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Abstract

As Islamic banking comes of age 40 years after its beginning, scholars and academics are calling for a better version 2. Regulators in Malaysia and Pakistan are pushing the industry to adopt more Islamic contracts which live up to the spirits of Shariah. Malaysia, specifically, has launched the Islamic Financial Services Act 2013 (IFSA) as a step in this direction. To facilitate the transition, this study has two objectives; to test whether conventional rates is still cointegrated with Islamic banks' profit rates in Malaysia and a ranking of the exogeneity of the factors that affect the profit rates. It uses a range of multivariate time series techniques namely the cointegration test, vector error correction model (VECM), cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests, variance decomposition (VDC), impulse response and persistence profiles. This study contributes to the literature through its use of the latest data (up to December 2014) and its rank of less-tested variables such as the ratio of Islamic deposits to total Islamic assets. The VDC ranking can also serve as a basis for comparison for the effects of IFSA. This research finds that Islamic profit rates are still cointegrated withconventional rates such as the overnight policy rate (OPR) and fixed deposit rates. Additionally, it is also led by Islamic banks' dependency on deposits for funding and their market shares. These findings may give urgency to policy makers and practitioners to evolutionise current Islamic banking practices towards what is likely to be a more stable financial system.

Keywords: Profit rates, investment account rates, interest rates, OPR, IFSA, Time Series

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1. Introduction: the issue motivating the study

The issue with Islamic banking currently is that most of its products are replicas of conventional finance. The profit rates of its investment accounts are thus, similar to conventional deposits. This has been cited by authors such as Wilson (2012) as the reason why there is little need for a different set of regulations for Islamic finance. But true Islamic finance is different from conventional. In fact, their foundations are antithetical to each other. While conventional finance is interest-based, Islamic finance focuses on an equitable distribution of profits and losses.

The reasons cited in the theoretical discourse for the similarity between Islamic and conventional rates include a lack of compatibility between the current legal and financial systems with Islamic finance. The latter has had to evolve towards becoming more conventional-like to compete in a system dominated by the former. Some practitioners also cite customers' risk aversion as to why their hands are tied from disbursing true profit and loss rates. Customers, Muslims and non-Muslims alike, want deposit guarantees and fixed payments since this is the system that they are accustomed to. Islamic finance on the other hand, requires a system thataccommodates the sharing of profits and losses.

Bankers also seem averse to implementing profit and loss sharing (PLS) contracts and thus, disbursing the true rates because of moral hazard problems. They say that they do not have the expertise to monitor and take on the risks of joint venture types of partnerships. To implement contracts such as *musharakah* and *mudarabah*, banks will first need to overcome the issue of asymmetric information since customers know first-hand the profit and loss outcomes of their projects. Otherwise, asymmetric information can lead to adverse selections by banks in that they may select non-profitable projects for funding as a result of misreporting by customers.

Yet another reason is the lack of hedging and liquidity tools for Islamic banks, an issue which remains a major problem for Islamic banks in all markets that they operate in. These reasons hamper the Islamic banks' ability to compete effectively with conventional banks on their own terms. Indeed reforming Islamic finance practices can be like trying to squeeze a round peg into a square hole. Academics, scholars and practitioners thus cite these reasons as to why the rates between Islamic investment accounts follow closely their conventional counterparts, although in theory they should be worlds apart.

Their rates should be different because they have diametrically opposite starting points. Instead of a benchmark which is based on the price of money, Islamic finance's key index should be based on the value and volume of real economy transactions. Some of this may be done through fixed rate contracts such as *murabaha*, *ijarah* and *wakalah* but Islamic banks also need to be supporters and users of PLS contracts such as *musharakah* and *mudarabah* as

and when they serve the objective better. These contracts are more appropriate for investments and business ventures. Since Islamic banks invest depositors' monies, as do the norm in banking, they should theoretically disburse profit and loss rates based on the outcomes of the investments, not conventional fixed deposit rates.

That Islamic investment account rates is similar with interest rates and conventional fixed deposits have been confirmed in several empirical studies. In fact, Chong and Liu (2009) found, based on data between 1995 and 2004, that contrary to expectations, Islamic investment rates was significantly lower and less volatile than conventional deposit rates. Farook, Hassan and Clinch (2012) also found that most Islamic banks manage their profit distributions towards market-based interest rates and away from asset returns. The extent is directly relatedto customers' religiosity, the market's financial development, the banks' asset composition, and the existence of discretionary reserves. Further, Cevik and Charap (2011) from the International Monetary Fundfound long-run cointegration and statistically significant correlation between the PLS returns of investment accounts in Malaysia and Turkey and their conventional bank deposit rates.

To differentiate Islamic banking from conventional, Malaysia, whose central bank is the only in the world which is shaping the growth ofits Islamic finance industry, has taken some bold steps. As part of IFSA,its central bank, Bank Negara Malaysia (BNM), requires Islamic banks to reclassify their deposits into principal-guaranteed *wadiah or qard* accounts, with no returns paid, or non-guaranteed, restricted and unrestricted investment accounts based on *wakalah, mudarabah* or *musharakah.* The objective is to steer the industry back to its roots by enforcing the practice of more genuine PLS contracts. Its success will have global implications for other regulators which are either looking to take advantage of the fast growth in Islamic finance or those, which like BNM, are trying to steer the industry towards a better version 2.These include the regulators of Pakistan, Turkey and Russia, among others.

To facilitate the transition, this study uses the latest data (up to December 2014) from Islamic banks in Malaysia to test whether conventionalratesare still cointegrated with profit rates. Results of the cointegration technique will have policy implications as some of IFSA's regulations kick off on 16 June 2015.If current *mudarabah* investment accounts are found to be no different from conventional saving deposits, lessons need to be drawn to ensure Islamic banks do not do more of the same with IFSA. Additionally, this study leverages ona useful feature of VDC to rank the exogeneity of the factors that affect Islamic banks' profit rates.Further, the ranking is of less tested variables such as the ratio of Islamic deposits to total Islamic assets (as proxy for banks' dependence on depositor funding) and the ratio of Islamic deposits to total deposits (as proxy for the impact of market share on the determination of investment account rates).

Theoretically, the more dependent the banks are on deposits for funding, the more likely are they to match conventional rates so as to keep the depositors' monies with them. Islamic banks extract a significant management fee from the gross profit distributions to depositors. As such, they are reliant on depositors for earnings albeit to different extents. Those which

depend more on depositor funding than shareholder funds are more likely to provide competitive rates, which are in line with conventional rates. This is to attract the deposit monies of the conventional loyalists (those who put their monies in interest-bearing accounts) and the floaters (the indifferent ones). On the other hand, those with relatively larger shareholder funds compared to the depositor bases may be less pressured to align their rates with conventional as the risk of collapsing as a result of large-scale depositor withdrawal (bank runs) is not as high. They may provide returns that are more consistent with their business or asset returns (Farook, Hassan and Clinch, 2012).

