The effect of interest rates and rate of profit on islamic investment deposits: evidence from Malaysia

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Abstract

An inimitable attribute of Islamic banking, in theory, is its risk sharing paradigm. However, even after almost three decades from its inception, the vital stratagem of Islamic banking is still to replicate the products/services offered by conventional banks. This means that deposit rates should also be analogous in both the systems. The inference is that, though Islamic rates of return are based on interest free principles, but they are still interest based. The spectacular augmentation of Islamic banking may seem to be the upshot of Islamic resurgence worldwide; rather by its distinctive trait of profit and loss sharing. In order to scrutinize this conception, this study investigates whether Islamic investment deposits rely more on Islamic profit rates or on conventional interest rates offered by their counterparts. It analyzes the impact of these two rates on investment deposits in Malaysian Islamic banking system, by applying recent econometric techniques on monthly data. The paper discovers that, in defining the amount of deposits, neither Islamic profit nor interest rates play a momentous role. It may be assumed that, rather, other macro economic factors, in fact, explain the variations in Islamic investment deposits. However, the results tend to indicate that the profit rates are positively related to the amount of investment in Islamic banking system; while, a negative relation is found with the interest rates. This implies that the customers of Islamic banking system are indifferent of the Islamicity of their investments; and are driven by profit-motives. Hence, this situation exposes the Islamic banks to interest rate risk and displaced commercial risk.

Keywords: Islamic investment deposits, rate of return, interest rates

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1. Introduction:

Banks play an important role of mobilizing surplus money from an economic sector to the sector which is in deficit of money. In order to perform this duty, banks, first, obtain deposits from different avenues. This is the main function of banks; hence, deposits are considered as the life line of any bank. These deposits come from a wide spectrum of the economy including retail, consumers, business enterprises, government agencies and others. Eventually, these funds are then channeled to provide funding to those economic sectors which are in need of them through issuing cheques, pay order, demand draft, loans and financing facilities. The spread between the two activities is the profit of banks. (Omar, 2011)

To make sure the smooth streams of deposits, conventional banks offer a variety of interest based products to attract customers. However, when it comes to the Islamic banks, they can only offer Shariah compliant products, i.e. Musharakah, Mudharabah, etc., to their depositors. Additionally, the reward to the depositors cannot be interest or usury; rather it should be some returns which should be legitimate from Islamic perspective, i.e. return on investment which is the reward for the risk sharing of depositors. Since Islamic banking has been operated, in most of the countries, under the dual banking system, the rate of return on Islamic banking deposits are benchmarked with the conventional interest rates. The justification of borrowing an un-Islamic indicator for the Islamic rate of return is furnished as to remain competent with the conventional industry. However, it exposes the Islamic banking industry to interest rate risk, which is the impact of adverse movements in interest rates on a bank's financial condition. Similarly, Islamic banks could also be exposed to the so-called rate of return risk (Zainol and Kassim, 2010). As Iqbal (1999) cites that 80% of investment is being channeled through

Murabaha, which is a debt based financing. In this mode of financing the LIBOR is commonly used as the reference for mark up. So, any change in the benchmark may result in investors or fund providers changing expectations about rate of return too. This has created a dilemma for Islamic banks. This problem is inevitable because changes in the conventional interest rates definitely put pressure on the Islamic deposits rates as the differential between the two rates could lead to easy arbitrage opportunity (Zainol and Kassim, 2010).

As a result, the pegging of rate of return with the conventional interest rate has attracted severe criticism (Iqbal, 1999). Many previous studies (Chong and Liu, 2008; Haron and Ahmad, 2000; and many others) proved that criticism correct and showed that there is a strong relationship between interest rates and Islamic bank deposits either directly or through return on these deposits. Despite the existence of a vast literature on this issue, very few studies (Yosuff and Wilson, 2005; Haron and Azmi, 2005, Chong and Liu, 2008; etc.) conducted an empirical research in order to provide some quantitative evidence. Furthermore, among those very few empirical researches, most of them focused on the macro-economic factors including GDP, CPI, unemployment rate, stock exchange indices, money supply, etc.; while, fewer highlighted interest rate and rate of return (for example: Haron and Azmi, 2005; Zainal, Yosuf, and Josuff, 2009; Kasri and Kassim, 2009). Although these researches offer some robust results, but they did not focus on the relationship of interest rates, return on deposits and deposits specifically, except few. In order to acquire some vigorous findings, it is required to mainly investigate such correlation among these three variables. Such study may be able to provide some focused and clear understanding of the nature of relationship among Islamic bank deposits, rate of return on those deposits and interest rate on its conventional counterpart.

This study not only tries to quench that need by taking only those three variables under observation, but also applies the latest time series econometrics techniques, which were seldom applied in the previous researches. The application of such powerful techniques will hopefully furnish some more reliable results for consideration, which might benefit the policy makers and Islamic banks to analyze the correlation among these three factors.

The paper starts by giving an introduction of the topic, followed by the motivation and need of this study in the same section. In the second section, a thorough analysis of the previous literature is reviewed. After this part, we try to postulate some theoretical considerations before directly analyzing the data and proposing some inferences. In part four, we define the data and variables used in this empirical work. Before reporting the findings, we explain the methodology applied in this study. The part five describes our findings in detail, by going through 8 steps. The paper ends at the summary and the conclusion of the paper. All the references and appendices are attached at the end of the paper.

2. Literature Review:

There are various studies conducted on discovering the determinants of Islamic deposits in general, fewer focused mainly on rate of return on Islamic deposits and interest rates on conventional deposits. Haron and Shanmugam (1995) in their work tried to link the rates of profit to Islamic bank's deposits. However, they found a strong negative relationship between the two variables using the Pearson Correlation and First Order Autoregressive model. Instead, their findings indicated that there was a positive linear relationship between deposits of conventional and Islamic banks.

Later, Haron and Ahmad (2000) used Adaptive Expectation Model in order to examine the effect of interest rates of conventional deposit accounts and past returns on funds deposited in the Islamic deposit facilities of Malaysian banks. They found completely opposite results to the previous study. They proposed that rate of profit offered on Islamic deposits was seen to have direct proportion with them. Alternatively, rate of interest of conventional banks had negative relationship with deposits in Islamic banks. Furthermore, the study showed that an increase in the saving deposits of conventional banks would reduce the amount of deposits with the Islamic banks.

