencies of Islamic banks were estimated using Cobb-Douglas production function and found that the global financial crisis had had no impact on banks' efficiency. Mean efficiencies between the pre global financial crisis and the post global crisis were estimated 39 and 38 percent respectively and the difference was not statistically significant.

Samad & Chawdhury (2017) examine the causality of Bangladesh Islamic banking return on deposits with conventional banks' interest payment of deposits and find that the causality run from the Islamic banks' rate of return to depositors to the conventional banks' interest rates.

The survey of literature shows no empirical study on Bahrain's rate of return of the Islamic banks' deposits and the deposit interest rate of the conventional banks.

5. Data and methodology

5.1. Data

Quarterly data for the conventional bank 6-moht deposit rates from 2004-2012 are obtained from the statistical Bulletin of the Central Bank of Bahrain. Similar data for the Islamic banks' deposit rates are not available. As the Islamic bank financing and the deposit rates mostly follow the short-term Al-Salam securities rate paid by the central bank, the paper uses the quarterly data of the short-term security rate of Al-Salam for the Islamic banks' rate of return on deposits during 2004-2012.

The two variables, Islamic banks' rate of return to depositors and the conventional banks' deposit interest rates, are: ($ISBKY-6M$)- Islamic bank 6-month rate of return to depositors; and ($CONBKX-6M$) - conventional bank 6-month deposit interest rates.

The descriptive statistics of two variables, Islamic banks' rate of return to depositors ($ISBKY-6$), and the conventional banks' deposit interest rates ($CONBKX-6$), are provided in Table 2.

TABLE 2. DESCRIPTIVE STATISTICS OF CONVENTIONAL BANK DEPOSIT INTEREST (CONBKX-6M) AND ISLAMIC BANK RATE OF RETURN TO DEPOSITORS (ISBKY-6M)

	CONBKX-6M	ISBKY-6M
Mean	1.886000	2.085200
Median	1.190000	1.255000
Maximum	5.200000	5.700000
Minimum	0.930000	0.700000
Std. Dev.	1.287827	1.601255
Skewness	1.377663	1.075824
Kurtosis	3.399794	2.687444
Jarque-Bera	16.14929	9.848493
Probability	0.000311	0.007268
Sum	94.30000	104.2600
Sum Sq. Dev.	81.26640	125.6368
Observations	50	50

5.2. Methodology

5.2.1. Vector Auto Regressive model (VAR)

When the distinction between endogenous and exogenous variables is not clear, VAR is an appropriate model. Since it was unknown whether the Islamic banks' rates of return to depositors (Y-6M) or conventional banks' deposit interest rates (X-6M) were endogenous or exogenous, the paper applied the VAR model. In the VAR model, all variables are treated as endogenous. The best thing in the VAR is that the econometrician does not have to worry which variables are endogenous or exogenous. Second, VAR is easy to estimate and the forecasts of VAR are in most cases far better than those obtained from the complex simultaneous model.

Vector Error Correction model (VECM) is applied to find the causality and the direction of the causality between them. In terms of two variables, Y-6M and X-6M, VECM can be written and estimated from the model:

$$\Delta(ISBKY-6M)_t = \beta_1 \sum_{i=1}^{n} \Delta(CONBKX6)_{t-i} + \alpha_1 \sum_{i=1}^{n} \Delta(ISBKY6)_{t-i} + \\ + \Phi\vartheta_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta(CONBKX-6M)_t = \beta_2 \sum_{i=1}^{n} \Delta(ISBKY6)_{t-i} + \alpha_2 \sum_{i=1}^{n} \Delta(CONBKX6)_{t-i} + \\ + \Psi\vartheta_{t-1} + \varepsilon_t \quad (2)$$

Where $\vartheta_{t-1} = (Y_{t-1} - \alpha_0 - \beta X_{t-1})$ is called the residual cointegration equation or Error Correction Term (ECT), ε_t is white noise error term. The sign of the error correction term, ϑ_{t-1} for both equations, (1) and (2) is expected to be negative.

Short run impact

In (3), β_i is the short-run impact multiplier that measures the immediate impact of changes in conventional banks' deposit interest, $(CONBKX-6)$ on the changes on Islamic banks' rate of return to depositors $(ISBKY-6)$, It, thus, provides the short effect.