In terms of market share, in theory, the higher is it for Islamic banks, the less likely is the need for them to offer the same rates as conventional banks. This is also related to the extent of Islamic finance penetration in the country. Most Islamic banks currently operate in a dual system where they compete with conventional banks for deposits. Islamic banks have an advantage in attracting the Shariah loyalist segment of the market but other customers, namely the conventional loyalistsand the floaters,are sensitive to price and features of the products. To attract their deposit monies, Islamic banks may be pressured to match conventional rates. The extent to which Islamic banks may yield to this pressure depends on the size of their market shares. A larger share reduces the need to match rates.Farook, Hassan and Clinch, 2012, however uses a different proxy for market share than this study. They used the Herfindahl concentration index which is the sum of the squares of the market shares of each individual bank. This study on the other hand, measures the market share of Islamic banks in Malaysia compared to the entire banking system through the ratio of Islamic deposits to total deposits.

The results of this study are thus potentially helpful in highlighting tocentral bankers and chiefs of Islamic banks thefactors which influencecurrent investment account rates and therefore, the need to steer the business towards a truer implementation of Islamic finance principles.

This study uses the multivariate time series technique. Although it has its limitations, time series isan improvement over traditional regression because it tests the long-run theoretical relationships between the variables,instead of assuming that a theory holds.This is done through the cointegration test and vector error correction model (VECM) which also decides the direction of causality ie which variables are exogenous (leaders) and which are endogenous (laggers). Traditional regression on the other hand, assumes causality based on theories. Secondly,VDCproduces a useful ranking of the leadersand laggers among the variables. It tells us their relative exogeneity and endogeneity. This list may be useful for BNM as a basis for comparison to gauge whether profit ratespost-IFSA conforms to that in a true Islamic finance system or not.

The results show strong evidence of cointegration between the Islamic and conventional variables over the long term. The VECM results also show that Islamic variablessuch as investment account and interbank rates and the ratio of Islamic deposit to total deposits are endogenous. They respond to the exogenous variables, which tend to be non-Islamic, such as

the OPR and conventional fixed deposit rates. This means that the non-Islamic variables are leading the Islamic variables. This is in line with previous studies, which found that Islamic banking *is*led by conventional interest rates since it is still a minority player in a dual banking system. The VDC results, which indicate future trends, are broadly in line with the VECM results, which are based on the sample. It shows that the conventional rates are strong leaders while the Islamic rates are followers.

Additionally, the leaders include the ratios which are more exogenous than the conventional rates. This is possibly because there are more external factors affecting the ratios for banks' dependence on depositor funding and market share than the factors that affect conventional rates. The latter is primarily driven by a country's monetary policy and thus, the interbank rates. The ratios however are affected by more external factors such as the banks' reliance on shareholder funding, their business models, regulations involving liquidity, capital adequacy and deposits and the government's 'enthusiasm' for Islamic finance. These are possibly why the ratios are found to be more exogenous than the conventional rates. The finding that the Islamic rates are the weakest followers is in line with the VECM results which stated that the Islamic investment account rates and the Islamic interbank rate are endogenous.

Section II reviews the empirical studies which investigated the determinants of Islamic investment account rates. This leads tothe major objective of the study in Section III. It isfollowed by the theoretical underpinnings and themethodology used in Sections IV and V,respectively. The contributions of this paper are detailed in Section VI.Data, empirical results and discussionsare dealt within Section VII. Finally, this article endswith the major conclusions and policy implicationsof the study in Section VIII.

2. Literature review

Studies such as Chong and Liu (2009), Farook, Hassan and Clinch (2012) and Cevik and Charap (2011) have found that Islamic deposit and investment account rates are closely tied to conventional deposit rates. Chong and Liu (2009) used monthly data on Islamic investment rates and conventional deposit rates from BNM's Monthly Statistical Bulletin between April 1995 and April 2004. Their sample size was 109. They ran two stationarity tests; ADF and Philips-Peron, a Granger-causality test and a Johansen cointegration test. They found that contrary to expectations, Islamic investment rates were significantly lower and less volatile than conventional deposit rates. Additionally, they found that none of the Islamic investment rates is cointegrated with the return on the KLCI equity index.

Farook, Hassan and Clinch (2012) did a related study which found that most Islamic banks manage their profit distributions towards market-based interest rates and away from asset returns. The extent is directly relatedto customers' religiosity, the market's financial development, the banks' asset composition, and the existence of discretionary reserves. On the other hand, the proportion is inversely related to the market's familiarity with Islamic banking, market concentration, reliance on depositor funding and how long the Islamic bank

has been in operation. Data from 50 Islamic banks between 1993 and 2005 were used. To determine the factors that affect banks' profit management distribution, they used the multiple Ordinary Least Square (OLS) regression. To establish the phenomenon of banks managing their profit distributions, a descriptive analysis involving four variables; asset spread, deposit spread, equity spread and a combined spread (asset spread and the inverse of the deposit spread) was done.

Cevik and Charap (2011) from the International Monetary Fund examined the behaviour of conventional bank deposit rates and the rates of return on retail Islamic PLS investment accounts in Malaysia and Turkey. They used monthly data from January 1997 to August 2010. Four econometric tools were used; cointegration and causality tests, VECM and a study of the correlation of the volatility between the two types of retail products. They found long-run cointegration between the PLS returns and the conventional bank deposit rates. And their volatility is found to be statistically significant and correlated. The multivariate causality tests also showed that conventional bank deposit rates Granger cause returns on PLS accounts. They concluded by saying that these have policy implications for price and financial stability.

Other descriptive studies echo these findings. Feisal Khan (2010) said that based on his investigation, three decades after the introduction of Islamic banking and finance (IBF), much of it remains functionally indistinguishable from conventionalbanking. However, despite not providing an alternative to conventionalbanking and finance, IBF does strengthen a distinctly Islamic identity by providingIslamic terminologies for de facto conventional financial transactions.

Azmat, Skully and Brown (2015) developed a theoretical model to explain why Islamic banks' profit rates have been similar with conventional deposit rates. Besides the current literature which says that Islamic banks refrain from PLS contracts because of asymmetric information problems, they argue that risk-averse depositors also hinder Islamic banks' ability to offer true PLS contracts for their assets. The authors concluded by saying that PLS and Islamic joint venture contracts are perhaps more suited for venture capitalists and private equity companies.

This topic has added urgency given that some of IFSA's regulationsare set to kick off in June 2015. Since its objectives include customer protection, financial stability and Shariah-compliance, the results of this study, which serve to confirm whether conventional interest rates is still cointegrated with Islamic banks' profit rates and the exogeneous factors that affect the rates currently, can serve as a guide for the transition. Indeed the International Monetary Fund said in an April 2015 paper that "an important regulatory challenge is to ensure that profit-sharing investment accounts (PSIA) at Islamic banks are treated in a manner that is consistent with financial stability. Manyregulators treat these as deposits, which undermines their loss and liquidity absorbency feature.When regulators do allow for some loss-absorbency, they do not always pay sufficient attention tothe implications for corporates governance and consumer protection. Regulation and supervisionshould ensure

that PSIAs are not treated as pure deposits, while also ensuring better disclosure andenforcement of the investors' rights, including those related to payouts and reserves."

3. The objectives of the study

This study has two objectives. In light of IFSA, the cointegration technique is used to test whether conventional interest rates are still cointegrated with Islamic banks' profit rates in Malaysia. Secondly, VDC is used to rank the exogeneity of the factors that affect the profit rates. Although there are similar studies in the past, this research uses the latest monthly data from 2007 to 2014 from BNM's monthly statistical bulletin. Besides commonly tested variables such as the 6-month Islamic investment account rates and conventional fixed deposit rates, this study includes other less tested variables such as the ratio of Islamic deposits to total Islamic assets, ratio of Islamic deposits to total deposits, overnight policy rates (OPR) and Islamic interbank rates.