Haron and Azmi (2005) further investigated the impact of economic variables on deposit level in Islamic and conventional banking system in Malaysia. They found determinants such as rate of profit of Islamic banks, rate of interest on deposits of conventional banks, Kuala Lumpur Composite Index, Consumer Price Index, Money Supply and Gross Domestic Product (GDP) all had positive impact on deposits at Islamic banking system. They failed to apply the conventional savings behavior theories on Islamic banking customers. However, they did find that the customers were sensitive to the returns on their Islamic deposits. Their results further suggested that the interest rates were negatively related to deposits at Islamic system. As for the fixed and investment deposits, their results were ambiguous.

Another study determining the Islamic deposits in Malaysian banking system was conducted by Yusoff and Wilson (2005). They applied a structural model on annual data for the period of 1983-2001 (only 18 observations in total). Ordinary least squares (OLS) analysis in the log linear form was used to estimate the influences of various factors on the Islamic investment deposits, including other conventional and Islamic deposits. The results showed that bank deposit growth

was influenced by changes in real gross domestic product (GDP), interest rates on conventional deposits and the profit-share for savings and investments in Islamic banks.

Haron and Azmi (2006) again investigated the structural determinants of deposit level of commercial banks in Malaysia, using cointegration techniques; and reported similar results as Haron and Azmi (2005).

Haron and Azmi (2008) in a different paper used co-integration techniques. The research highlighted the relationship between amount deposited by various groups and financial factors such as returns given by both Islamic and conventional banks, as well as other macro economic variables, i.e. money supply, composite index, inflation rate, and gross domestic product. The results of this study were nothing but a reiteration of the previous findings by the same authors.

Zainal, Yusof and Jusoff (2009) also conducted the same research using GDP, CPI, and two new variables such as income per capita and unemployment rate. In this study, they also changed the dependent variable by using investment and Mudharabah accounts in Maybank only. So, their endogenous factor was firm specific. The data used were from 1996 until 2007, which were analyzed using Correlation and Multiple Regression analysis. The findings showed that UER, GDP, IPC and CPI had significant relationships with investment and Mudharabah accounts. They further proposed that unemployment rate was the most dominant factor that influenced both investment and Mudharabah accounts. However, this study did not include any industry or firm specific factor, which might have a critical influence on these accounts. Moreover, the techniques used in this analysis have their own limitations and drawbacks.

Finger and Hesse (2009) rather looked at the demand side of banks' deposits, instead of viewing from the supply side. They analyzed, at the macro level, so-called internal factors, e.g. economic

activity, prices, and the interest differential between the Lebanese pound and the U.S. dollar. They suggested that all the variables were significant in explaining deposit demand. As external factors, they applied advanced economy, economic and financial conditions and some variables as a proxy for the availability of funds from the Gulf. All the variables were found significant. At the micro level, they used bank-specific variables, such as the perceived riskiness of individual banks, their liquidity buffers, loan exposure, and interest margins; and found their significant influence on the demand for deposits.

Kasri and Kassim (2009) carried out the research on Indonesian Islamic banking industry. They employed the data of all Islamic banks in Indonesia from March 2000 to August 2007. The variables used were the real rate of return on Islamic deposit, interest rate on conventional deposit, real income and number of Islamic bank branches in determining the level of savings in the Islamic banks. Interestingly, their study showed that conventional interest rate turned out to be the most influential component in determining the level of saving in the Islamic banks. They also appreciated that the return on Islamic deposits are positively correlated with the deposits.

Another study in Indonesia was carried out by Ismal (2011). He used a different technique such as linear probability model (LPM) to identify depositors' withdrawal behavior. The results were identical to Kasri and Kassim (2009).

In a nut shell, almost all the studies found some strong relationship between macro economic factors and banks' deposits. Most of them also found that interest rates and return on deposits have greater influence on determining the amount of Islamic deposits.

3. Theoretical Considerations:

3.1. Al-Mudharabah Contract in Islamic Law:

According to Islamic law of contract, Mudharabah is an agreement between two parties, where one party (Rabb al-Mal) provides the whole capital to be invested, and the other party (Mudharib) manages the investment through entrepreneurial skills. Profits generated from the investment are distributed according to a predetermined ratio. Any pecuniary loss accruing is borne by the Rabb al-Mal only, unless it is proved that loss has been occurred due to the negligence of Mudharib. (Tahir Mansuri, 2009, p. 275-288)

3.2. Investment Deposits in Islamic Banks:

The Islamic investment deposits in an Islamic bank are equivalent to a fixed deposit or investment account with a conventional bank. The account is operated under the Islamic concept of al-Mudharabah. However, there are some dissimilarity between the conventional fixed deposits and Islamic investment deposits. Islamic investment deposits are, in fact, not a liability or debt on the bank; rather it is a participation of customers in the bank's investment activity. Here the capital collected from these accounts is then invested by the bank, with the general or specific consent of its clients, depending on the account contract, in different projects. The profit generated from the project is distributed between the bank and its customers according to a pre-agreed ratio. (Yusoff and Wilson, 2005)

Another difference between the conventional fixed deposits and Islamic investment deposits is that the fixed deposits offer a pre-determined fixed interest rate which is mentioned at the inception of the contract; while, the profits on Islamic investment deposits are "indicative profit rate"; they cannot be pre-determined initially. (Omar, 2011)

3.3. Theoretical Relationship between Interest Rates and Fixed Deposits:

In this study, we only focus on investment deposits, because of two reasons. Firstly, unlike investment deposits, demand and saving deposits are simply Wadiah accounts. The Islamic banks do offer some reward on demand deposits, but this is completely based on their own discretion. On the other hand, flexible rate of return are offered on saving deposits (Yusoff and Wilson, 2005). Secondly, investment deposits share the biggest proportion of all types of deposits in Malaysian Islamic banking; so, it seems appropriate to consider only this type of accounts.