Long-term relation and Granger causality test

Since ΔY_t in (3) does not, for sure, provide about long-term relation/behavior, the incorporation of ϑ_{t-1}, the ECT resolves this problem and, thus, provides the existence of long-term relation. The coefficient (Φ) of the ECT, ϑ_{t-1}, on the other hand, is the short-term adjustment effect. It provides the speed/rate of adjustment when rates are out of equilibrium. The sign of Φ is expected to be negative in the mean reverting case. Based on Henry (1995), the mean adjustment lag is calculated by the following equation:

$$MAL = (1-\beta)/\Phi \qquad (3)$$

The equation (3) provides two sources of causation: **first**, $\Delta(CONBKX-6)_t$ and **second**, the cointegrating equation, ϑ_{t-1}. In the conventional Granger causality test, null hypothesis: $\Delta(CONBKX-6)_t$ does not Granger cause $\Delta(ISBKY-6)_t$ is rejected if $\beta \neq 0$ (i.e. β is not significantly zero). With the incorporation of cointegrating equation ϑ_{t-1}, additional source of causation is established. The null hypothesis: $\Delta(CONBKX-6)_t$ does not Granger cause $\Delta(ISBKY-6)_t$ is rejected not only if β, the lagged values of *Y* are not jointly significant (i.e. $\beta = 0$), but also if the coefficient of the ECT, Φ is significant, according to Miller & Rusk (1990) and Grander (1988).

In other words, the ECT opens up an additional channel for Granger causality. The Granger causality is established either through the significance of (i) Φ, the ECT by t-test; or (ii) joint test applied to the significance of the sum of lagged of each explanatory variables ($\sum_{i=1}^{n} \Delta X\, t-i$ and $\alpha_1 \sum_{i=1}^{n} \Delta Y\, t-i$)) by a joint F or Wald χ^2 test.

The causality in the long term exists **only when** Φ, the coefficient of ECT is statistically significant and different from zero ($\Phi \neq 0$).

The application of the VEC requires that the variables X and Y must integrated of order I(1) i.e. $X \sim (1)$ and $Y \sim (1)$. They are nonstationary at level but stationary at first difference. This requirement sets the stage for unit test and cointegration test.

Determining Lag

Since the cointegration analysis, is very sensitive to lag length, the determination of optimum lag is very import. The two most commonly used criteria are the Akaike Information (AIC) and the Schwarz Bayesian Criterion (SBC). If they contradict, usually SBC is preferable because SBC provides the smallest negative number. So, this paper used SBC to determine the lag length or K.

5.2.2. Unit root tests

Since the publication of Nelson & Plosser (1982), it is widely recognized that most time series macroeconomic variables contain unit root, i.e. variable $Xt \sim I(1)$. So, this paper, first, examines the existence of unit root in Y indices and X indices by using the augmented Dickey-Fuller (ADF) and Philip-Perron tests. In the following equation, the null hypothesis, $\alpha = 0$ is tested against the alternative hypothesis, $\alpha < 0$:

$$\Delta y_t = \alpha_0 + \beta t + \gamma y_{t-1} + \sum_{i}^{k} \lambda i \Delta y_{t-1} + \varepsilon_t \quad (4)$$

Schwarz Bayesian Criterion (SBC) will be used to determine the lag length or K. The results of ADF and PP test are presented in Table 3.

TABLE 3. ADF AND PHILLIPS-PERRON UNIT ROOT TESTS

VARIABLES	ADF TEST (INTERCEPT) Null hypothesis: Variable has unit root Lag Length: (Automatic-based on SIC, Maxlag= 9		PP(PHILLIPS-PERRON) TEST Null Hypothesis: Variable has a unit root	
	Level (t-Statistics)	1st difference (t-Statistics)	Level (t-Statistics)	1st difference (t-Statistics)
CONBKX-6M	-1.03	-4.46*	-1.47	-4.49*
ISBKY-6M	-1.31	-3.30**	-1.17	-3.23**

Note: *- Significant at 1 percent level; ** - Significant at 5 percent level; and *** - Significant at 10 percent level.

The results of both ADF and PP test demonstrated that both series are non-stationary at the level but are stationary at the first difference.