4. Theoretical underpinnings

Given that the principles behind Islamic finance are diametrically opposite to the foundations of conventional finance, the rates on their products should be different. While Islamic finance emphasises the sharing of risks through an equitable distribution of profits and losses, conventional finance has, as its foundations, interest and therefore, the time value of money. It refers to the concept that money is preferrednow to later because of its ability to earn more money over time. The current reality however is that Islamic profit rates tend to be aligned, if not determined, by conventional rates. This seems to be the result of operating in a dual banking system and in some countries as minority players. Even countries with sizeable Islamic markets such as Saudi Arabia and Kuwait have rates that are aligned with the local LIBOR (London Interbank Offered Rates). Again, this seems to be the consequence of being minority players in the global financial system. Islamic assets are less than two percent of global assets.

Among the reasons cited for the 'similarity' of Islamic banking and conventional products is the lack of compatibility between the current legal and financial systems with Islamic finance. For the latter to stay competitive, it has had to evolve to fit into the conventional system. Thus, the 'similarity' has been cited as the result of operating in a dual banking system and in some countries as minority players.

Other reasons include customers' risk aversion themselves. Having been accustomed to the guarantees and fixity of payments in the conventional system, practitioners cite customers' lack of appetite for a true distribution of profits, if these come with the possibility of losses. Yet another difficulty in implementing PLS contracts in the current system is the issue of moral hazard. To implement contracts such as *musharakah* and *mudarabah*, banks will first need to overcome the issue of asymmetric information since customers know first-hand the profit and loss outcomes of their projects. Otherwise, asymmetric information can lead to

adverse selections by banks in that they may select non-profitable projects for funding as a result of misreporting by customers.

Besides moral hazard issues, academics such as Iqbal, Mirakhor and Krichene (2012) have also highlighted the lack of hedging and liquidity tools for Islamic financial institution (IFIs) to compete effectively with conventional banks. In all Muslim countries, monetary and fiscal policies operate with interest rate-based bond issues – instruments that IFIs cannot legitimately use for hedging and liquidity purposes. These are among the reasons cited in the theoretical controversy as to why Islamic investment account rates and profit rates are similar to conventional rates.

At the other end of the theoretical controversy, academics have argued for a significantly different form of Islamic finance than the version today.Bacha and Mirakhor (2013) argue that the essence of the true Islamic finance system is risk sharing and a proper acknowledgement of property rights. Theseshould then lead toan equitable distribution of wealth and profits or losses from business ventures.The spectrum of ideal Islamic finance instruments would include short-term, liquid, low-risk financing of trade contracts to long-term financing of real sector investment. In this spectrum, there is no room to do as conventional finance at times does, which is to make money out of pure finance where instruments are developed that use real sector activity only as virtual license to accommodate what amount to pure financial transactions.

If risk sharing is to be at the heart of Islamic finance, then Islamic banks should, in theory, be enthusiastic users of PLS contracts such as *musharakah* and *mudarabah*. And customers should be prepared to bear the risk of loss as much as they look forward to the possibility of earning true profit rates based on real economy activities. All of these will translate into a new paradigm in banking where rates for deposits and financings are very different from the conventional system. The current system uses interest rates, specifically the London Interbank Offered Rates (LIBOR), to price everything from assets, opportunity costs to money. Whereas Islamic finance prices are based on one's value-add to the transaction or the worth of a commodity. This is not to say that there can be no fixed or benchmark rates in Islamic finance. In fact, some contracts such as *murabaha*, *ijarah* and *wakalah* can be used to structure fixed rate returns but Islamic banks should ideally be a balanced user of the entire range of contracts, including PLS, to achieve the ultimate objective of an Islamic economy, which as stated earlier, is an equitable distribution of wealth and profits or losses from business ventures.

Thus, industry stakeholders, mainly the regulators, have been devising ways to help Islamic finance move away from the clutches of conventional finance. This study serves as a humble attempt to add to this effort by using the latest data to confirm whether conventional rates such as those on deposits and interbank overnight instruments are still cointegrated with Islamic profit rates in Malaysia.

5. Methodology

This study tests the relationshipbetween Islamic and conventional rates, specifically whether the latterare still cointegrated with Islamic investment account profit rates. Besides the 6-month profit rates and the conventional fixed deposit rates, it uses the ratio of Islamic deposits to total Islamic assets as an indicator of the banks' reliance on deposits for funding. It also uses the ratio of Islamic deposits to total deposits as a proxy for market share. Additionally, the OPR and Islamic interbank rates are studied since they are the benchmarks for conventional and Islamic rates respectively.

The relationships between the six variables are analysed using five econometric tools namely a test for cointegration (Johansen); Granger-causality; VDC ranking of the leading variables or the most independent; a test of their inter-temporal linkages through the impulse response function (IRF) and lastly, an investigation of the impact of a system-wide shock on the variables through the persistence profiling(PP) function.

The cointegration approach provides a direct test of whether the profits ratesmove together with the other five variables over the long-term. Regression tests may not be appropriate as most economic variables are non-stationaryin their level form. This violates OLS's primary assumption that the variables are stationary. If the variables are non-stationary, the conventional statistical test such like R_2, t-ratios and F-statistics will no longer be valid. As such, the augmented Dicky-Fuller (ADF) test is used to confirm that the series are non-stationary. Following which, the Johansen (1988) test is conducted to assess the long-term relationship between the variables.The Johansen testis used as it allows for testing cointegration in a system of equations in one step and also avoidspriorassumptions of the endogeneity and exogeneity of the variables.The Johansen test shows whether a long-run combination of variables is stationary and therefore cointegrated by assigning hypothetical coefficients that lead to a stationary error term.

The direction of causality is then explored.The existence of cointegration indicates thepossibility of a causal link between the variables, but doesnot identify the direction of causality. The Granger (1969) testis used to determine which variables are exogenous and endogenous ie the leader and follower variables. Since the Granger test results provide little or no insight into the sign andmagnitude of the causality, the data is further analysed via VDC.

The VDC, impulse response and persistence profile tests are conducted to identify the inter-temporal linkages between the variables. The impulse response and persistence profile functions provide further information regarding the sign and timing of the variables' adjustments to shocks.

6. The contributions of the paper

The study will advance the field in the following ways:

I. It uses the latest data to test the hypothesis that Islamic investment account rates are cointegrated with conventional factors such as fixed saving deposits rates and OPR.

II. The VDC ranking can serve as a base for comparison for BNM to gauge whether investment rates post-IFSA conforms to that in a true Islamic finance system or not.

III. The study evaluates and ranks less tested variables such as the ratio of Islamic deposits to total Islamic assets (as proxy for banks' dependence on deposits for funding) and the ratio of Islamic deposits to total deposits (as proxy for the impact of market share on the determination of investment account rates).

IV. Lastly, lessons from this study can be applied to other central banks which are keen to implement a better Islamic finance system or bring their current ones back to their roots. The results of this study and the success of IFSA can serve as useful guides for their transitions.

