Does interest rate impact the shariah index? Malaysian evidence based on ARDL approach

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Abstract

Interest rates play a leading role in earning profits not just for banks only but for insurance companies and the stock market. The major problem with the interest rate from the Islamic point of view is that it is a profit generated without any hard work to earn it. This is why it is prohibited in the Shariah. This paper examines whether interest rate has an impact on the Shariah index. It employs the autoregressive distributed lag (ARDL) approach which has taken care of a major limitation of the conventional cointegrating tests, in that they suffer from the pretest biases. Although there have been studies that have studied the effects of macroeconomic variables such as interest rates on the conventional stock market, to the best of our knowledge, there has not been much empirical research carried out on the effects of interest rates on the Shariah index. Our results tend to indicate that interest rate does not impact the Shariah index but rather, it is the Shariah index that affects it. In terms of policy implications, therefore, an investor wishing to pool his funds in the Shariah index will be happy to know that interest rate has no effect on the index and he can invest his money into a Shariah compliant vehicle.

Keywords: Shariah index, interest rates, ARDL, VECM, VDC, Malaysia

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1 Introduction

The Islamic financial system is not a new term or subject as it has been around during the time of Prophet Muhammad ﷺ. Trade was a very common phenomena in early Arabia as the caravans would journey from North to South in search of merchandise and profits. Allah (S.W.T) says in the Qur'an, 'Those who consume interest cannot stand on the Day of Resurrection except as one stands who is being beaten by Satan into insanity. That is because they say, Trade is just like interest. But Allah has permitted trade and has forbidden interest. So whoever has received an admonition from his Lord and desists may have what is past, and his affair rests with Allah. But whoever returns to dealing in interest or usury those are the companions of the Fire; they will abide eternally therein' (Qur'an 2:275). The only thing that could be said to be new in the Islamic financial system is the modern application of it such as the contracts used and applied. None the less, some countries operate a dual financial system that is both Islamic and conventional systems. Due to this, because the conventional system heavily relies on interest rates, this could indirectly affect the Islamic financial system knowingly or unknowingly. Theories have been developed such as the Fama French three factor theory to see the impact of interest rates on stock market (Fama & French, 2014). Additionally, practical studies have highlighted the effects of interest rates on stock markets, financial institutions, and insurance companies (Kim and Nguyen, 2009; Kasman et al. (2011) and Papadamou and Siriopoulos (2014). In spite of the studies that have been carried out regarding the impact of interest rates on conventional financial system, not much work has been done on how interest rates impact the Islamic financial industry from Islamic banking, Islamic stock markets and Takaful (Islamic insurance) industries. Lack of empirical studies prevent the Islamic financial industry from formulating effective counter-measures to counteract conventional interest rates. The key objective of this study is to determine whether interest rates impact the Shariah Index. Using time series techniques to obtain evidence from Malaysia, this paper finds no impact of interest rates on the Shariah index. This paper is structured as follows: Section 2 provides a literature review, Section 3 describes data and methodology, empirical results and discussion are deliberated in Section 4 and finally we conclude with Section 5 which includes proposed policy implications based on the empirical results.

2 Literature Review

Generally speaking, Islamic finance literature is rare and usually is hypothetical as opposed to practical studies. Therefore, the likelihood of discovering numerous studies looking at the Shariah Indices is rare. Nonetheless, few research have examined conventional indices and its association with macroeconomics variables such as interest rates (Bilson, Brailsford, & Hooper, 1999; Abeyratna, Pisedtasalasai, & Power, 2004; Vuyyuri, 2005; Singh, Mehta, & Vasha, 2011; Hosseini, Ahmad, & Yew, 2011; Ahmed & Mustafa, 2012).

Interest Rates though might appear harmless in the conventional financial system, was one of the causes of the global financial crisis. Investopedia.com defines it as the amount charged, expressed as a percentage of principal, by a lender to a borrower for the use of assets. Interest rates are typically noted on an annual basis, known as the annual percentage rate (APR) According to conventional economic reasoning, interest rate has negative impact on stock market index. When the interest rate is high, investors will shift their money from higher risk instrument which is the stock market to savings or fixed deposit accounts (Foo Zor Thang, 2009).

Islam is a religion established on the basic principle which is to believe in Allah (S.W.T.) and not associate any partners with Him. The basic structure that the Islamic financial system is based on, can be traced back to time of Prophet Muhammad (S.A.W.) The rule or law that governs the Islamic financial system is Shariah. In the Qur'an, precisely in surah Al Baqarah verse 275 'Those who consume interest cannot stand on the Day of Resurrection except as one stands who is being beaten by Satan into insanity. That is because they say, Trade is just like interest. But Allah has permitted trade and has forbidden interest. So whoever has received an admonition from his Lord and desists may have what is past, and his affair rests with Allah. But whoever returns to dealing in interest or usury those are the companions of the Fire; they will abide eternally therein'. As seen from the verse above, Interest or Riba is forbidden in Islam because it creates unfairness in the society.

