An Analysis of Islamic Banks' Exposure to Rate of Return Risk

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The objective of this study is to analyze the dynamic effects of interest rate changes on the rate of return of Islamic banks and the amount of deposits in the conventional and Islamic banks. In analyzing the potential rate of return risk in the Islamic banks and interest rate risk in the conventional banks, for the Islamic banks, the 3-month Islamic deposit rate of return and total Islamic deposit are considered, while for the conventional banks, the 3-month fixed deposit interest rate and total conventional deposits are considered. Using data covering the period from January 1997 to October 2008, the study applies the cointegration analysis, bi-variate Granger causality test, Impulse Response Function (IRF) and Variance Decomposition (VDC) analysis based on the Vector Auto-regression (VAR) framework. The results of the study have important implications on the risk management practices of the Islamic banks in Malaysia. Several suggestions are put forward to mitigate the rate of return risk so as to ensure healthy growth of the Islamic banking institutions.

1. Introduction

In the process of providing financial services, commercial banks assume various kinds of financial risks. The risks can be categorized into six types, namely systematic or market risk, credit risk, counterparty risk, liquidity risk, operational risk and legal risk. Market risk, in particular, involves interest rate and foreign exchange risks. Interest rate risk can be of various forms, which include re-pricing risk, yield curve risk and basis risk. A key source of interest rate risk resulted from a common characteristic of banks in that they borrow short and lend long, leading to the maturity mismatch or re-pricing mismatch.

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Interest rate risk can be defined as the exposure of a bank's financial condition to adverse movements in interest rates. The changes in interest rates can affect bank's earnings by affecting its net interest income and the level of other interest-sensitive income and operating expenses. It also affects the underlying value of the bank's assets, liabilities, and off-balance-sheet instruments because the present value of future cash flows and in some cases, the cash flows themselves change due to interest rates fluctuations. As such, an effective risk management process that maintains interest rate risk within prudent levels is essential for the safety and soundness of the banks.

Similar to the conventional banks, the Islamic banks also face the financial risks but with variations due to specific requirements to comply with the *shari'ah*. With regard to the interest rate risk, the Islamic banks could also be exposed to the same risk, known as the rate of return risk as suggested by the Islamic Financial Services Board (IFSB) (2005). In the context of their overall balance sheet exposures, the Islamic banks are exposed to a "squeeze" resulting from holding fixed-return assets such as *murabahah* that are financed by investment accounts, the holders of which expect a rate of return in line with the benchmark rates. An increase in the benchmark rates may result in investors or fund providers having expectations of a higher rate of return.

However, rate of return risk differs from interest rate risk in that Islamic banks are concerned with the result of their investment activities at the end of the investment-holding period. According to Iqbal and Greuning (2008), the rate of return risk is different from the interest rate risk in two ways. First, since Islamic banks have a mix of mark up-based and equity-based investments, there is higher uncertainty in the rate of return earned on investments compared to conventional banks which operate on interest-based whereby there are fixed-income securities on the assets side. Second, the return on deposits in conventional banks is pre-determined, while the return on deposits in Islamic banks is anticipated but not agreed beforehand.

In a dual banking system where the Islamic banking system operates in parallel with the conventional system such as in Malaysia, there is indeed a substantial link between the Islamic and conventional systems.

Changes in the conventional interest rates put pressure on the Islamic deposit rates as interest rate differentials could lead to easy arbitrage opportunity. Consequently, the Islamic banks are exposed to the interest rate movements similar to their conventional counterparts since the rate of return in the Islamic bank is sensitive to the changes in the interest rate.

A consequence of the rate of return risk in the Islamic banks is the displaced commercial risk (DCR) which involves the transfer of risk associated with deposits to equity holders. DCR implies that the bank may operate in full compliance with the *shari'ah* requirements, may not be able to pay competitive rates of return as compared to its peers and other competitors. Depositors will have the incentive to seek withdrawal and to prevent the withdrawal, the banks will need to apportion part of their share of profits to the depositors.