We consider the Interest rates on conventional fixed or investment deposits, rate of return on Islamic investment deposits as our independent variables which influence the Islamic investment deposits, which we expect to be our dependent variable. For Islamic deposits these two variables have always been the featured and important consideration in explaining the saving and profit maximizing behavior of individuals.

$$\text{Islamic Investment Deposits} = f(\text{interest rate, rate of return})$$

Or

$$ID = f(IR, RR)$$

Haron and Azmi (2005) cite that according to the classical economic theory, savings are strongly and positively related to the rate of interest. If the interest rate is higher, the savings will also be higher, and the vice versa. By virtue of the utility maximization theory, it is expected that people save more money at higher interest rates, expecting more rewards; and forgo their present consumption. The same expectation can be employed in case of savings in Islamic deposits. The reward for savings, in this case, is substituted by the Islamic rate of return offered by the Islamic banks on their investment deposits. Furthermore, we also add the interest rate offered on

conventional fixed deposits in our model to investigate that whether the customers of Islamic investment deposits are invariant of Islamicity of their investments or not. In other words, is there any substitution effect of interest rates on Islamic deposits? In fact, we presume that since the Islamic returns on deposits are benchmarked with conventional interest rates, interest rates might have more influence on Islamic deposits than return on deposits. We also assume that people are free to move their deposits from Islamic system to conventional system and otherwise. Hence, we expect:

Islamic Investment Deposits = + Rate of Return – Interest Rates

Or

ID = + RR - IR

4. Data Descriptions and Variables:

The data, used in this research, is of a secondary type, which is collected from the various issues of Monthly Statistical Bulletin of Bank Negara Malaysia. All the issues are accessible through the official web site of Bank Negara Malaysia. The monthly data is from January 2001 to December 2010 (ten years), consisting of total 120 observations. The values of Islamic deposits are presented at the scale of one million Malaysian ringgits, while monthly interest rates and rate of return are in the percentage form. The logged values of all the variables are used as their level form; while the differenced form represents the first differenced values of the variables. The variables are as follows:

No. of Variables	Names of Variables	Description	Log Form of the Variables	Differenced Form of the Variables
1	ID	Investment Deposits of Islamic Banks	LID	DID
2	IR	Interest Rates on Investment Deposits of Conventional Banks	LIR	DIR
3	RR	Rate of Return on Islamic Investment Deposits	LRR	DRR

Table 1: Description of the Variables

5. Methodology:

The techniques of cointegration and error correction model are carried out within the framework of vector autoregression (VAR). In the first step of the analysis, we will examine whether all the variables have unit root/I(1) or not, which is an ideal condition for cointegration test. For a variable to be I(1), it is necessary that the variable is non-stationary in level form, and becomes stationary after taking the first difference. For checking stationarity, we will use Augmented Dickey-Fuller (ADF) test. Once the condition of I(1) is examined, the next step is to determine the appropriate order of the VAR. This second step suggests the number of lags to be used in the cointegration model.

The third step is to test for cointegration. A multivariate test for cointegration developed by Johansen (1988), and Johansen and Juselius (1990) is used in this study. Haron and Azmi (2005) cite that the Johansen-Juselius (JJ) procedure of cointegration test is based on the maximum likelihood estimation of the VAR model. The test is carried out through a VAR system such as follows:

$$Dt = \beta 1 Dt\text{-}1 + \beta 2\ Dt\text{-}2 + \ldots + \beta k\ Dt\text{-}k + \alpha + \upsilon t, \qquad t = 1, \ldots, T \qquad (1)$$

Where Dt is a (n × 1) vector of I(1) variables; βi are (n × n) matrices of parameters; α is a (n × 1) vector of constant; υt is a vector of normal log distributed error with zero mean and constant variance; and k is the maximum number of lag length processing the white noise. The trace and maximum eigenvalue statistics will be calculated to test for the presence of r cointegrating model(s).

Through this step, we will know that whether there is a long-run theoretical relationship among the variables or not. The conitegrating relationship among the variables leads to a stationary error term. The existence of an error correction term in a cointegrated model is discovered by Engle and Granger (1987). Haron and Azmi (2005) explain that the implication of an error correction term is that the dependent variable is a function of the level of disequilibrium in the cointegrating relationship which are captured by the error correction term, as well as changes in other explanatory variables.

Following the cointegration test, in fourth step, we will apply long run structural modeling (LRSM). LRSM, basically, quantifies the cointegrating relationship which will be acquired in step 3. This will give us the opportunity to compare coefficients of variables with our a priori or theoretical expectations. LRSM will further facilitate us in testing the significance of particular coefficients of variables or lack thereof.

Once done with step 4, we will focus on vector error correction model (VECM) if the variables are found to be cointegrated previously in step 3. Haron and Azmi (2005) write that a vector correction model (VECM) can be used to investigate the dynamic interactions among variables in

the system. The Granger representation states that for two cointegrated variables, an ECM can be found in the following form:

$$\Delta Yt = \beta 0 + \beta 1 \Delta Xt + \beta 2 \epsilon t\text{-}1 + \upsilon t \qquad (2)$$

Where ϵt-1 represents the error correction term which captures the adjustment toward the long-run equilibrium and β2 is the short-run adjustment coefficient. In the step 5 (VECM), we will be able to discover which variables are exogenous (leader or independent) and which are endogenous (follower or dependent). Additionally, we will acquire the information about the period required by a variable to get back to the equilibrium, if that variable is shocked.

Haron and Azmi (2005) elaborate that for each variable in the system, innovation accounting techniques can be used to ascertain how each variable respond over time to a shock in itself and in another variable. For this procedure, we will consider variance decomposition (VDC) technique, which is step 6. The VDC will allow us to determine the relative exogeneity and endogeneity of the variables. Furthermore, a graphical representation of the results of VDC can be acquired through impulse response analyses (IRF), which is our step 7. An impulse response function essentially maps out the dynamic response path of a variable to a change in one of the variable's innovations. This function shows the degree of external transmission among variables as well as the speed and length of time of the interaction between them. (Haron and Azmi, 2005)

Lastly, in our step 8, we apply persistence profile technique in order to estimate the required period for our model to get back into the equilibrium condition, if the entire cointegrating equation is shocked. Unlike IRF where the consequences of only a variable-specific shock can be observed, persistence profile analyzes the effects of system-wide shock.