As in the case of the conventional stock market, a stock index in the Islamic stock market has the same basic function of providing a benchmark or performance measure for a group of companies' stock in a specific market. The Islamic stock market index is relatively a new phenomenon in the global capital market prompted by the rapid demand for Islamic investment

products. In the post-2000 period, almost all major global index companies started to establish their own bench mark indices for the Islamic equity funds (Kassim, 2010)

Despite the fact that Interest is prohibited in Islam, it still affects the Islamic financial industry indirectly as it operates in a dual banking system together with the conventional financial system.

The Fama-French three-variable model serves as hypothesis which joins the effect of interest rates on stock returns. The three elements incorporate the market return over the risk free loan fee, the profits on diversified portfolios of little over enormous capitalization stocks and the returns on diversified portfolios of high over low book-to-market stocks (Fama and French, 2004). Kim and Nguyen (2009) showed in their results, show that all most all of the stock markets based in Asia, experienced negative returns and increased volatility due to rises in interest rates by the United States Federal Reserve and the European Central Bank.

3 Data and Methodology

In this paper, time series techniques were used to determine the impact of interest rates on the Shariah Index, EMAS. This methodology is favored over traditional regression analysis for a few reasons.

Firstly, most economic time series variables tend to be non-stationary in their original 'level' form, thus implying that any conventional statistical tests carried out on such variables would be invalidated. To explain further, if the variables are non-stationary but cointegrated, then the ordinary regression without the error-correction term(s) derived from the cointegrating equation would be mis-specified. However, if the variables are non-stationary and not cointegrated, then an ordinary regression with 'differenced' variables (which will be stationary) could be estimated. However, the conclusions drawn from such an analysis will be valid only for the short run, and no conclusions can be made about the long-run theoretical relationship among the variables. This is due to the fact that the 'differenced' time-series variables have no information about the long-run relationship between the trend components of the original series as these have, by definition, been removed. The long run co-movement between the variables cannot be captured by 'differenced' variables (Masih *et al*, 2009).

Secondly, in traditional regression analysis, the endogenous and exogenous nature of variables is pre-determined by the researcher, usually on the basis of prevailing or a priori theories.

Cointegration techniques are advantageous in this sense, as it does not make any assumptions regarding the endogeneity and exogeneity of variables. Rather, in the final analysis, the data itself will be allowed to determine which variables are in fact exogenous, and which are exogenous. In other words, in traditional regression analysis, causality is assumed, whereas in cointegration techniques, it is empirically proven by data. This is achieved through the 'Long-run Structural Modelling' or 'LRSM' technique which endeavors to estimate theoretically meaningful long-run (or cointegrating) relations by imposing on those long-run relations (and then testing) both identifying and over-identifying restrictions, based on theories and a priori information of the economies (Masih et al, 2009).

Thirdly, cointegration techniques embrace the dynamic interaction between variables whereas traditional regression methods, by definition, exclude or discriminate against interaction between variables

The functional form of the model is as

SI = f (IR, IP, ER, RS)

Where,

SI = Shariah Index

IR = Interest Rate

IP = Industrial Production Index

ER = Exchange Rate

RS = Reserve Supply

This study utilizes auto regressive distributive lag (ARDL) approach from Pesaran and Pesaran (1997) and Pesaran et al. (2011). The reason for the use of this technique is because the variables tested, are a mixture of Non Stationary and Stationary variables. ARDL can take care of variables that are I (0), I (1) or mixed.

The ARDL model can be displayed as:

$$DSI_t = a_0 + \sum_{i=1}^{k} b_1 DSI_{t-i} + \sum_{i=0}^{k} b_2\, DIR_{t-i} + \sum_{i=0}^{k} b_3 DIP_{t-i} + \sum_{i-0}^{k} b_4 DER_{t-i} \sum_{i=0}^{k} b_5 DRS_{t-i} + b_6 LSI_{t-1} + b_7 LIR_{t-1} + b_8 LIP_{t-1} + b_9 LER_{t-1+} b_{10} LRS_{t-1}$$

Where k = order of lags and b = coefficient of variable

$$LSI_t = a_0 + \sum_{i=1}^{k} b_1 LSI_{t-1} + \sum_{i=0}^{k} b_2 LIR_{t-1} + \sum_{i=0}^{k} b_3 LIP_{t-1} \sum_{i=0}^{k} b_4 LER_{t-1} + \sum_{i=0}^{k} b_5 LRS_{t-1} + \mu_t$$

$$DSI_t = a_0 + \sum_{i-1}^{k} b_1 DSI_{t-i} + \sum_{i=0}^{k} b_2 DIR_{t-i} + \sum_{i=0}^{k} b_3 DIP_{t-i} + \sum_{i=0}^{k} b_4 DER_{t-i} + \sum_{i=0}^{k} b_5 DRS_{t-i} + b_6 ECT_{t-1}$$

Monthly data is used covering a five year period starting January 2011. Hence there are fifty six (56) observations in total. Data used here is sourced from DataStream.