Islamic banks may be under market pressure to pay a return that exceeds the rate that has been earned on assets financed by investors or fund providers when the return on assets is under-performing as compared with competitors' rates. Islamic banks may decide to waive their rights to part or entire *mudharib* share of profits in order to satisfy and retain their fund providers and dissuade them from withdrawing their funds. In short, DCR derives from competitive pressures on Islamic banks to attract and retain investors or fund providers. An example for the practice of this approach is the International Islamic Bank for Investment and Development in Egypt which distributed all of its profit to the investment account holders and nothing to its shareholders from the middle to late 1980s.

The practice of forgoing part or all of the shareholders' profits may adversely affect the bank's capital which in turn may lead to another risk, namely the insolvency risk. To avoid this risk, Islamic banks could undertake the income smoothing method whereby the banks create reserves out of profits attributable to the account holder, particularly the profit-sharing investment account to smooth the return to the shareholders without affecting their profit allocation. In practice, the bank may include a clause in the contract which provides the right to the bank to set aside a certain percentage of the profit, that attributable to the accountholders, as a reserve.

One such reserve, as drawn up by AAOIFI standard is Profit Equalization Reserve (PER) which is created by setting aside amounts out of the bank's profit before allocation and calculation of the *mudharib* holder. Another reserve is Investment Risk Reserve (IRR) by setting aside amounts out of the profit attributable to the profit-sharing investment holders, which the bank as *mudharib* is typically authorized to do in the investment or *mudharabah* contract. Furthermore, the portion of PER that is attributable to the profit-sharing investment account and all of the IRR then will be invested in assets that give return to the profit-sharing investment account.

In view of the important issue of the rate of return risk, this study aims to provide empirical evidence on the exposure of the Islamic banks to the rate of return risk and suggest effective ways to mitigate the risk. Focusing on the Malaysian case, this study aims to analyze the effect of interest rate changes to the rate of return in Islamic banks and the effect of the deposit rate changes on the deposits of the conventional banks and the Islamic banks.

The rest of the study is organized as follows: the next section presents the overview of interest rate risk in the banking industry and rate of return risk in the Islamic banks. Section 2 reviews the literature to understand the inevitable role of bank in the risk business and highlights the typical risk factors and characteristics inherent in the banking operation in general. Subsequently, the discussion focuses on the rate of return risk and exposure of the Islamic banks to rate of return risk. Section 3 discusses the research methodology which includes the methods adopted, nature of the data and model specification. Section 4 presents the empirical findings and discusses the results. Finally, Section 5 concludes.

2. Literature Review

Interest rate risk is a major issue that needs serious attention by banks. The Basel Committee on Banking Supervision (2004) describes that changes in the interest rates can have adverse effects on both bank's earnings and its economic value. Bacha (2004) states that a constant rise in the interest rate may lead to several problems to the bank such as increasing in cost of fund since the bank would have to pay higher rate

in order to attract new deposits and maintain the existing ones. Variation in market interest rates could also affect the economic value of a bank's assets, liabilities and off-balance-sheet positions due to a mismatch in rate-sensitive assets and rate-sensitive liabilities. For this reasons, banks should be aware of the reduced earnings or outright losses that could threaten the financial stability of an institution by undermining its capital adequacy and reducing market confidence.

For the Islamic banks, a study conducted by Khan and Ahmed (2001) finds that the rate of return risk is the most critical risk faced by the Islamic banks compared to other risks such as the operational risk and liquidity risk. According to How et. al (2005), interest rate risk management or rate of return risk management should be a concern to the Islamic banks, particularly in a dual banking context such as in Malaysia. This is due to the misconception that the Islamic banks, which are not using interest rate in their dealings, are not exposed to interest rate risk or rate of return risk. The study documents that banks that offer Islamic financing are exposed to a higher rate of return risk than banks that do not offer the Islamic financing. This is due to the differences in the interest rate sensitivity of assets and liabilities in the Islamic banks. Unlike conventional bank that have more flexibility on the asset side, the Islamic bank have the fixed rate assets that not sensitive to the changes in market interest rate while the liabilities are sensitive to interest rate changes. Therefore the Islamic banks cannot react swiftly to changing interest rate and this lead to a higher exposure to rate of return risk.