6. Findings:

6.1. Unit Root Tests Results:

Results of the Augmented Dickey-Fuller unit root tests for each variable are shown in Table 2, 3 and 4, respectively, for both the level and differenced forms. Overall, the results indicate that the null hypothesis of unit root cannot be rejected for series levels at the 5% significance level. However, the first-differenced series rejects the hypothesis of a unit root which implies that each data series is integrated in the first order, i.e. I(1).

No.	Level Form	Test Statistics	Result
1	LID	-1.9651 **	Non-Stationary
2	LIR	-2.2645 **	Non-Stationary
3	LRR	-1.8652 ** (AIC)	Non-Stationary
		-2.8820 ** (SBC)	

95% critical value for the augmented Dickey-Fuller statistic = -3.4494

Table 2: Stationarity Test in the level form

No.	Differenced Form	Test Statistics	Result
1	DID	-7.3398 **	Stationary
2	DIR	-5.3942 **	Stationary
3	DRR	-9.9174 **	Stationary

95% critical value for the augmented Dickey-Fuller statistic = -2.8870

Table 3: Stationarity Test in the differenced form

No.	Variables	Result

1	Islamic Investment Deposits (ID)	I(1)
2	Interest rate on conventional investment deposits (IR)	I(1)
3	Rate of return on Islamic investment deposits (RR)	I(1)

Table 4: First order integrated variables

6.2. Order of the VAR Results:

Before testing for the cointegrating relationship among the variables, we have to determine the appropriate order of the VAR. Based on the criteria of highest value of Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) tests, it is suggested that the order of the VAR is 1. However, we find the adjusted LR test less than 10% (7%) for the order of VAR = 1, which is not significant. Thus, we choose order of the VAR = 2. At this order, AIC and SBC both give the second highest value, and the adjusted LR test is also more than 10% (10.2%), which shows that this order is significant. This information is summarized in table 5, below:

Order of the VAR	AIC Value	SBC Value	Adjusted LR TEST	P-Value
1	652.9677	636.6034	59.6658	0.070 (7.00%)
2	651.5233	622.8857	47.0955	0.102 (10.2%)

Table 5: Order of the VAR

Moreover, we also conducted the test for serial correlation in unrestricted VAR for all variables in their differenced form. We find that all series do not have serial correlation at differenced form. Summary of the results is shown in table 6

No.	Variables	Diagnostic Test' Results

1	DID	No Autocorrelation
2	DIR	No Autocorrelation
3	DRR	No Autocorrelation

Table 6: Diagnostic Test Results

6.3. Cointegration Test Results

Table 7 presents the results of the Johansen maximum likelihood cointegration test. Based on the results from the maximal Eigenvalue, AIC and HQC, it is suggested that there is 1 cointegrating vector. On the contrary, Trace statistics test and SBC show that there is no cointegration. Johansen (1991) argues that trace test considers all N-r of the smallest eigenvalues, thus, tends to be more robust than the maximum eigenvalue test. Therefore, in case of conflict, trace test should be preferred; however, we strongly believe that based on the nature of the variables, theory and previous empirical studies, there must be at least 1 cointegrating vector. Hence, we prefer the results obtained through Eigenvalue, AIC and HQC tests.

Criteria	Test Statistics	95% Critical Value	Number of Cointegrating Vector
Maximal Eigenvalue	4.1207 **	19.2200	1
Trace	35.1745	42.3400	0
AIC	695.5210 **	Highest Value	1
SBC	671.3604	Highest Value	0
HQC	685.3962 **	Highest Value	1

Table 7: Number of the cointegrating vector(s)

We opine that a long run relationship among our 3 variables is found. This implies that all the series in the deposit function move together in the long-run.

Statistically, the above results indicate that the variables we have chosen, in some combination, result in a stationary error term. The economic interpretation, in our view, is that all the variables are theoretically related, in the sense that they tend to move together in the long term. In other words, these 3 variables are cointegrated, that is, their relation to one another is not merely spurious or by chance.

6.4. Long Run Structural Modeling (LRSM):

Having verified the existence of a long run relationship in all the variables, we investigate now that whether each variable entered statistically significant in the cointegrating vector by way of imposing restrictions and likelihood ratio tests which are finitely distributed as a chi-squared distribution with one degree of freedom. The cointegrating vector is normalized on the dependent variable (LID) in the exact identification. In table 8, the LR test statistics, which are computed manually, are used to test the null hypothesis that each coefficient is statistically zero. (See detailed results in Appendix 4)

No	Variable	Test Statistics	Result
1	LID	1.0000	None
2	LIR	1.5909	Statistically Zero
3	LRR	-1.5384	Statistically Zero
4	Trend	-1.2057	Statistically Zero

95% Critical value for the test is = 1.980

Table 8: ML estimates of Exact identifying restrictions

Since the trend is found to be insignificant in exact identification, in maximum likelihood test subject to over identifying restrictions, we switch off the trend (trend = 0). The results in table 9 show that LIR and LRR both become significant. Furthermore, likelihood ratio of restriction display that p-value is greater than 5% (47.5%), which implies that our restriction is correct. (Complete results can be seen in Appendix 4)

No	Variable	Test Statistics	Result
1	LID	1.0000	None
2	LIR	3.3860	Statistically Not Zero
3	LRR	-2.3740	Statistically Not Zero
4	Trend	-0.0000	None

95% Critical value for the test is = 1.980

Table 9: ML estimates of Exact identifying restrictions

From the above analysis, we arrive at the following cointegrating vector (numbers in parentheses are standard deviations):

Vector	1.0000 (LID)	+ 8.8951 (LIR)	- 11.6920 (LRR)	→ I(0)
Standard Errors	(NONE)	(2.6270)	(4.9250)	

Nonetheless, these results are incomplete unless we know which variable is the leader and which one is the follower. Unfortunately, LRSM only suggests that these variables are cointegraed, so we still do not know the exogenous and endogenous variables. Thus, we move on to Vector Error Correction Model (VECM), in order to find out the Granger causality.