5.2.3. Structural break test

The issue of testing the presence of unit root gained further momentum when Perron (1989) emphasized the importance of structural break while testing the unit root test. The structural break test is needed because the most macroeconomic series suffer some kind of shock, i.e. structural break. Thus, the unit root test is not enough. Perron (1989) argued that conventional unit root tests have low power to reject the null hypothesis of

nonstationarity when there is a structural break in the series. To overcome this problem, Perron (1989) modified the augmented Dickey-Fuller (ADF) test by adding dummy variables to account for structural breaks at known points in time. Zivot & Andrews (1992) suggested that structural breaks in the series may be endogenous and they extended Perron's methodology to allow for the endogenous estimation of the break date. We employ the following two alternative models proposed by Zivot & Andrews (hereafter ZA) to examine the presence of unit root with structural break in the stock market price series:

$$\text{Model C: } \Delta(ISBKY-6)_t = \mu + \emptyset DU_t(\lambda) + \beta t + \gamma DT_t(\lambda) + \\ +\alpha(CONBKX-6)_{t-1} + \varepsilon_t \quad (5)$$

Where ($\Delta ISBKY-6$) is the Islamic banks' rate of return to depositors, DU_t and $DT_t$are indicator variables for mean shift and trend shift for the possible structural break-date (*TB*) and they are described as following:

$$DT_t = \begin{cases} t-TB & if\ t > TB \\ 0 & otherwise \end{cases}$$

The null hypothesis of unit root ($\alpha = 0$) can be tested against stationary with structural breaks ($\alpha < 0$) in Equations 4 and 5. Every time points are considered as a potential structural break date in the ZA unit root test and the break date is determined according to minimum one-sided t-statistic. Results of Zivot-Andrews test are provided in Table 4.

TABLE 4. ZIVOT-ANDREWS UNIT ROOT WITH STRUCTURAL BREAK

ZIVOT-ANDREWS UNIT ROOT TEST Null Hypothesis: Variable has a unit root with a structural break in the intercept Chosen Lag length: 2 (maximum lags: 4)		
Variables	(t-Statistics)	Chosen break point
CONBK-6M	-5.61*	2007Q4
ISBKY-6M	-5.39*	2008Q1

Note: *- Significant at 1 percent level.

The result of Zivot-Andrews unit root test shows that both series had structural break.

5.2.4. Determining lag length

Before we run the cointegration test, it is essential to determine the optimum lag length because the cointegration analysis is very sensitive to the selection of lag length. This paper uses the most commonly used lag length criteria such as the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC).

$$AIC = T\,In\,(sum\,of\,squared\,residual) + 2n$$

$$SBC = TIn\,(Sum\,of\,squared\,residual + n\,ln(T)$$

Where, n - number of parameters estimated, T - number of used observations,

As $In(T) > 2$, the SBC is always selected as a more appropriate lag length than the AIC. Ideally the best fit happens when AIC and SBC is as small as i.e. as negative as possible (see Table 5). The Table 5 suggests that the optimum lag length is 2.

TABLE 5. LAG LENGTH DETERMINATION

VAR Lag Order Selection Criteria
Endogenous variables: CONBKX-6M ISBKY-6M
Exogenous variables: C
Sample: 2004Q2 2016Q3
Included observations: 39

LAG	LOGL	LR	FPE	AIC	SC	HQ
0	-92.08420	NA	0.427030	4.824831	4.910142	4.855439
1	-27.42486	119.3711	0.019043	1.714095	1.970028	1.805922
2	-9.166315	31.83540*	0.009186*	0.982888*	1.409442*	1.135932*
3	-5.773945	5.566967	0.009525	1.014048	1.611224	1.228310

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

5.2.5. Cointegration

Having established that the variables are non-stationary i.e. $I(1)$, the presence of cointegration among these variables in level form is required for the model. Consequently, the co-integration properties of the variables are examined. That is, it is necessary to determine whether there is at least one linear combination of these variables that is $I(0)$. To investigate multivariate cointegration, this paper applies Johansen (1991; 1995) Trace and Maximum eigenvalue tests. Johansen (1991; 1995) cointegration is a VAR test and written in general form as:

$$\Delta Y_t = \pi Y_{t-1} + \sum_{i=1}^{p-1} \tau_i \, \Delta Y_{t-i} + \beta X_t + \varepsilon_t \qquad (6)$$

Where, $\prod = \sum_{i=1}^{p} \beta_i - I$ and $\tau = \sum_{j=i+1}^{p} \beta_j$.