The rate of return risk stems from uncertainty in the returns earned by Islamic banks on their assets. This uncertainty can cause a divergence from the expectations that investment account holders have on the liabilities side. The larger the divergence, the bigger is the rate of return risk. In this matter, Rosly (1999) argues that the Islamic banks in Malaysia have less flexibility on the asset side than conventional banks since most of the Islamic financing in Malaysia takes the form of *murabahah* and *bay' bithaman ajil* (BBA) which is insensitive to the market interest rates. Since all the Islamic liabilities are interest-sensitive, he argues that the fund gaps of the Islamic banks will always be negative. Consequently, the Islamic banks are at disadvantage in the face of changing interest rates. This is supported by his findings that

profit margins decline in Bank Islam Malaysia Berhad in the periods of rising interest rates when the interest margins of conventional banks increase.

Several studies suggest that the Islamic banks operating in a dual banking system are more vulnerable to the rate of return risk. Bacha (2004) documents that when the interest rates rise, Islamic banks have to raise deposit rate and failing to do so will expose them to the liquidity problem. Similarly, Kaleem and Md Isa (2003) find that Islamic banks in Malaysia take into account the conventional interest rates before adjusting their deposit returns. In addition, How et. al (2005) investigate if Islamic financing is related to bank risks namely credit, interest-rate and liquidity risk. The study finds that commercial banks in Malaysia that offer Islamic financing facilities have significantly lower credit and liquidity risks but significantly higher interest rate risk than banks that do not offer such facilities. Kasri and Kassim (2009) examine the dynamic interactions among determinants of the Islamic banking growth in Indonesia namely real *mudharabah* investment deposit, real rate of interest, real rate of return, Islamic banks' branch and real income. Based on Vector Auto-regression (VAR) methodology, this study finds that the conventional interest rate is one of the major determinants of saving in the Islamic banks in Indonesia. Furthermore, the study documents that the Islamic banks are exposed to various types of risks namely rate of return risk, DCR, benchmark risk and *shari'ah* compliance risk.

As mentioned, a consequence of the rate of return risk is the DCR. According to Greuning and Iqbal (2007), the AAOIFI has identified the DCR as the risk when an Islamic bank is underperform during a period and is unable to generate adequate profits to pay its investors-depositors a rate of return higher than what should be payable under the actual terms of the investment contract. Archer and Abdel Karim (2006) argue that DCR is potentially an efficient and value-creating means of sharing risks between two classes of investor with different risk diversification capabilities and preferences. As a solution, Islamic banks set up reserves with the intention of minimizing any need to forgo management fees. Thus, according to Greuning and Iqbal (2007), the attempt to mitigate the DCR has led to the development of two standard practices in the banking industry namely the Profit Equalization Reserve (PER) and

Investment Risk Reserve (IRR). In examining the provisioning behavior of PER, Ismail and Shahimi (2006) find that the provisioning decisions should be based on the entire future profile of expected losses and PER decisions should not be independent of the way in which financings are priced.

3. Methodology

3.1 Empirical Framework

This study describes the dynamic interactions among a set of variables using vector time series analysis. In order to analyze the relationship between the Islamic banks' rate of return, conventional banks' interest rate, Islamic banks' total deposits and conventional banks' total deposits in Malaysia, a VAR model is utilized.

The validity of the VAR analysis depends on the stationarity of the time series. This implies that the time series should have no trends or fixed seasonal patterns and economic time series have to be transformed before these properties hold. This study utilizes two unit root tests on the individual stochastic structure, that are the Augmented Dickey-Fuller (ADF) test and Phillip-Perron (PP) test which have been frequently used for time series data.

In this study, the lag is determined based on Schwarz Criterion (SC) which is commonly used for the VAR model. Once the stationarity condition has been determined, the study then conducts a cointegration test using a multivariate test developed by Johansen (1988) and Johansen and Juselius (1990). The cointegration test is based on the maximum likelihood estimation of the VAR model. In order to examine the causality and the direction of influence of one variable to another variable, this study adopts the bi-variate Granger causality test based on Granger (1969). Next, this study conducts Impulse Response Function (IRF) to ascertain how each variable responds over time to a shock in itself and in other variable by using the innovation technique. The IRF essentially maps out the dynamic response path of a variable to a change in one of the variable's innovations. Finally, the Variance Decomposition (VDC) is adopted to indicate the degree of exogeneity between variables outside of the sampling period. The VDC shows the

percentage of forecast error variance for each variable that may be attributed to its own shocks and to fluctuations in the other variables in the system.