6.5. Vector Error Correction Model (VECM):

Since the deposits structure of Islamic banks and other variables exhibit cointegrating (long-run) relationships, VECMs are estimated to know the direction of causality, and to model short-run dynamics of each system. The size of the ECT measures the extent to which each dependent variable has the tendency to return to its long-run equilibrium (Haron and Azmi, 2005). The significance of the ECT informs about the dependency of the variable. A summary of the results of VECM is given in table 10, below; while, the complete output can be seen in Appendix 5.

No.	Variables	Coefficient of ECM(-1)	ECM(-1) P-Value	Result
1	LID	-0.0031588	0.494 (49.4%)	Exogenous
2	LIR	-0.0071935	0.021 (2.10%)	Endogenous
3	LRR	0.036456	0.000 (0.00%)	Endogenous

5% Critical value is taken to compare p-values

Table 10: Exogenous and Endogenous Variables

It may be said on the basis of these results that, interestingly, the Islamic investments are supply driven, rather than demand driven. These results are completely opposite to our expectations and to the previous studies, as we assumed that LID would be endogenous; while LIR and LRR would be exogenous. On the basis of these results, we probably assume that rate of return may be set on the basis of supply of investments; but it is difficult to say that interest rates of conventional investment accounts are also influenced by the Islamic deposits. In our opinion, these results strongly support the idea that the customers of Islamic banking system are not driven by profit-motive. The Islamic investment accounts do not bear impact from either interest

rates or from rate of return; rather it transmits the external shocks to these factors. Furthermore, these results, basically, suggest that the investment accounts of Islamic banks may be affected by macro-economic factors, i.e. GDP, CPI (Haron and Azmi, 2005; Yusoff and Wilson, 2005), unemployment rate (Zainal, Yosuf, and Josuff, 2009), etc.; but not by these two rates.

The coefficients of ECT inform about the tendency to adjust to any deviations from the equilibrium in the long-run. If LID is shocked then only 0.32% changes towards the long-run equilibrium take place every month or 3.84% every year. Similarly, LIR will adjust by only 0.72% every month or 8.64% every year, if it is shocked. As for the LRR, 3.6% adjustments occur on monthly or 43.2% yearly basis to return to the long-run equilibrium, if it is deviated from its equilibrium. This indicates that the speed of adjustment among the variables is very slow, except return on deposits (LRR).

The estimated coefficients of the lagged first different variables capture short run effects (Engle and Granger, 1987). In table 11, below, p-values of the independent variables (in columns) are given for every dependent variable (in rows). (Complete output is available in Appendix 5)

No.	Variables	DLID	DLIR	DLRR
1	DLID	0.040 (4.0%)	0.973 (97.3%)	0.212 (21.2%)
2	DLIR	0.825 (82.5%)	0.00 (0.00%)	0.686 (68.6%)
3	DLRR	0.679 (67.9%)	0.121 (12.1%)	0.003 (0.3%)

Vertical: Dependent variables, Horizontal: Independent variables

Table 11: P-values for short term adjustments

All the p-values of the explanatory variables are greater than 5%, except for the case where same variable is dependent. The results from the above table 11 reveal that in the short run, all of the determinants do not affect each other at all; instead they only have a self-impact on themselves. Since, all the variables are insignificant in impacting each other in the short run, their coefficients are meaningless and do not have any economic interpretation.

The cointegrating equation can be given as: (full output can be seen in Appendix 5)

$$\mathbf{ecm1 = 1.0000*LID + 8.8951*LIR - 11.6920*LRR - 0.0000*Trend}$$

Or

$$\mathbf{LID = 11.692(LRR) - 8.8951(LIR) + ecm1}$$

The signs of the equation are as expected. A theoretical explanation of these results is that the customers of Islamic banking system might be guided by conventional theories of profit maximization; and thus, any changes in the rates of interest of conventional banks may have a negative impact; while, rates of profit of Islamic banks may positively affect the Islamic investment deposits. These results are better than the findings of Haron and Azmi (2005), as they found some ambiguous output for Islamic investment deposits. The output also conforms to other previous studies, e.g. Kasri and Kassim (2009), Haron and Ahmad (2000), Haron and Azmi (2006; 2008), Ismal (2011), etc. Furthermore, the findings suggest that the clients of Islamic system are indifferent of Islamicity of their investments. Hence, an increase in interest rate may induce the Islamic banks to increase their deposits return in order to maintain the amount of funds and to prevent the depositors from switching their deposits to the conventional banks (Zainol and Kassim, 2010). However, it may not be overlooked that the Islamic investment

deposits as an exogenous variable are driven by other factors, and not by interest rates and profit rates.

No.	Each Dependent Variable System	Serial Correlation	Functional Form	Normality	Heteroskedasticity
1	DLID	No (0.171)	Correct (0.959)	No (0.024)	No (0.554)
2	DLIR	No (0.987)	Incorrect (0.000)	No (0.000)	Yes (0.000)
3	DLRR	No (0.658)	Incorrect (0.000)	No (0.000)	No (0.201)

Table 12: Diagnostic Tests for each system of dependent variable

From the above diagnostic tests (table 12; p-values are given in parentheses; whole diagnostic test is provided in Appendix 5), it is clear that all three systems of equations with different dependent variables have no serial correlation problem; however, all of them are non-normal. Only the model of dependent variable DLIR suffers from the problem of heteroskedasticity. Lastly, only the equation with DLID as a dependent variable has the correct functional form; while, others are showing incorrect functional form. This also supports our results.

6.6. Vector Decomposition Correction (VDC):

Although, through VECM we are able to identify leader and laggard variable, but we cannot suggest which variable is relatively more exogenous and which is less exogenous. Or in other words, we know that LID is the exogenous factor, but we are keen to find the relative endogeneity

of other two variables. That is why, now we focus on Vector Decomposition Correction (VDC). VDC decomposes variances of the forecasted error of each variable into proportions attributable to shocks from each variable in the system, including its own. The most exogenous variable is thus the variable whose variation is explained mostly by its own past variations.