4 Empirical Results and Discussions

4.1 Unit Root Tests

We begin our empirical analysis by testing whether the variables employed in the study are Stationary or not. A Stationary variable is one who's mean, variance, and covariance are constant. It is imperative that the variables be non-stationary in level form and stationary in their first differenced form before the cointegration step. The differenced form for each variable used is created by taking the difference of their log forms. For example, DSI = LSI-LSI (-1). To check

the unit root of the variables, we performed the Augmented Dicky Fuller (ADF) tests (1989) and Philip-Perron (PP) Test (Table 1). The difference between the ADF and PP tests is that ADF corrects the autocorrelation problem while PP, corrects both the autocorrelation and heteroscedasticity problems by using the Newey- West adjusted-variance method. It was found that some variables were I (0) and I (1), this is to say, some variables were Non Stationary and Stationary. Therefore, ARDL approach to cointegration was applied.

TABLE: 1 Augmented Dicky Fuller (ADF) Test.

Variable	Test Statistics	Critical Value	Implication
	Variables in Level Form		
LSI	-0.57366	-3.5005	Variable is Non Stationary
LIR	-4.0684	-3.5005	Variable is Stationary
LIP	-5.4516	-3.5005	Variable is Stationary
LER	-0.23807 (AIC) -1.4758 (SBC)	-3.5005	Variable is Non Stationary
LRS	-7.587 (AIC) -6.9513 (SBC)	-3.5005	Variable is Stationary
	Variables in Differenced Form		
DSI	-4.5622	-2.9215	Variable is Stationary
DIR	-4.312	-2.9215	Variable is Stationary
DIP	-6.5629	-2.9215	Variable is Stationary
DER	-4.4393	-2.9215	Variable is Stationary
DRS	-7.5129	-2.9215	Variable is Stationary

TABLE 2: Philip-Perron (PP) Test

Variable	Test Statistics	Critical Value	Implication
	Variables in Level Form		
LSI	-0.89324	-3.4919	Variable is Non Stationary
LIR	-3.0794	-3.4919	Variable is Non Stationary
LIP	-10.3184	-3.4919	Variable is Stationary
LER	-1.1529	-3.4919	Variable is Non Stationary

LRS	-2.1944	-3.4919	Variable is Non Stationary
	Variables in Differenced Form		
DSI	-7.2399	-2.9157	Variable is Stationary
DIR	-12.7442	-2.9157	Variable is Stationary
DIP	-30.2373	-2.9157	Variable is Stationary
DER	-5.0072	-2.9157	Variable is Stationary
DRS	-7.1179	-2.9157	Variable is Stationary

4.2 Determination of the Order of the VAR Model

Before proceeding on to cointegration, the vector autoregression (VAR) order will be determined. It is not necessary to determine the VAR as the ARDL model determines the VAR order for each of the variables. According to Table 3 below, AIC recommends eight (8) lags whereas SBC zero (0). The difference in results for AIC and SBC is because AIC focuses on predicting the best order of lags whereas SBC tends to choose lower order of lags. The adjusted likelihood ratio test recommends one (1) lag. The adjusted LR test of one lag is thereby selected as employing 8 lags might reduce the degree of freedom.

Table 3: VAR order Selection

	Choice Criteria		
	AIC	SBC	Adjusted LR Test
Optimal Order	8	0	1

4.3 Testing Long Run Relationship between the Variables

- F (LSI | LIR, LIP, LER, LRS) = .85709
- F (LER | LSI, LIR, LIP, LER) = 3.5245
- F (LIP | LSI, LIR, LER, LRS) = 2.9035
- F (LIR | LSI, LIP, LER, LRS) = 1.4953
- F (LRS | LSI, LIR, LIP, LER) = 6.4936

Table 4: F-Statistics for Testing the Existence of Long-Run Relationship

Computed F Statistics - LRS	6.4936
Critical Values at 5% percent level	Lower bound; Upper bound 3.189; 4.329

The Pesaran et al. (2001) F table with intercept and trend is referred to for critical values. The null hypothesis of no long run relationship can be rejected as the F statistics of 6.4936 is higher than the upper bound of 4.329. The economic implication of this is that the variables Shariah index (SI), interest rates (ER), industrial production index (IP), exchange rates (ER), and Reserve (RS) are moving together in the long run. The evidence of long run relationship rules out the possibility of any spurious relationship existing between the variables. In other words, there is a theoretical relationship existing between the variables.