Based on Granger's theorem, if the coefficient matrix $\prod$ has reduced rank $r < k$, then there exists $k\ x\ r$ matrices α and β each rank r such that $\prod = \alpha\beta'$ and $\beta' y_t$ is $I(0)$. r is the number of cointegrating relations (the cointegrating rank) and each column of β is the cointegrating vector. The null hypothesis is that number of cointegration:

$H_0 : r = 0$

$H_a : r = 1$

The result of the Johansen cointegration between the Islamic banks' rate of return to depositors ($ISBKY - 6M$) and the conventional banks' deposit interest rate ($CONBKX - 6M$) is presented in Table 6.

TABLE 6. JOHANSEN COINTEGRATION TESTS RESULT

Sample (adjusted): 2004Q2 2016Q3
Included observations: 39 after adjustments
Trend assumption: Linear deterministic trend
Series: CONBKDI RORSALAM
Lags interval (in first differences): 1 to 2

UNRESTRICTED COINTEGRATION RANK TEST (TRACE)

Hypothesized No. of CE(s)	Eigenvalue	Trace statistics	0.05 critical value	Prob.**
None *	0.333635	17.59621	15.49471	0.0238
At most 1	0.044258	1.765405	3.841466	0.1840

Note: Trace test indicates 1 cointegrating eqn(s) at the 0.05 level. * - denotes rejection of the hypothesis at the 0.05 level. ** - MacKinnon-Haug-Michelis (1999) p-values.

UNRESTRICTED COINTEGRATION RANK TEST (MAXIMUM EIGENVALUE)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.333635	15.83081	14.26460	0.0280
At most 1	0.044258	1.765405	3.841466	0.1840

Note: Maximum eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level. * - denotes rejection of the hypothesis at the 0.05 level. ** - MacKinnon-Haug-Michelis (1999) p-values.

Table 6 reports the results of the Trace test and the Maximum eigenvalue test. The trace statistics 17.59 and the Max-Eigen statistics 15.83 is greater than their critical value 14.49 and 14.26 respectively and, thus, reject the null hypothesis of no cointegration i.e. r= 0. The rejection of null hypothesis that there is no cointegration among the variables suggests the presence of one cointegrating equation.

6. Empirical results

6.1. VEC result

The results of the VEC model 1 and model 2 outlined in section 5.2.1 is presented is presented in Table 7.

First, the significance of the coefficient of the first quarter lag of the conventional banks' six month deposit interest rates ($CONBKX - 6M$) suggests that it had short-run impact

on the conventional banks' deposit interest rate as well as on the Islamic banks' return to the depositors. On the other hand, the insignificance of the coefficient of the first quarter and the second quarter lag of the Islamic banks' six month rate of return to depositors ($ISBKY-6M$) suggests that it had no short run impact on the conventional banks' deposit interest rate as well as on the Islamic banks' rate of return to the depositors.

TABLE 7. RESULT OF VECTOR ERROR CORRECTION MODEL

ERROR CORRECTION	MODEL 2	MODEL 1
	D(CONBKX-6M)	D(ISBKY-6M)
CointEq1	-0.625225	-0.092600
	(0.18352)	(0.12655)
	[-3.40682]*	[-0.73172]
D(CONBKX-6M(-1))	0.636677	0.669333
	(0.18947)	(0.13065)
	[3.36030]*	[5.12296]*
D(D(CONBKX-6M(-2))	0.486325	0.014133
	(0.23137)	(0.15954)
	[2.10196]	[0.08858]
D(ISBKY-6M(-1))	-0.447835	0.231691
	(0.27309)	(0.18832)
	[-1.63986]	[1.23032]
D(ISBKY-6M(-2))	0.025561	-0.067453
	(0.16544)	(0.11408)
	[0.15450]	[-0.59125]
C	-0.013145	-0.003928
	(0.05140)	(0.03544)
	[-0.25574]	[-0.11082]

Note: Standard errors in ( ), t-statistics in [ ]. * - Significant at 1 percent level.