From the orthogonalized forecast error variance decomposition method, at three different time horizons, i.e. 1 year, 2 years, and 3 years, we obtain the following results: (full output is provided in Appendix 6)

	LID	LIR	LRR	Rank of Exogeneity
LID	98.73%	0.45%	0.82%	LID
LIR	3.63%	84.59%	11.78%	LIR
LRR	2.43%	49.24%	48.32%	LIR

Horizon: 1 Year

Table 13: Orthogonalized VDC

	LID	LIR	LRR	Rank of Exogeneity
LID	98.51%	0.56%	0.93%	LID
LIR	4.35%	81.38%	14.27%	LIR
LRR	1.74%	62.72%	35.54%	LRR

Horizon: 2 Years

Table 14: Orthogonalized VDC

	LID	LIR	LRR	Rank of Exogeneity
LID	98.43%	0.60%	0.97%	LID

LIR	4.60%	80.25%	15.15%	LIR
LRR	1.47%	67.99%	30.55%	LRR

Horizon: 3 Years

Table 15: Orthogonalized VDC

From the above 3 tables, it may be observed that LID is most exogenous variable as 98.73% - 98.43% variations come from itself. On the other hand, LIR and LRR are endogenous variables, but between these two, LRR is more endogenous; because, 51.68% to 69.45% variations come from other variables throughout the 3 years time horizon, if it is shocked. Similarly, if LIR is shocked then 15.41% to 19.75% changes come from other variables, which are less than the changes in LRR. However, there are some limitations in orthogonalized VDC method. Firstly, the results are biased towards the order of the VAR. It means that Orthogonalized method particularly shows the first variable which is put in the order of the VAR, as the most exogenous variable. Thus, its results are not unique. Secondly, Orthogonalized VDC assumes that when a specific variable is shocked, all other variables are held constant. In other words, it analyzes the partial impact of the shock of one particular variable; while, all other variables are switched off. For these reasons, we also test these variables through Generalized VDC method; which is neither biased nor keeps other variables constant, when a particular variable is shocked. The results of Generalized VDC method are given below, in tables 16, 17 and 18 for the horizon 1, 2 and 3 years, respectively. (Complete results are given in Appendix 6)

	LID	LIR	LRR	Rank of Exogeneity
LID	97.85%	1.49%	0.66%	LID

LIR	3.72%	88.36%	7.91%	LIR
LRR	2.50%	51.08%	46.42%	LRR

Horizon: 1 Year

Table 16: Generalized VDC method

	LID	LIR	LRR	Rank of Exogeneity
LID	97.79%	1.74%	0.48%	LID
LIR	4.47%	85.58%	9.95%	LIR
LRR	1.82%	66.19%	31.99%	LRR

Horizon: 2 Years

Table 17: Generalized VDC method

	LID	LIR	LRR	Rank of Exogeneity
LID	97.77%	1.82%	0.42%	LID
LIR	4.74%	84.60%	10.67%	LIR
LRR	1.54%	72.24%	26.22%	LRR

Horizon: 3 Years

Table 18: Generalized VDC method

In spite of the fact that Generalized VDC is more reliable, it did not change the rank of exogeneity of the variables throughout the period. Although, there are some minor differences in percentages, but the overall results are same as Orthogonalized VDC. Another interesting fact is that 51.08%, 66.19% and 72.24% variations of LRR depend on LIR in year 1, 2 and 3, respectively

(see table 16, 17 and 18). This confirms the findings of Chong and Liu (2008), Bacha (2004), Haron and Shanmugam (1995), Haron and Ahmad (2000), Kasri and Kassim 2009, etc.

Moreover, the results are of great significance for policy makers and also consist of immense importance for Islamic banks. The implications of these results are that in order to control the rate of return, the amount of deposits play a crucial role including interest rates; so, they should be targeted for controlling return on deposits. Regardless of the fact that interest rates are proved to be endogenous, it is difficult to suggest that Islamic investment deposits can control them. Furthermore, changes in rate of return and interest rates have a very minor impact on Islamic investment accounts, which means that whenever policy makers and banks try to control the investment accounts, they might look on other factors, instead of rate of return and interest rates.

The results of VDC can be presented graphically through Impulse Response Function (IRF), which is provided in the next section.

6.7. Impulse Response Function (IRF):

Impulse Response Function (IRF), basically, maps out the dynamic response path of a variable owing to a one-period standard deviation shock to other variables. It presents the orthogonzalied and generalized responses of dependent variables to shocks on their independent variables. The problems with Orthogonalized IRF are same as Orthogonalized VDC; thus we do not discuss the results of Orthogonalized IRF. Nonetheless, the results of orthogonalized IRF are given in Appendix 7 for interested readers. Here, only Generalized IRF's results are given and commented on.