4.3 Error Correction Model

Cointegration only tells us that there is theoretical relationship between the variables. It tells us that the variables are moving together in the long run. However, what cointegration doesn't tell us is whether there could be a short-term deviation from the long term equilibrium. Information on direction of Granger-causation can be particularly useful for investors. By knowing which variable is exogenous and endogenous, investors can better forecast or predict expected results of their investment. The t ratio or p value of the error-correction coefficient specifies whether the deviation from the equilibrium has a significant effect on the dependent variable, which in this case is Shariah Index (SI). In other words, whether the dependent variable is endogenous or exogenous. The estimation of the ARDL model is based on the Schwarz Bayesian Criterion (SBC). SBC is chosen over akaike's information criterion (AIC) because SBC is more concerned on over-parameter whereas AIC is less concerned on over-parameter.

Table 5: Results of Error Correction Representation for the selected ARDL Model

Variables	Coefficient	Standard Error	P value	Result
ECM (-1) dLSI	-.10767	.078945	[.179]	Exogenous
ECM (-1) dLIR	-.41145	.11644	[.001]*	Endogenous
ECM (-1) dLER	-.12832	.12232	[.299]	Exogenous
ECM (-1) dLRS	-.16631	.060085	[.008]*	Endogenous
ECM (-1) dLIP	.39557	1.8793	[.839]	Exogenous

Note: * denotes significance at 5% level

The results in table 5 show that there are two variables that are endogenous, LIR, [.001]* and LRS [.008]*. The rest of the variables (Shariah Index [.179], interest rates [.001], exchange rates [.299], and industrial production index [.839]) are shown as independent. From the table above, it can be seen that Shariah index is an exogenous variable. However, this does not make sense as it means, that interest rate, an endogenous variable depends on the Shariah index. Interestingly, this result indicates that interest rates depends on the other variables. Though, this does not make sense in the reality and there is no theoretical and empirical background to back the results. Interest rate does not depend on other variables which are used in this study. In the area of banking and finance, interest rate is independent in nature so this indicates that the findings here cannot take into consideration as dependent variable in this study.

4.4 VARIANCE DECOMPOSITION (VDC)

In the error correction model, Shariah index (SI), exchange rate (ER), reserve (RS), and industrial production index have been identified as exogenous variables. However, the error correction model does not ranking each variable from most exogenous to least exogenous. Variance Decomposition helps in determining relative exogeneity and endogeneity that is which variable is most leader and which is least follower. VDC decomposes the variance of forecast error of each variable into proportions attributable to shocks from each variable in the system, including its own. The least endogenous variable is thus the variable whose variation is explained mostly by its own past variations. Orthogonalized VDC was first applied and the following results were obtained.

Forecast at Horizon = 60 months

	Horizon	**LER**	**LIP**	**LIR**	**LRS**	**LSI**
LER	60	62.60%	13%	20.33%	1.70%	2.21%
LIP	60	3%	0.5198	7%	7%	31%
LIR	60	11.18%	6%	74.75%	3.24%	4.93%
LRS	60	11.98%	11.29%	17.66%	34.62%	24.46%
LSI	60	9.08%	2.97%	3.08%	4.21%	80.67%

From the above table, rows read as the percentage of the variance of forecast error of each variable into proportions attributable to shocks from all variables (in columns), including its own. The columns read as the percentage in which that variable contributes to other variables in explaining observed changes. The diagonal line of the matrix (highlighted) represents the relative exogeneity. According to these results, the ranking of indices by degree of exogeneity (extent to which variation is explained by its own past variations) is as per the table below:

No.	Variable
1	LSI
2	LIR
3	LER
4	LRS
5	LIP

This was result is confusing as in the earlier test of VECM, it was determined that LIR was an endogenous variable. However, in this result, it the second most exogenous variable. Conflicting results between VECM and VDC is because of the limitations of VDC. Firstly it assumes that when a particular variable is shocked, all other variables are "switched off". Secondly and more importantly, orthogonalized VDCs do not produce a unique solution. Because of the limitations stated above, Generalized VDC's will instead be applied as it is time invariant to the order of variables. One difference between Orthogonalized and Generalized VDC is that when interpreting the numbers identified for the latter, additional computations is required as the numbers do not add up to 100%. For any variable, at a specified horizon we first total up the numbers in a given row then divide the number of that variable against the computed total. By doing this, the numbers in each row will become 100%. The tables below show the results

Forecast at Horizon = 60 months

	Horizon	LER	LIP	LIR	LRS	LSI
LER	60	54.86%	13.32%	16.79%	2.08%	12.64%
LIP	60	3.01%	57.53%	8.66%	8.72%	22.08%
LIR	60	10.37%	5.14%	73.03%	4.78%	6.68%
LRS	60	13.36%	13.62%	20.03%	42.00%	10.99%
LSI	60	8.71%	3.21%	2.83%	4.02%	81.23%