3.2 Data and Model Specification

In Malaysia, where the Islamic banks operate hand in hand with the conventional banks, the two systems may interact given that they operate in a common macroeconomic environment (Bacha, 2004). If the rate of return in the Islamic banks and interest rate in the conventional banks are related, an increase in interest rate may induce the Islamic banks to increase their deposit return in order to avoid the problem of depositors switching their deposits to the conventional banks or withdrawing their funds. In addition, no restriction is imposed on the depositors in the dual banking system in Malaysia who wishes to move their funds from one system to another could also expose the bank to the problem of DCR.

In term of the deposit rate, Chong and Liu (2008) suggest that the rate of return on the Islamic investment is closely pegged to the conventional banks' interest rate. Additionally, Kaleem and Md Isa (2003) and Bacha (2004) find the evidence of a significant relationship between Islamic banks' rate of return and conventional banks' interest rate and prove that the changes in conventional banks' interest rate Granger cause changes in Islamic banks' rate of return.

In term of the total deposits, Bacha (2004) finds that there is a strong correlation between the total deposits of the Islamic banks and conventional banks. The Granger causality test shows a uni-directional causality from the conventional banks' total deposits to the Islamic banks' total deposits. Islamic banks' total deposits were also found to have a relationship with Islamic banks' rate of return and conventional banks' interest rate. Haron and Shanmugam (1995) for instance, find a strong negative relationship between interest rate and Islamic banks' total deposits. In another study, Haron and Ahmad (2000) and Kasri and Kassim (2009) show a negative relationship between the interest rate and Islamic banks' total deposits. These findings lead to a conclusion that the DCR is observed among the depositors of Islamic banks. Moreover, these studies find that Islamic banks' total deposits and

Islamic banks' rate of return are positively related which indicates a rate of return risk in the Islamic banks whereby the depositors are attracted to a high rate of return and may switch or withdraw their deposits when the rate of return decreases.

In order to analyze the potential rate of return risk for the Islamic banks, this study analyzes the relationship between the rate of return of the Islamic banks and interest rate of the conventional banks. Thus, the two key variables of the Islamic banks being examined in this study are the rate of return and total deposits since the interest rate changes would possibly give a direct impact on them. If interest rate risk resulting from the change of interest rate exists in the conventional banks, it follows that if the costs of funds for the Islamic banks are equally changing, then they must face rate of return risk.

Based on the above, this study estimates a four-variable VAR model using Islamic banks' rate of return (IBROR), conventional banks' interest rate (CBINT), Islamic banks' total deposits (LNIBTD) and conventional banks' total deposits (LNCBTD) as the main variables in the system. Specifically, this study focuses on the following systems:

IBROR = {IBROR, CBINT, LNIBTD, LNCBTD}
CBINT = {IBROR, CBINT, LNIBTD, LNCBTD}
LNIBTD = {IBROR, CBINT, LNIBTD, LNCBTD}
LNCBTD= {IBROR, CBINT, LNIBTD, LNCBTD}

where IBROR is the Islamic banks' rate of return proxied by 3-month return on investment account of the Islamic banks, CBINT is the conventional banks' interest rate proxied by 3-month rates on fixed deposits of the conventional banks, and LNIBTD and LNCBTB are total deposits of the Islamic and conventional banks, respectively.

The data for this study are taken from the various issues of Bank Negara Malaysia's *Monthly Statistical Bulletin*. The study uses monthly data covering the period from January 1997 to October 2008. The total deposits data are aggregated across all accounts including demand deposits, investment deposits and savings deposits.

4. Results and Discussions

4.1 Pearson Correlation

The overall results suggest that the correlations between all the variables are statistically significant. The significance and high magnitude of the Pearson correlation coefficient shows the close association and possible co-movement between the variables under consideration.