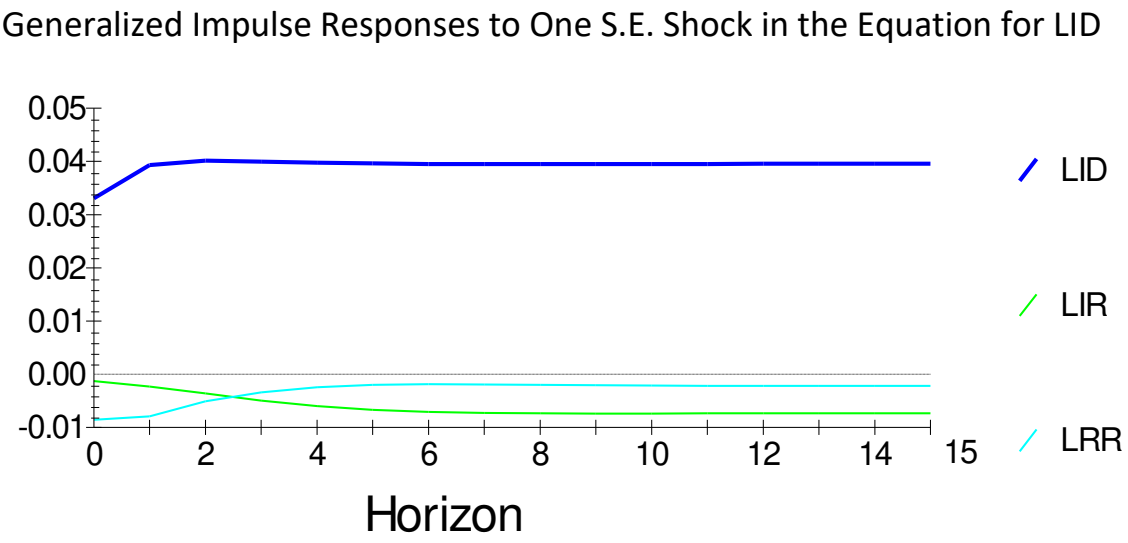

Figure 1: Generalized IRF for LID

It can be seen in Figure 1 that LIR and LRR respond to a shock in LID. However, the overall responses still remain negative, below zero, when shocks are introduced in LID; but LRR shows a positive trend. It may be noteworthy that instead of rate of return, interest rates are more responsive to the shocks in LID. This may be in support of the intuition that the customers of Islamic banking system get the signals of rate of return from the predetermined conventional interest rates. As the profit is not initially fixed in Islamic deposits, the clients of Islamic system rely on pre-determined interest rate on conventional deposits (Zainol and Kassim, 2010). They expect that Islamic banks, in order to remain competent, will distribute the profits at almost the same rate or higher. So, that is why interest rate is seemed to be more responsive. Furthermore,

figure 1 also suggests that if LID is shocked then it will take almost 11 months for LIR and LRR to get back to the long run equilibrium.

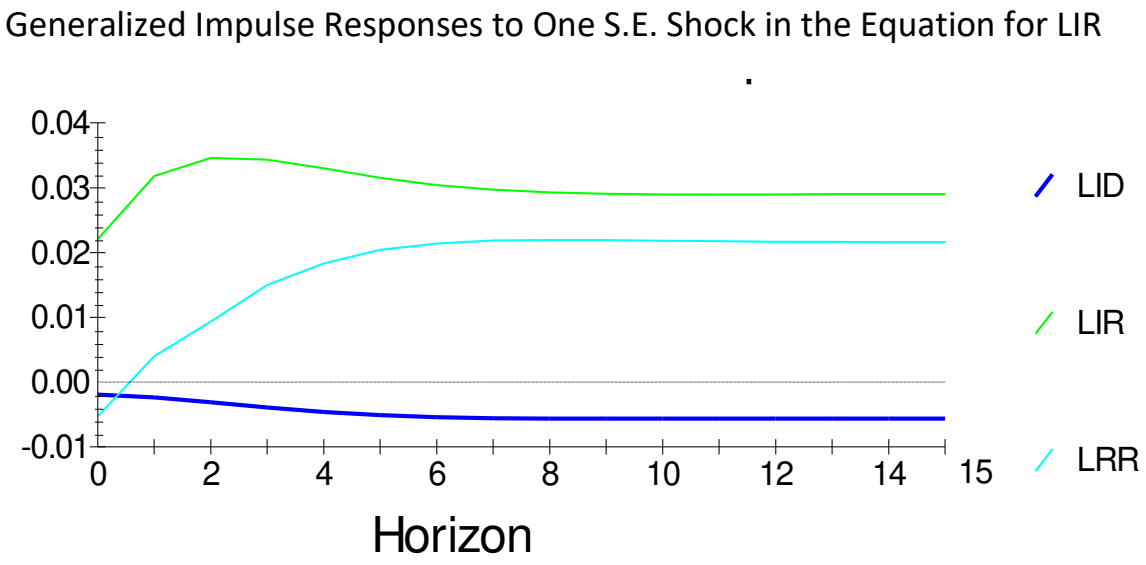

Figure 2: Generalized IRF for LIR

In figure 2, when a shock is introduced in LIR, LID responds negatively, as expected, and the response is also very small; while, LRR moves in the same direction with a greater response. LID's response tends to start to dampen after 6 months before completely dying out in 8 months. On the contrary, the response of return on Islamic investment deposits to a 1% shock of the standard deviation of interest rates on conventional investment accounts is larger, but dampens out quickly in month 7. This is in favor of the argument that Islamic banks define return on deposits based on interest rates offered by conventional banks' accounts. The economic implication of this behavior is crucial for Islamic system. This is important because, as compared to other types

of risks born by Islamic financial industry, rate of return risk is the most critical risk. This is due to the fact that in most cases, Islamic banks possess assets generating fixed rates that are insensitive to the changes in interest rate; while their liabilities are sensitive to changes in conventional interest rates. Moreover, the rate of return risk also emerges from uncertainty in the returns earned by Islamic banks on their assets (Rosly, 1999; Bacha, 2004, Zainol and Kassim, 2010). These results call for a serious consideration into this matter.