According to these results, the ranking of indices by degree of exogeneity (extent to which the variation is explained by its own past variations) is as per the table below:

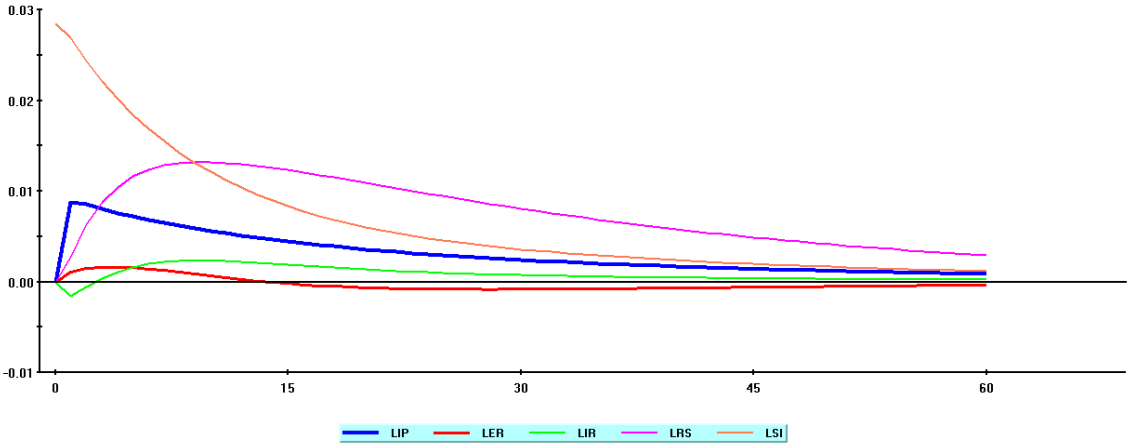
No.	Variable
1	LSI
2	LIR
3	LIP
4	LER
5	LRS

The above result, reveals a slight contradiction. As seen in the above table, LER is ranked 4 while in the Orthogonalized results, LER is ranked 3. Also in the Orthogonalized VDC, the variable LRS is ranked 4 but in the generalized results above, LRS is ranked 5. Furthermore, LIP is ranked 5 in the Orthogonalized results but ranked 3 in the generalized results.

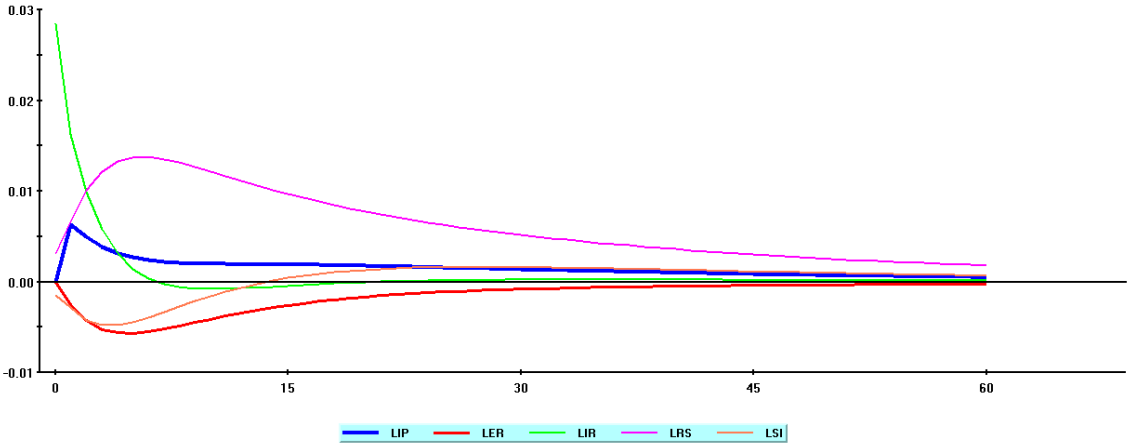
4.5 Impulse Response Functions

Impulse Response Functions (IRF) essentially produce the same information as the VDCs, except that they are presented in a graphical form. Both orthogonalized and generalized impulse responses have been applied.