7. Data, empirical results and discussions

To test the hypothesis that Islamic profit rates are cointegrated with conventional rates, the following variables are used:
* 6-month Islamic investment account rates
* 6-month conventional fixed deposit rates
* OPR
* Islamic interbank rates
* Ratio of Islamic deposits to total Islamic assets
  - As proxy for Islamic banks' dependence on deposits for funding
* Ratio of Islamic deposits to total deposits
  - As proxy for the impact of market share on the determination of investment account rates

This research uses the latest monthly data from BNM's monthly statistical bulletin, which lists the average rates across all financial institutions in Malaysia. Theperiod covered in this study is between January 2007 and December 2014.

Table 1: Unit root tests

ADF	Level	First differences
	With intercept and trend	
Islamic investment account rates	-2.69	-3.58
Conventional fixed deposit rates	-2.24	-4.55
Islamic interbank rates	-2.15	-4.76
OPR	-2.15	-4.61
Ratio of Islamic deposits to total deposits	-2.13	-7.6
Ratio of Islamic deposits to total Islamic assets	-2.84	-6.52
95% Critical value	**-3.46**	**-2.89**

PP	Level	First differences
	With intercept and trend	
Islamic investment account rates	-1.93	-10.86
Conventional fixed deposit rates	-1.69	-6.32
Islamic interbank rates	-1.58	-6.85
OPR	-1.6	-6.74
Ratio of Islamic deposits to total deposits	-1.98	-10.96
Ratio of Islamic deposits to total Islamic assets	-2.36	-12.71
95% Critical value	-3.42	-2.88

The unit root tests are run because the cointegration techniques require that the variables are I(1), which means that they are non-stationary in their level forms and stationary in the differenced forms. Non-stationarity in the level forms means the variables have the long-term, theoretical component in them. Threetypes of unit root tests were run; augmented Dickey-Fuller(ADF),Phillips-Peron (PP) and KPSS. ADF resolves the issue of autocorrelation in the variableswhile PP solves the issues of autocorrelation and heteroskedasticity. Theseproblemsaffect the standard deviations of the coefficients. Both tests confirmed all six variables are I(1) at the 5% significance level.The KPSS results on the other hand, mostly suggested otherwise. Since both the ADF and PP tests confirm the variables' I(1) status, we proceed with the cointegration test, pending the VAR (lag) order.

Table 2: Selecting the Order of the VAR Model

Order	LL	AIC	SBC	LR test	Adjusted LR test
6	1639	1417	1140.7	------	------
5	1606	1420	1188.6	CHSQ(36)=65.8759[.002]	38.4893[.358]
4	1581.2	1431.2	1244.6	CHSQ(72)=115.4638[.001]	67.4620[.630]
3	1546.3	1432.3	1290.4	CHSQ(108)=185.3849[.000]	108.3148[.473]
2	1508.3	1430.3	1333.2	CHSQ(144)=261.4299[.000]	152.7456[.293]
1	1474.9	1432.9	1380.7	CHSQ(180)=328.0903[.000]	191.6932[.262]
0	1334.6	1328.6	1321.1	CHSQ(216)=608.7526[.000]	355.6757[.000]

The table above provides the second requirement for the cointegration test. The order of the VAR model is found to be one, based on both the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC). AIC tends to indicate the higher number of lags at the expense of the degrees of freedom.It is also less concerned with the problem of over parameterization. SBC on the other hand, tends to give the lower number of lags with apossible problem of autocorrelation of the error correction term. In this case, there is no conflict as both points to an order of one.

We thus proceed with the Johansen cointegration test, having determined the variables' I(1) status and a lag order of one. The results show strong evidence of cointegration among the six variables over the long term. That they are cointegrated suggests that there is a theoretical, long-termrelationship among them and that each variable contains information for the prediction of other variables. Both the maximal eigenvalue andtrace statistics (table 3) suggest a cointegration vector of two at the 5% significance level. This is when the statistic is less than the critical value and thus, the null hypothesis of two or less cointegration vectors cannot be rejected. This means that there aretwo groups of three variables each which tend to move together over the long term. This is plausible as one of the conventional rates, for example, OPR may have a long-term trend with some of the Islamic variables while the other conventional rate, namely fixed the deposit rates, may be cointegrated with the remaining Islamic variables over the long-term.

Table 3: Johansen's cointegration test

Cointegration with unrestricted intercepts and restricted trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r=0	r=1	218.347	43.61	40.76
r<=1	r=2	42.9219	37.86	35.04
r<=2	r=3	31.6197	31.79	29.13
r<=3	r=4	9.0508	25.42	23.1
r<=4	r=5	5.9438	19.22	17.18
r<=5	r=6	4.1426	12.39	10.55

Cointegration with unrestricted intercepts and restricted trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r=0	r>=1	312.026	115.85	110.6
r<=1	r>=2	93.6788	87.17	82.88
r<=2	r>=3	50.7568	63	59.16
r<=3	r>=4	19.1372	42.34	39.34
r<=4	r>=5	10.0864	25.77	23.08
r<=5	r=6	4.1426	12.39	10.55

When another cointegration test, Engle-Granger (E&G),was run, the results were negative (table 4). In this case, the Johansen test results are preferred as it does not have a restrictive assumption. E&G on the other hand, assumes there is only one cointegration or none. E&G tests for cointegration by checking whether the error term is stationary through unit root tests such as ADF. A stationary error term suggests the existence of cointegration as the variables are adjusting to each other to bring about long-term equilibrium. The Johansen test on the other hand, creates a stationary error term by assigning hypothetical values to the coefficients of the variables. It can indicate multiple cointegration patterns.

Table 4: E&G's cointegration test

	Test Statistic	LL	AIC	SBC	HQC
DF	-4.8725	179.108	178.1083	176.8584	177.6043
ADF(1)	-4.4555	179.197	177.1974	174.6976	176.1894
ADF(2)	-3.9066	179.201	176.201	172.4513	174.6889
ADF(3)	-3.0794	179.831	175.8307	170.831	173.8145
ADF(4)	-2.5034	180.419	175.4188	169.1693	172.8986
ADF(5)	-2.4721	180.484	174.484	166.9846	171.4598

95% critical value for the Dickey-Fuller statistic = -4.8964

	Vector 1	Vector 2

LL = Maximized log-likelihood   AIC = Akaike Information Criterion
SBC = Schwarz Bayesian Criterion   HQC = Hannan-Quinn Criterion

As the absolute value of the T-statistic (4.4555)of the ADF test for the highest AIC and SBC values is less than the 95% critical value (4.8964), the null hypothesis of non-stationarity of the error correction term cannot be rejected. This indicates no cointegration among the variables.

Having ascertained that the six variables are cointegrated by two vectors, a long-run structural modeling (LRSM) test was conducted to estimate a theoretically meaningful long-run relationship between the variables. This was done by first imposing some restrictions on the relationships and then testing them.