Second, the sign of the ECT (ϑ_{t-1}) is negative and consistent as per the expectation of the Error Correction Model. The coefficient of the ECT (ϑ_{t-1}) is -0.62 and indicates that the speed of adjustment was 62 percent if the conventional banks' deposit interest rate was deviated from the long-term equilibrium.

Third, the significance of the ECT (ϑ_{t-1}) establishes long-term Granger causal relation between the two series. The VAR Granger causality/block exogeneity Wald test was performed in determining the causal direction.

6.2. VAR Granger causality/block exogeneity Wald tests result

The low probability of χ^2 test statistics (Table 8) shows that the conventional banks' deposit interest rate ($CONBKX-6M$) had significant impact on the rate of return on the Islamic banks' depositors ($ISBKY-6M$). Thus, the direction of Granger causality run from the conventional banks' deposit interest rate ($CONBKX-6M$) to the rate of return of the Islamic banks' depositors ($ISBKY-6M$).

On the other hand, the high probability (0.25) of χ^2 test statistics suggests that the rate of return to the depositors of Islamic bank ($ISBKY-6M$) had no impact on the

conventional bank deposit interest rate ($CONBKX - 6M$) and did not Granger cause the conventional banks' deposit interest rate.

TABLE 8. RESULT OF VAR GRANGER CAUSALITY / BLOCK EXOGENEITY WALD TEST

Sample: 2004Q2 2016Q3 Included observations: 47			
DEPENDENT VARIABLE: D(CONBKX-6M)			
Excluded	Chi-sq	df	Prob.
D(ISBKY-6M)	2.699908	2	0.2593
All	2.699908	2	0.2593
DEPENDENT VARIABLE: D(ISBKY-6M)			
Excluded	Chi-sq	df	Prob.
D(CONBKX-6M)	30.84783	2	0.0000
All	30.84783	2	0.0000

The summery conclusion of Table 8 was that the was unidirectional Granger causality running from the conventional banks' deposit interest rate to the rate of return to the Islamic banks' depositors of Bahrain.

The finding of this paper does confirm the findings Chong & Liu's (2009) who state that the Islamic banks' rate of return simply follows the interest rate of the convention banks.

7. Conclusions

This paper examined the conventional banks' quarterly deposit interest rate and the Islamic banks' rate of return to the depositors of Bahrain in determining whether there was a causal relation between them and the causal direction during 2004-2016.

The paper applied ADF test, Phillips-Perron test, and Zivot-Andrews test for determining the stationarity of the series. The results of the test found that all series were stationary at the first difference and had structural break. The paper tested whether the two series, the deposit interest rate of the conventional bank and the rate of return to the depositors of the Islamic bank, were cointegrated by applying the Johansen cointegration test. The result of the Johansen cointegration test established cointegration between the two series which established the stage for the VEC.

The result of the VEC model found that the conventional banks' quarterly deposit interest rate had significant short-term impact on both conventional banks' deposit interest rate and the rate of return to the depositors of the Islamic banks.

The significance of the ECT (ϑ_{t-1}) establishes long-term Granger causal relation between the two series. The coefficient of the ECT (ϑ_{t-1}) is -0.62 indicates that the speed of adjustment was 62 percent if the conventional banks' deposit interest rate was deviated from the long-term equilibrium.

The VAR Granger causality/Block Exogeniety Wald test was performed in determining the causal direction. The probability of the of χ^2 test statistics demonstrated unidirectional

causality running from the conventional banks' deposit interest rate to the Islamic banks' rate of return to depositors.

The result of this paper confirmed the findings of Chong & Liu (2009) for Malaysia.

The absence of more data series prevented this paper to provide the robust conclusions.

This paper provides suggestions for the improvement of reliable result. As paper relied on just one series i.e., six month quarterly rate, the result of the paper cannot considered robust. The incorporation and the examination of more data series such as the monthly deposit interest rate and the yearly deposit interest rate of the conventional bank as well as the rate of return to the Islamic banks' depositors were essential for robust conclusions. However, the absence of such data set prevented this paper in providing such conclusions.

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