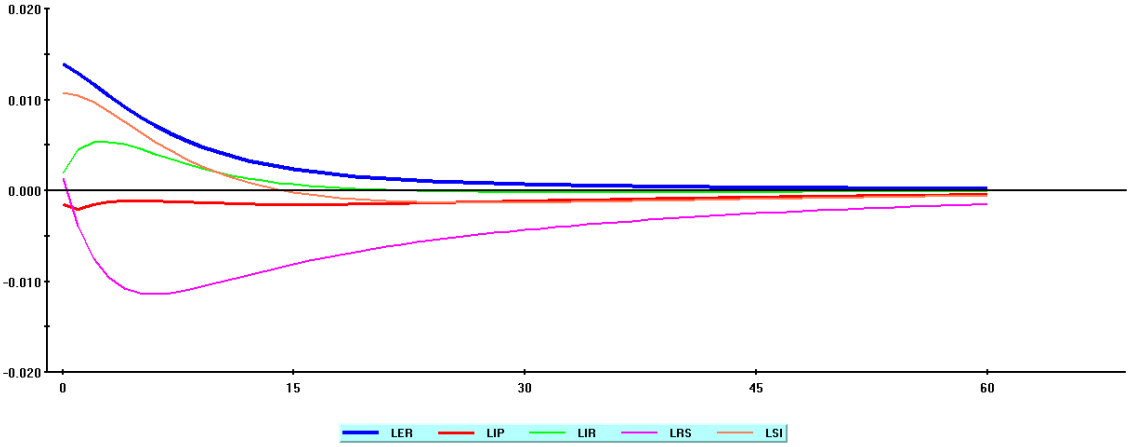
Orthogonalised Impulse Responses to one SE shock in the equation for LSI



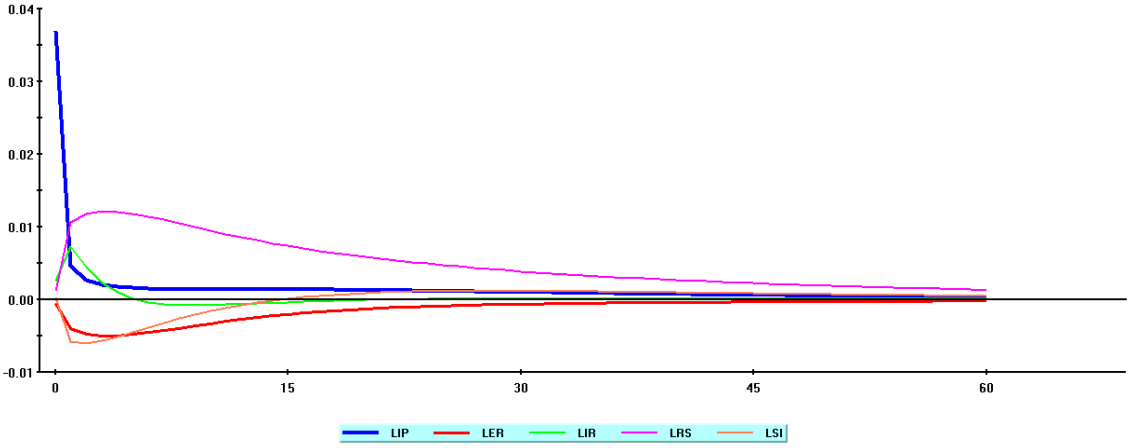
Orthogonalised Impulse Responses to one SE shock in the equation for LIR



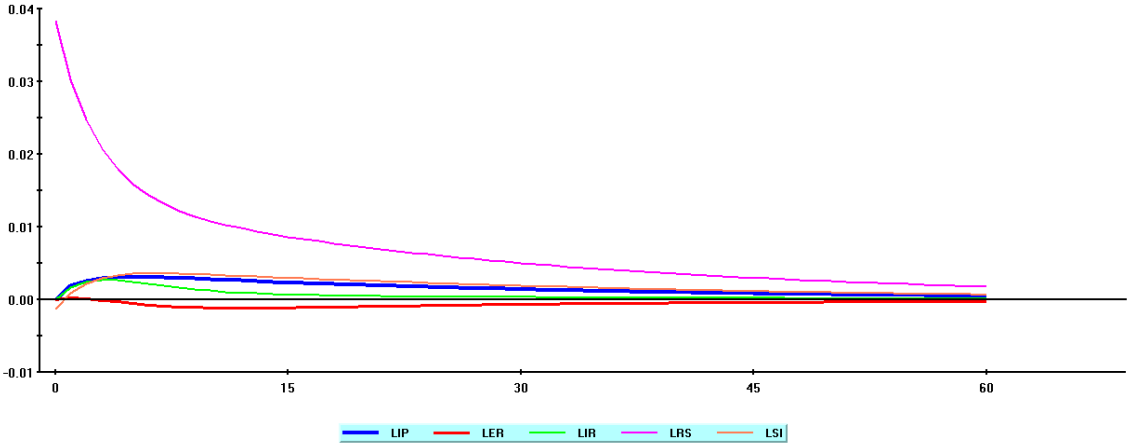
Orthogonalised Impulse Responses to one SE shock in the equation for LER