Table 5: Long-run relationship of the variables based on exact identification

Conventional fixed deposit rates	-0.37	-0.25
	(1.01)	(0.19)
Ratio of Islamic deposits to total Islamic assets	0.00	-0.29*
	(NONE)	(0.10)
Islamic interbank rates	5.05*	1.00
	(2.45)	(NONE)
Islamic investment account rates	1.00	0.14*
	(NONE)	(0.07)
Ratio of Islamic deposits to total deposits	-1.35*	0.00
	(0.67)	(NONE)
OPR		
	(3.20)	(0.14)
Trend	0.01*	0.00
	(0.00)	(0.00)

Numbers in parentheses are standard errors

Significant at 5% level

Restrictions

the

Table 5 shows that in one of vectors, Islamic investment account rates have statistically significant, long-run relationships with Islamic interbank rates and the ratio of Islamic deposits to total deposits. Significant t-statistics, derived by dividing the coefficients with the standard deviations, implythe rejection of the null hypothesis that there is no long run relationship between the variables. In the second vector, the Islamic interbank rates are found to have statistically significant, long run relationships with the ratio of Islamic deposits to total Islamic assets,Islamic investment account rates and OPR. These suggest that Islamic rates on investment accounts and the interbank rates may be affected by both Islamic and conventional factors.

This is likely as studies have found that Islamic profit rates are indeed tied closely with conventional rates, most probablydue to the dual banking system and Islamic banks being minority players.Farook, Hassan and Clinch (2012) also found that there is a negative relationship between the extent of Islamic banks' market shares (as proxied in this study through the ratio of Islamic deposits to total deposits) and their profit distribution management. This means that the lower are their market shares, the more likely are the banks to manage their investment account rates towards the interest rates.

The ratio of Islamic deposits to total Islamic assets, which indicates the Islamic banks' reliance on depositor funding, has also been found to affect Islamic banks' profit distribution management. Contrary to the hypothesis of a positive relationship, Farook, Hassan and Clinch (2012) found that the relationship is significantly negative.This means that Islamic banks' management of the profit rates reduces as they become more reliant on depositor funding. A likely reasonis that as banks' depositor base increases, they are subject to more scrutiny so it is harder for managers tomanage the profit distributions without being detected.

the

	Vector 1	Vector 2
Conventional fixed deposit rates	0.00	0.00
	(NONE)	(NONE)
Ratio of Islamic deposits to total Islamic assets	0.00	-0.25*
	(NONE)	(0.10)
Islamic interbank rates	5.56*	1.00
	(2.15)	(NONE)
Islamic investment account rates	1.00	0.05
	(NONE)	(0.05)
Ratio of Islamic deposits to total deposits	-1.47*	0.00
	(0.51)	(NONE)
OPR	-6.44*	-1.07*
	(2.22)	(0.03)
Trend	0.01*	0.00
	(0.003)	(0.00)

Table 6: Long-run relationship of variables based on over identification

CHSQ(2)= 2.4283[.297]

☐ Significant at 5% level

Numbers in parentheses are standard errors

For the overidentification test, a coefficient of 0 was suggested for conventional fixed deposit rates because its coefficients were insignificant in both vectors in the exact identification stage. The results suggested thatfor Islamic investment account rates, besides the variables which it was found to have statistically significant, long run relationships within vector 1 of the exact identification stage, this time, it was also found to have a significant relationship with OPR. This is likely because all banking rates are ultimately benchmarked against the interbank rate, which in this case is OPR. The removal of the conventional fixed deposit rates in the test may have fast tracked the relationship between OPR and Islamic investment account rates.

Given a p-value of 0.297, the null hypothesis, which is the restrictions in both vectors, may not be rejected. As per the exact identification results, this implies that Islamic rates may be

affected by both Islamic and conventional factors, particularly the OPR. We will however proceed with all six variables since they are found earlier to be cointegrated.

Cointegration cannot tell us the directionof Granger causality ie which variable is leadingand which is lagging (or which variable isexogenous and which is endogenous). To discernthe endogeneity and exogeneity of the variables,the VECM technique is applied. VECM also allows an exploration of the short- and long-run dynamics among the variables since they are found earlier to be cointegrated.

Vector 2

P-values	OPR	Conventional fixed deposit rates	Ratio of Islamic deposits to total Islamic assets	Islamic interbank rate	Islamic investment account rates	Ratio of Islamic deposits to total deposits
ecm1(-1)	0.52	0.69	0.12	0.60	0.00	0.00
ecm2(-1)	0.33	0.43	0.13	0.00	0.00	0.00
Chi-square for SC	0.96	0.87	0.22	0.03	0.53	0.53
Chi-square for FF	0.01	0.01	0.73	0.68	0.54	0.90
Chi-square for N	0.00	0.00	0.09	0.00	0.00	0.60
Chi-square for Het	0.00	0.00	0.48	0.93	0.55	0.34

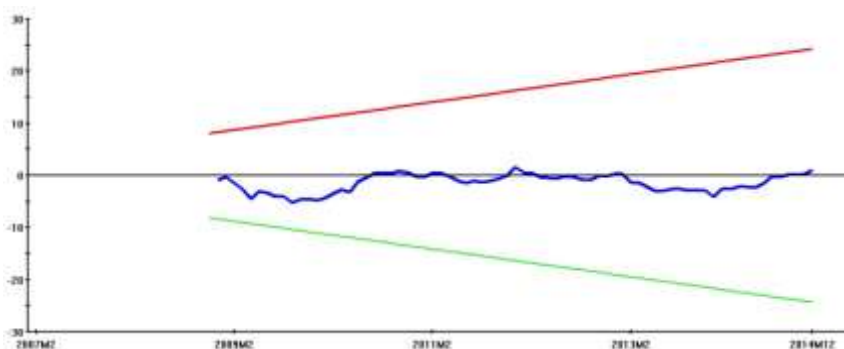**Table 7: Error correction model for the six variables**

Based on the p-values of the error correction terms of both vectors of cointegration, the VECM results tell us that three of the variables are exogenous namely the OPR, conventional fixed deposit rates and the ratio of Islamic deposits to total Islamic assets. Exogeneity indicates that they are the leading variablesin that they absorb the exogenous shocks first before transmitting them to other variables. The remaining variables are found to be endogenous namely the Islamic investment account rates and the ratio of Islamic deposit to total deposits. As results for the Islamic interbank rates are mixed, we proceed with the significant one ie it is endogenous. Endogeneity indicates that these variables depend on the deviations of exogenous variableswhich tend to be non-Islamic, such as the OPR and conventional fixed deposit rates. It also implies that they will bear the brunt of short-run adjus☐e Exogenous variables ☐m Endogenous variables : cointegrating variables. This is in line with previous studies done, which found that Islamic banking isled by conventional interest rates since it is still a minority player in a dual banking system.