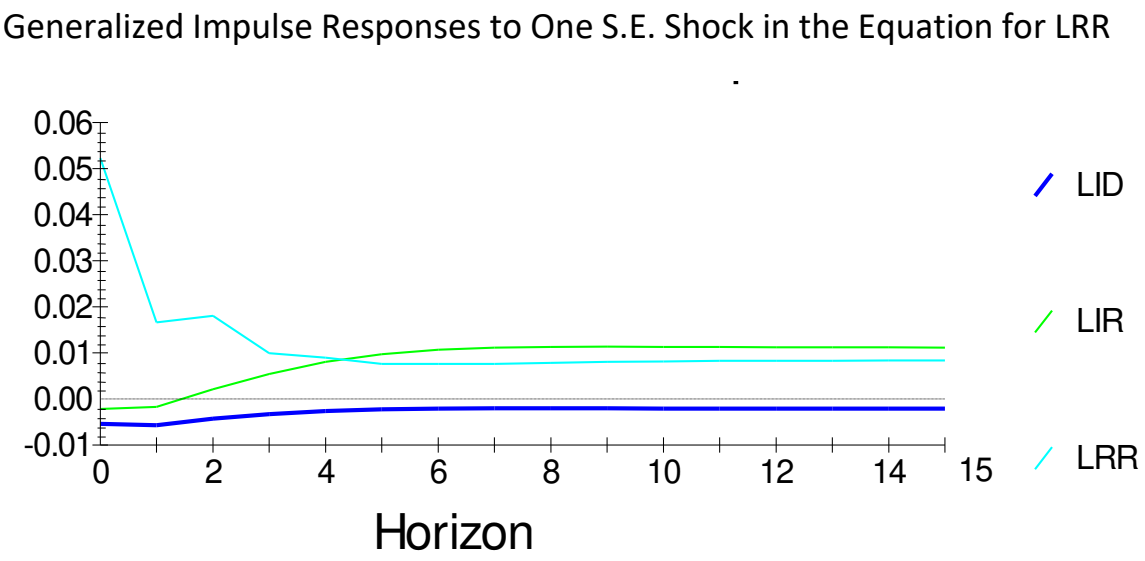

Figure 3: Generalized IRF for LRR

Figure 3 shows the response of LID and LIR to a 1% standard error shock in LRR. The responses of LID and LIR are somewhat slow, as the impact is seen after 1 month. Both LID and LIR responds negatively to LRR; and also display a small magnitude of impact. It, basically, shows that this is the most endogenous variable in the system. The impact of the shock in LRR on LID and LIR dies out completely in month 7. Moreover, the figure 3 also tells us that LIR is more related to LRR as compared to LID. In fact, the influence of LRR on LIR is not as negligible as it should be. It may

point out that as the Islamic finance industry grows overtime, it will quickly start counter responding to the conventional industry. In that scenario, LRR will not be empirically pegged with LIR; rather it will start influencing LIR itself.

6.8. Persistence Profile (PP):

Persistence profile shows that how long it will take to get back to the long run equilibrium, if the entire cointegrating equation is shocked. In oppose to IRF, where the shock is variable-specific, here the shock is system-wide.

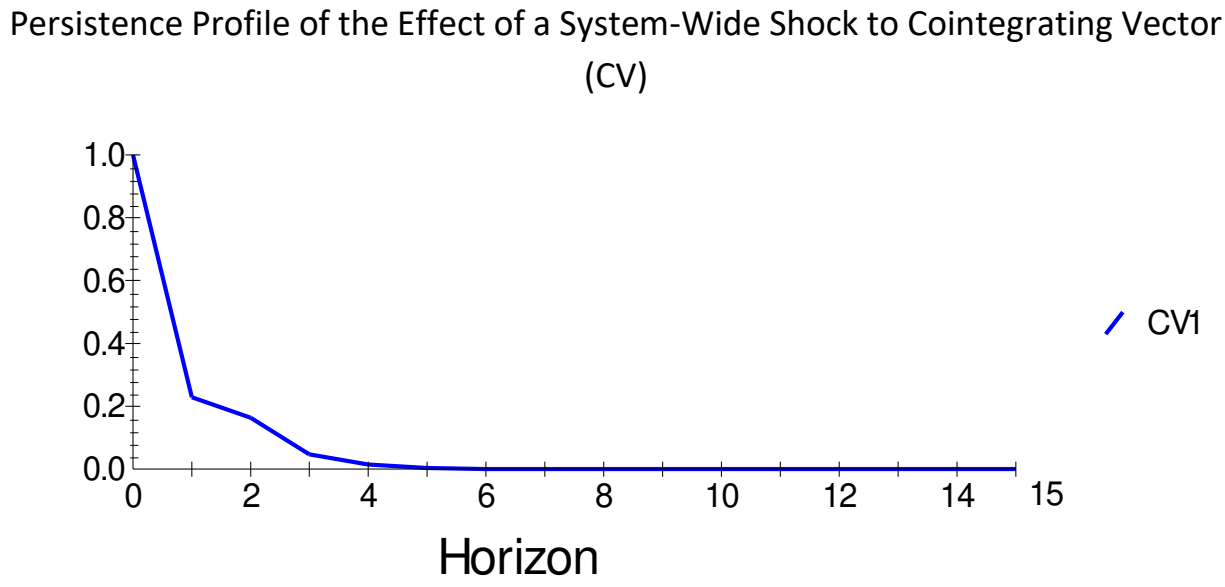

Figure 4: Persistence Profile (PP) for the whole equation

Figure 4 (above) shows that if there are system-wide deviations or fluctuations from the equilibrium, it will take 6 months for the whole system to return to its long run equilibrium. This period is important for the policy makers as well as for the bankers to facilitate themselves in taking any decision, whenever any problem disturbs the equilibrium of the whole system.

7. Conclusion:

This study finds a long run theoretical relationship among Islamic investment deposits, profit offered on these deposits and interest rate on conventional investment deposits. The customers of Islamic system are sensitive to the rewards received on their deposits. Due to the existence of a dual banking system in most of the Islamic countries, as a consequence Islamic banks are operating on, though interest free but, interest based system. As a result, the economic environment in such system may expose them to the problem of rate of return risk (Zainol and Kassim, 2010).

It may also be cited that any increase in rates of interest negatively affects investment deposits at Islamic system, and vice-versa. While, if the return on these deposits increases then the amount of deposits also rises. Taking on to the explanation of Haron and Azmi (2005), and Zainol and Kassim (2010) which says that return on investment accounts at Islamic system are known at the end of the deposit period, not at the beginning. In contrast, the interest rate of conventional investment accounts is pre-determined and fixed. Thus, the customers of Islamic system, based on the signal of interest rates, expect more rewards on their investment accounts; this argument is supported by the assumption of the customers that Islamic banks, in order to remain in the market and to compete with conventional banks, will offer greater profit return. Hence, the clients of Islamic system rely more on conventional interest rate instead of profit on their investment accounts.

However, this paper also finds that Islamic investment deposits are, in fact, not determined by either the interest rates or investment profits; as the deposits have appeared to be exogenous, while other two variables are turned out to be endogenous. It might be for the reason that the

actions of customers in Islamic system are not derived by profit-motive; rather they are influenced by the teachings of Islam (Haron and Azmi, 2005). Because, according to these teachings, taking debt for spending is not appreciated; this encourages the followers to save, irrespective of economic situations. Or it may imply that the investment accounts in Islamic system may be influenced by the macro-economic factors, as found in previous empirical researches.

Lastly, if the results of this study is taken into account by the policy makers, then it may be noted that the Islamic investment deposits may be controlled by GDP, CPI, unemployment rate, money supply, composite index, etc. However, profits on these deposits follow the amount of deposits, instead of influencing them. Moreover, conventional interest rate also may not be looked at for manipulating the amount of deposits in Islamic investment accounts.

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