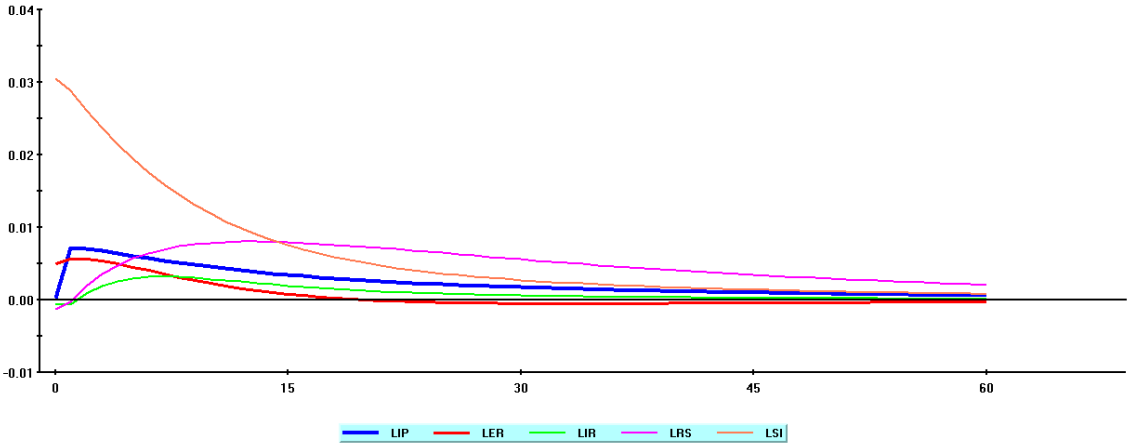
Orthogonalised Impulse Responses to one SE shock in the equation for LIP



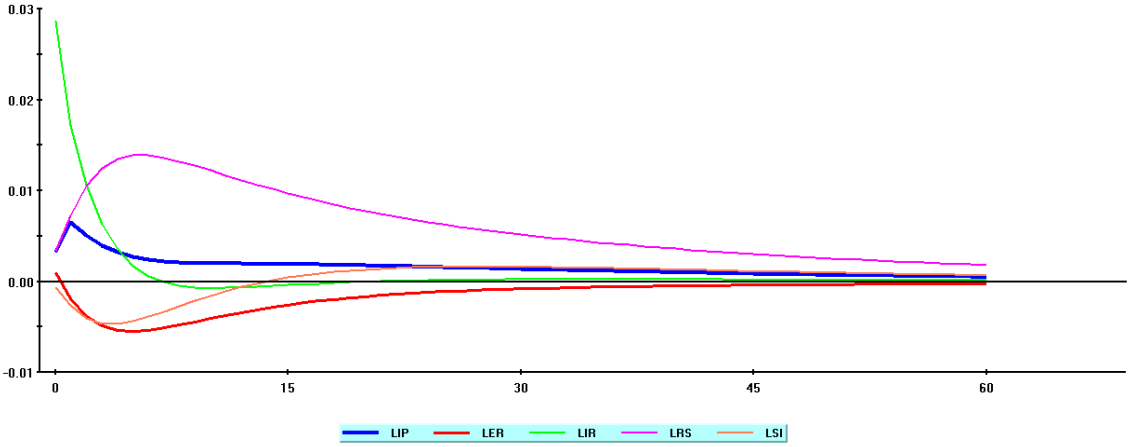
Orthogonalised Impulse Responses to one SE shock in the equation for LRS



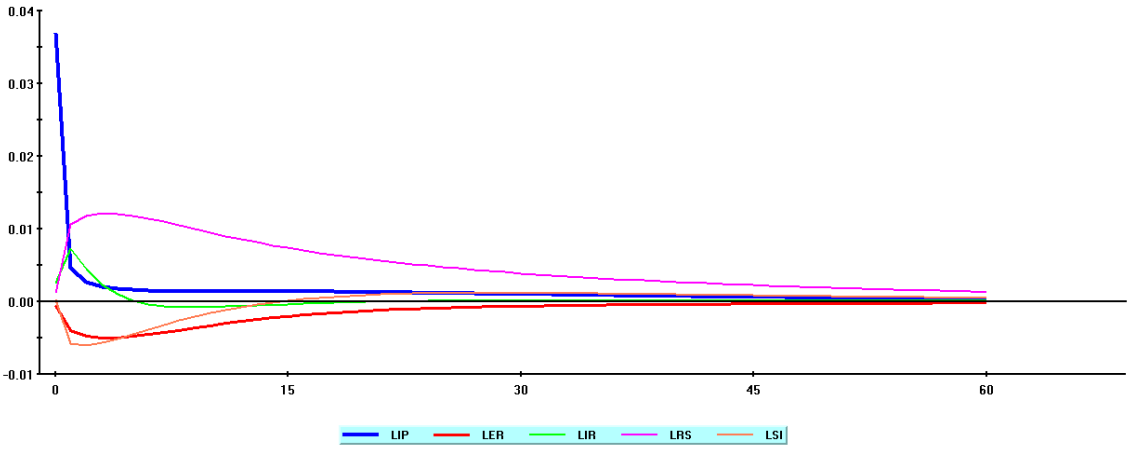
Generalised Impulse Responses to one SE shock in the equation for LSI