Additionally, the results tell us that the ratio, which is a proxy for the banks' reliance on depositor funding, is exogenous while the other ratio, which is a proxy for market share, is

endogenous. This is possible because the extent of a bank's dependence on depositor funding is affected by other variables such as the amount of shareholder funds it has, its business model and the country's regulations on deposits. The market share proxy, on the other hand, is a possible endogenous variable because the deposits are mainly affected by the variables in this study ie the product rates and interbank rates.
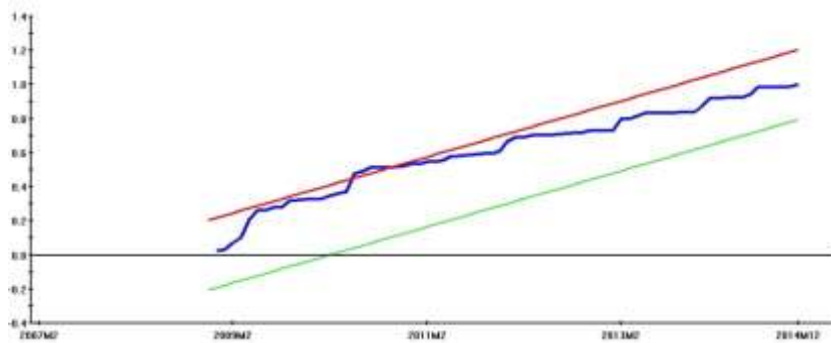
The diagnostics of the equations of the error correction model (testing for the presence of autocorrelation, functional form, normality and heteroskedasticity) generally indicatedthat the equations are well-specified. There are problems of normality and in two of the variables, functional form and heteroskedasticitybut these are not major problems for a time-series test.More importantly, the results show no serial autocorrelation problems, except for one of the variables. To check the stability of thecoefficients, the CUSUM and CUSUM SQUAREtests were run (figures 1 and 2). The plot of the cumulative sum of squares of the recursive residuals shows a structural break in mid 2010. This is plausible as Malaysia was experiencing the ripple effects of the global financial crisis then. Theimpact on its financial system, both conventional and Islamic, is a likely reason for the structural break in the CUSUM test.

Figure 1: Islamic investment account rates as dependent variable
Plot of cumulative sum of recursive residuals

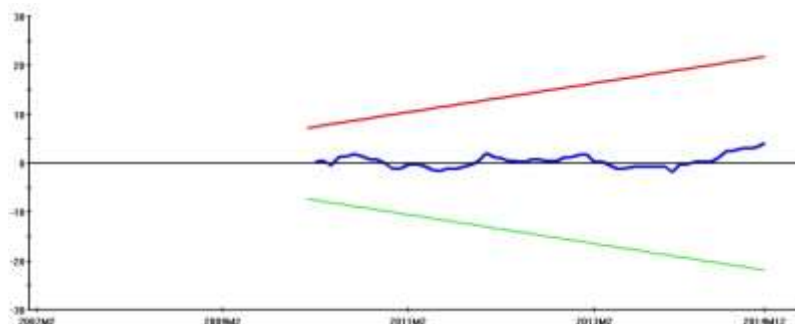The straight lines represent critical bounds at 5% significance level

Figure 2: Islamic investment account rates as dependent variable
Plot of cumulative sum of squares of recursive residuals

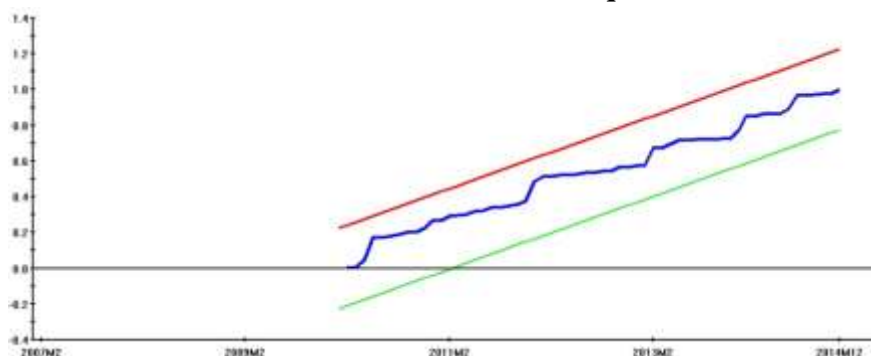The straight lines represent critical bounds at 5% significance level

A dummy for the crisis period of January to December 2010 was then introduced. When the CUSUM and CUSUM SQUAREtests were re-run (figures 3 and 4), there were no more structural breaks. The OLS estimations also showed that the T-statistic for the dummy crisis, at 1.17 (table 8), is insignificant at the 5% level. These indicate that the coefficients are now stable. Although this means that the data should be separately tested ie pre- and post-2010, we will proceed with all of the data because otherwise the sample size is too small for accurate testing.

Figure 3: Islamic investment account rates with crisis dummy
Plot of cumulative sum of recursive residuals

The straight lines represent critical bounds at 5% significance level

Figure 4: Islamic investment account rates with crisis dummy
Plot of cumulative sum of squares of recursive residuals

The straight lines represent critical bounds at 5% significance level

Table 8: OLS estimates of the variables' coefficients

Islamic investment account rates as the dependent variable

Variables	T-statistics
Conventional fixed deposit rates	2.79
Ratio of Islamic deposits to total Islamic assets	0.33
Islamic interbank rates	2.57
Ratio of Islamic deposits to total deposits	-2.68
Overnight Policy Rates	-3.03
Dummy crisis	1.17

After identifying the endogeneity and exogeneity of the variables through VECM, the orthogonalised and generalised VDCtechnique was applied to discern the relative degreeof endogeneity or exogeneity of the variables. VDC decomposes the variance of the forecast error of a particular variable into proportions attributable to shocks in each variable in the system including its own.The relative exogeneity/endogeneity of a variable can be determinedby the proportion of the varianceexplained by a variable's own past. The variable that isexplained mostly by its own shocks (and not byothers) is deemed to be the most exogenous.

Table 10: Generalised VDCresults

	Horizon	CFD	DEPTA	IINTERBR	IINVR	ITOTDEP	OPR	Ranking
CFD	30	48.63%	2.76%	0.47%	0.30%	0.10%	47.74%	4
DEPTA	30	0.76%	64.49%	4.56%	6.51%	23.41%	0.27%	1
IINTERBR	30	47.97%	1.07%	0.29%	1.18%	0.17%	49.31%	6
IINVR	30	34.32%	10.35%	2.02%	17.76%	2.87%	32.69%	5
ITOTDEP	30	4.63%	32.45%	0.65%	2.02%	54.09%	6.15%	2
OPR	30	47.82%	2.07%	0.28%	0.45%	0.24%	49.14%	3

Where CFD = Conventional fixed deposit rates, DEPTA = Ratio of Islamic deposits to total Islamic assets, IINTERBR = Islamic interbank rates, IINVR = Islamic investment account rates, ITOTDEP = Ratio of Islamic deposits to total deposits, OPR = Overnight Policy Rates

The generalised VDC technique is preferred over the orthogonalised because the latter has a bias towards theorder of the variables in the equation, particularly the first variable.And generalised VDC has a more realistic assumption of investigating the impact of a shock from one variable, assuming the other variables can change. Orthogonalised VDC assumes the other variables are kept constant. Thus, the generalised technique is more useful when the results are normalised as a percentage of the total. It should be noted that while the VECM results is based on the sample and therefore historical data, VDC results project trends into the future.

Table 10is composed of the 30th row observations out of a monthly data of 60 months.It tells us that the contributions of own shockstowards explaining the forecast error variance ofeach variable is as follows:

Figure 5: Ranking of exogeneity

Ratio of Islamic deposits to total Islamic assets	64%
Ratio of Islamic deposits to total deposits	54%
OPR	49%
Conventional fixed deposit rates	49%
Islamic investment account rates	18%
Islamic interbank rates	0.3%

These out-of-sample variance forecasts tell us that the ratios are the strongest leaders among the variables and the Islamic rates the weakest followers.This is possible because as mentioned, the ratios are likely to be affected by other variables. For example, the ratio for banks' reliance on depositor funding may be affected by the amount of shareholder funds they have, the business models and the country's regulations on deposits. Results for the other ratio, the proxy for market share, is however different from the VECM. There, it was found to be endogenous whereas through VDC, it came out as the second highest exogenous variable. The difference in results is probably because the tests cover different time frames. While VDC projects into the future, the VECM test is based on a historical sample. The ratio for market share (ie proportion of Islamic deposits to total deposits) may become exogenous in future as the factors that affect it may not only be the variables in this study ie the interbank and product rates.

Given the implementation of IFSA, where Islamic banks can no longer use the profit equalisation reserve and investment risk reserve to smooth returns on investment accounts, the proportion of Islamic deposits to total deposits may depend on other factors. These include customer awareness of the Shariah merits and profit and loss potential of the investment accounts, willingness of other Islamic banks to participate in the investment account initiative and other conducive regulations enforced by BNM to spur the growth of Islamic finance locally. These could perhaps be the key variables affecting the ratio for market share in future, making it exogenous.

The finding that the Islamic rates are the weakest followersis in line with the VECM results which stated that the Islamic investment account rates and the Islamic interbank rate are endogenous. The generalised VDC results show for example, that OPR and conventional fixed deposit rates are both in third place in the exogeneity ranking. This means that they are more exogenous and stronger leaders than the Islamic rates. As indicated in table 10, OPR explains 33% of the variance of the Islamic investment account variable, whereas the latter explains only 0.45% of the variance in OPR. Further, table 10 shows that conventional fixed deposit rates and OPR explain most of the variance (30-50%) in both Islamic investment

account rates and interbank rates. This is in line with previous studies, which found that conventional rates have statistically significant impacts on Islamic rates.

To confirm the results of the VDCtest and visually present the transmission mechanism of the shocks, orthogonalised and generalised impulse responsetests were conducted. As mentioned, the generalisedtest results are preferred as they are more useful when normalised. As shown in figure 6, when OPR (dark brown) is shocked by one-period standard deviation, the variable that was most affected is the Islamic interbank rate (green) followed by the Islamic investment account rates (purple). They changed by 0.065 and 0.03 respectively over a four-month period. The effects seem significant with no signs of fading. This suggests, as per the VDC results, that Islamic ratesare weak followers of conventional rates such as OPR.

Figure 6
Generalised Impulse Response(s) to one S.E. shock in the equation for LOPR

LCFD = Conventional fixed deposit r....., = Ratio of Islamic deposits to total islamic assets, LIINTERBR = Islamic interbank rates, LIINVR = Islamic investment account rates, LITOTDEP = Ratio of Islamic deposits to total deposits, LOPR = Overnight Policy Rates
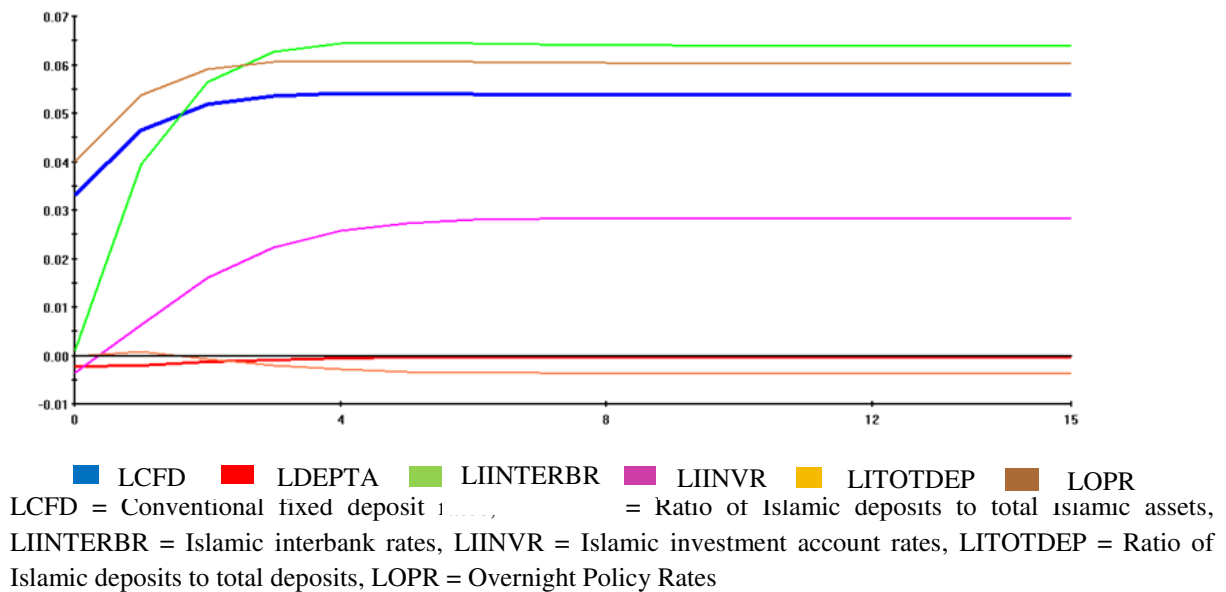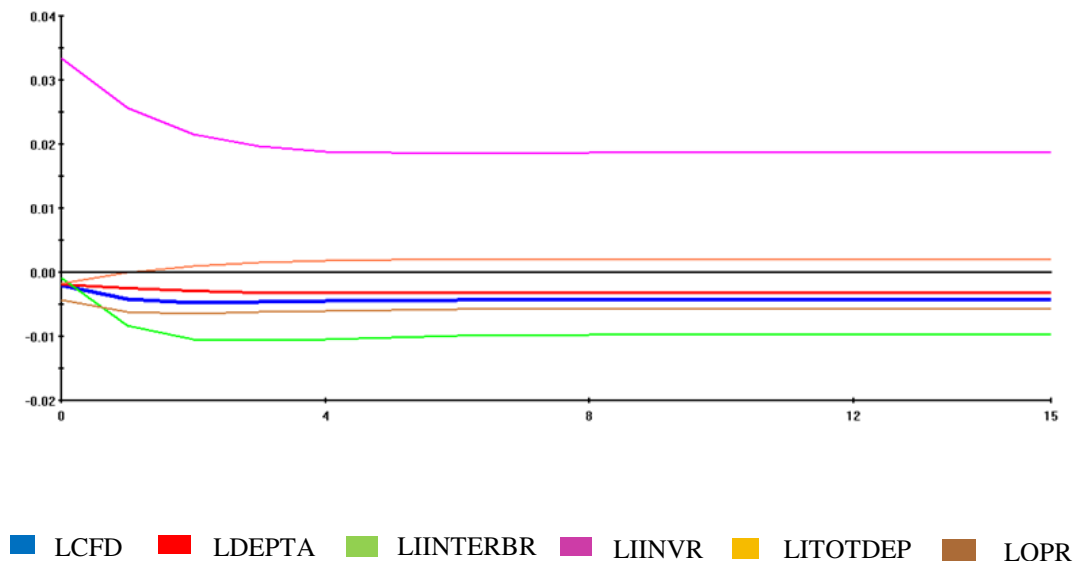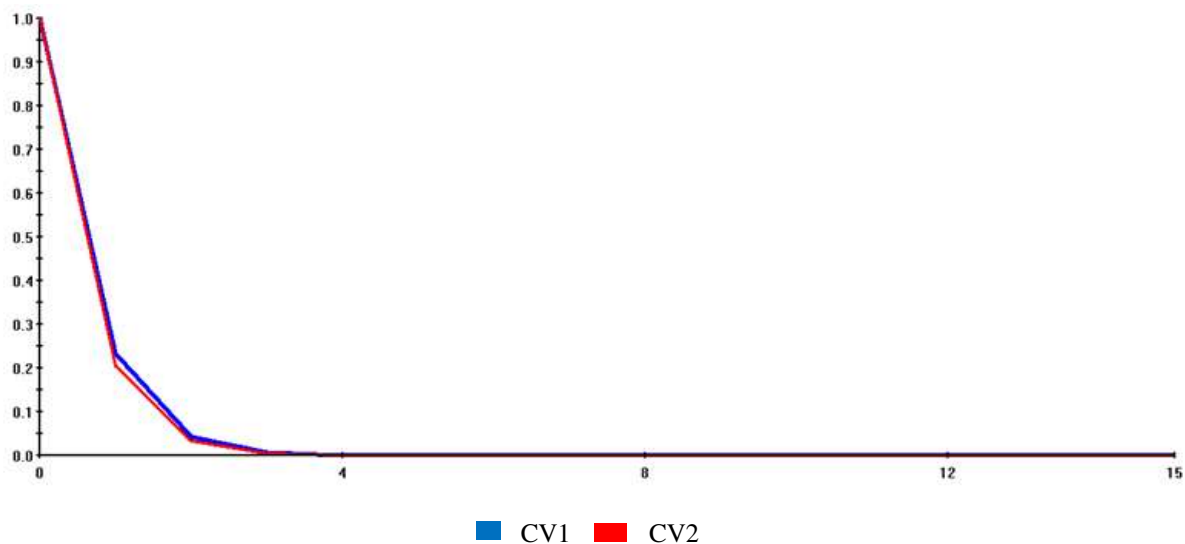
Figure 7
Generalised Impulse Response(s) to one S.E. shock in the equation for LIINVR