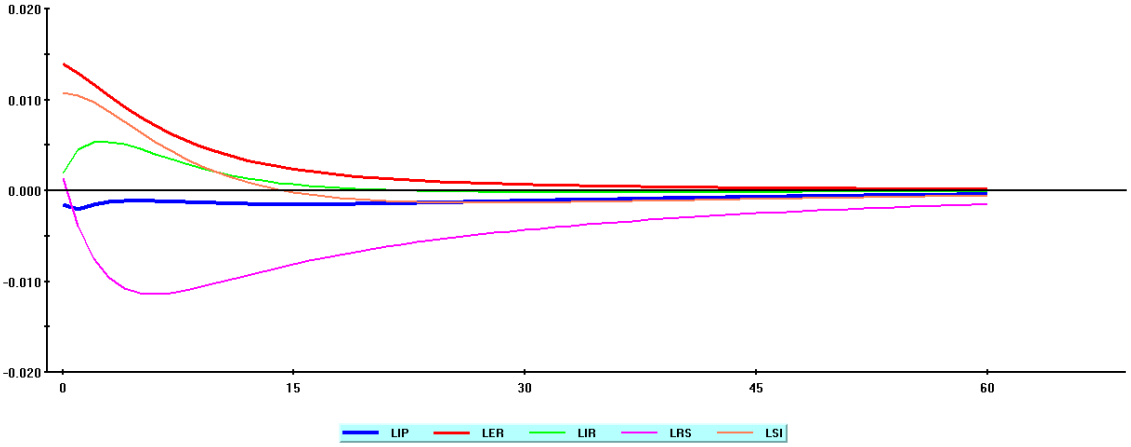
Generalised Impulse Responses to one SE shock in the equation for LIR



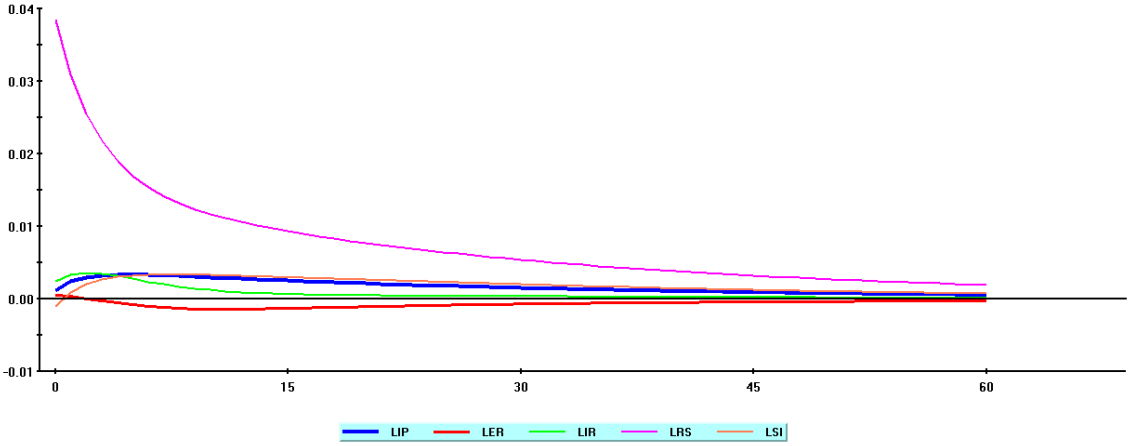
Generalised Impulse Responses to one SE shock in the equation for LIP



Generalised Impulse Responses to one SE shock in the equation for LER



Generalised Impulse Responses to one SE shock in the equation for LRS



5 Concluding Remarks and Policy Implications

This paper employs the ARDL approach to co-integration as introduced by Pesaran and Shin (1999), and Pesaran et al. (2001) to examine the impact of interest rates towards Shariah stock market. Due to the fact that the Shariah index is compliant with Islamic Law (Shariah), it allows for Muslim investors to pool their capital into investments that are deemed in line with Shariah. Although the practice of stock/share trading was not common during the time of Prophet Muhammad ﷺ or during the period of the rightly guided caliphs, it has been allowed based on Ijima or general consensus. However, with Islamic finance still a new phenomenon in the eyes of many and with it trying to compete with the conventional financial system, issues arise based on practices within the system. Such issue such as whether Islamic profit rates should be bench marked against interest rates is an example. The findings in this study show that interest rate does not impact the Shariah index. It is in fact the Shariah index that impacts interest rate. The policy implication of this is that an investor looking to pool his money into a Shariah compliant vehicle can do so knowing that the conventional interest rate does not impact or affect the Shariah index.

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