LCFD = Conventional fixed deposit rates, LDEPTA = Ratio of Islamic deposits to total Islamic assets, LIINTERBR = Islamic interbank rates, LIINVR = Islamic investment account rates, LITOTDEP = Ratio of Islamic deposits to total deposits, LOPR = Overnight Policy Rates

Figure 7 confirms our earlier findings on the endogeneity of Islamic rates such as the investment account rates. It shows that a one-period standard deviation shock to investment account rates produces less than a 0.01 change on other variables such as conventional fixed deposit rates, the ratio of Islamic deposits to total Islamic assets and OPRover a two-month period. Results of shocks to other variables are not shared in this study because the focus variables are the Islamic investment account rates and OPR.Finally, an application of the persistence profileanalysis in Figure8 indicates that in the event of a system-wide shock, it willtake almost four months for the equilibrium to berestored.

Figure 8
Persistence Profile of the effect of a system-wide shock to CV(s)

CV1　CV2

8. CONCLUSIONS AND POLICY IMPLICATIONS

Forty years after the introduction of modern Islamic finance, this study provides the latest confirmation that Islamic rates such as investment account and interbank rates are still cointegrated with conventional rates in Malaysia. Additionally, in an exogeneity ranking, it was found thatthe ratios are the strongest leaders among the variables and the Islamic rates the weakest followers. Both the conventional rates (OPR and fixed deposit rates) are a tie in the middle. Worth noting is the change for the ratio of Islamic deposits to total deposits, which is the proxy for the impact of market share on investment account rates. While in VECM, it was found to be endogenous, through VDC, it came out as the second highest exogenous variable. Since VECM is based on the historical sample and VDC projects into the future, this change is a likely indication that IFSA may help to reconfigure the variables that affect Islamic deposits and its market share. Other factors such as the banks' asset returns or performance in its investments maystart to matter more than the variables in this study ie deposit and interbank rates.This may explain why the ratio is projected to become exogenous

in the future. A lot however depends on how the Islamic banks reclassify their deposits versus investment accounts and how these are booked in their balance sheets.

Another factor that may cause the ratio to become exogenous in the future is the fact that Islamic banks can no longer use the profit equalisation reserves and investment risk reserves to smooth returns on investment accounts. This IFSA regulation may force Islamic banks to disburse the true profit and loss rates to customers, hence affecting the previously endogeneous nature of the ratio of Islamic deposits to total deposits.

The VDC result, which stated that the Islamic rates are the weakest followers, is in line with the VECM results as well as previous studies. This study finds that OPR for example, explains 33% of the variance of the Islamic investment account variable, whereas the latter explains only 0.45% of the variance in OPR. Further, it is also found that conventional fixed deposit rates and OPR explain most of the variance (30-50%) in both Islamic investment account rates and interbank rates.

The VDC results and exogeneity ranking are potentially useful for regulators such as BNM to compare the progress of its Islamic finance industry post-IFSA. If successful, the exogeneous variables should no longer be conventional rates but perhaps benchmarks with links to the real economy such as the gross domestic product, industrial production and equity market returns. If unsuccessful, BNM and Islamic banks in Malaysia may need to look for other ways for the banks to offer *mudarabah* investment account rates in a way which allows for true profit and loss sharing. This is inevitably linked to how they book the monies in the balance sheets. The need to balance the assets and liabilities may lead to a liquidity premium charge which shaves returns down to the level of conventional deposit rate. Thus, the regulator may need to set certainminimum requirements for Islamic banks, as per the IMF suggestions in its April 2015 paper.

In 'Supervisory, regulatory and capital adequacy implications of profit sharing investment accounts in Islamic Finance' (Karim, Archer, Sundararajan, 2010), the authors highlighted that it is critical for Islamic banks and regulators to determine the true value of 'alpha', or the proportion of assets that is funded by profit-sharing investment accounts. It is critical because it will impact the denominators of banks' capital adequacy ratios. Depending on the nature of the investment accounts, alpha may be close to zero if they are treated as pure, investment-like products or close to one if they are deposit-like. Some themes in the study are outdated but the overall point of finding an appropriate way to book monies from the profit-sharing investment accountshold. This is especially given that banks still have a fiduciary duty to depositors. Thus, lessons from the implementation of IFSA can be bundled with this study's findings and offered to other central banks which are also looking to either start, expand or evolutionise their Islamic banking practices towards a better version 2.

Readers however, need to bear in mind some limitations of this study.The results are based on data from one country (Malaysia). For it to be relevant to other jurisdictions, regulators and Islamic banks of the receiving countries need to adapt the lessons to their local

practices.The multivariate time series technique also has limitations. For example, the cointegrating tests (such as Johansen) and the unit root tests (such asADF and PP, which precede the cointegrating tests) lack power and are biased in favour of accepting the null hypothesis. The cointegration tests also require variables to be I(1) but the order of integration of a variable, whether I(1) or I(0), may depend on the number of lags included or whether the intercept and/or the trend are included or excluded in the unit root tests.Bearing these limitations in mind, research findings can serve as useful guides, though not conclusive evidences, to help policy and decision makers in their analysis.

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