The Pearson correlation provides a very interesting result. First, the relationship between Islamic banks' rate of return and conventional banks' interest rate is shown to be very strong and positive. With a correlation coefficient of 0.95, this seems to suggest that one deposit rate is benchmarked against the other deposit rate. Second, the relationship between Islamic banks' rate of return and Islamic banks' total deposits is shown to be negative and significant. This is quite puzzling since one could expect as the return on deposit increase, the deposit will increase accordingly. Third, the relationship between Islamic banks' rate of return and conventional banks' total deposits is also negative and significant. This is a logical relationship which suggests that as Islamic rate of return increase, conventional banks' total deposits would decrease, *vice versa*. Fourth, the relationship between Islamic banks' total deposits and conventional banks' interest rate is shown to be significantly negative. This suggests that Islamic banks' total deposits decrease when return on conventional deposits is higher, *vice versa*. In order to rule out the possibility of spurious correlations, next, this study conducts several standard econometric tests to determine unit root, cointegration and Granger causality.

Table 1: Results of the Pearson Correlation Coefficient

	IBROR	LNIBTD	CBINT	LNCBTD
IBROR	1.000000			
LNIBTD	-0.876843*	1.000000		
CBINT	0.952188*	-0.848047*	1.000000	
LNCBTD	-0.683497*	0.928959*	-0.643963*	1.000000

Note : * denotes significance level at 5%.

4.2 Unit Root Test

Table 2 presents the results of the stationarity test at level and first difference. From the results, it is found that the null hypotheses of non-stationary for all the time series failed to be rejected at level. However, the null hypotheses are rejected for all the time series at first difference. The results clearly indicate that all variables are stationary at I(1).

Table 2: Results of Unit Root Tests

Variables	ADF Test		PP Test	
	At Level	First Difference	At Level	First Difference
IBROR[a]	-1.53707	-4.025714*	-1.631849	-9.192220*
CBINT[a]	-1.587980	-4.046401*	-1.704210	-9.028974*
LNIBTD[b]	-1.269480	-3.532226**	-1.388691	-9.173869*
LNCBTD[b]	-1.662459	-3.443719***	-2.086609	-11.89537*

Notes : *, ** and *** denote significant at 1% , 5% and 10% significance level, respectively.
[a] with intercept.
[b] with intercept and linear trend.

4.3 Cointegration Test

For all models, Schwarz Criterion test confirmed that a one-period lag is suggested as the optimal lag length. Based on the results from the maximum eigenvalue and trace statistics as reported in Table 3, the null hypothesis of no cointegration vector hypothesis (r = 0) is rejected at 5 percent significance level. In other words, at least one cointegration vector exists for series of variables in the system. The existence of the cointegrating vector suggests that the variables in the system have a long-run equilibrium.

Table 3: Results of the Johansen Cointegration Test[a]

Null Hypothesis	Test Statistics		Critical Values (5%)	
	Trace	Maximum-Eigenvalue	Trace	Maximum-Eigenvalue
r = 0	84.77631*	59.91827*	63.87610	32.11832
r ≤ 1	24.85803	12.85417	42.91525	25.82321
r ≤ 2	12.00386	7.088297	25.87211	19.38704
r ≤ 3	4.915563	4.915563	12.51798	12.51798

Notes: The test statistics are compared to the critical values from MacKinnon-Haug-Michelis (1999)
[a] with trend assumption; linear deterministic trend.

4.4 Granger Causality Test

The results of the Granger causality test show two significant causal relationships. First, there is a bi-directional causal relationship between Islamic banks' rate of return and conventional banks' interest rate. This result is supportive of our earlier findings based on the Pearson correlation. Second, there is a significant uni-directional relationship between Islamic banks' rate of return and Islamic banks' total deposits suggesting that the level of Islamic banks' total deposits significantly affected by their rate of return. This result leads to a conclusion that the depositors' behavior is driven by profit motive.

Table 4: Results of the Granger Causality Test

Null Hypothesis:	F-Statistic	p-value
CBINT does not Granger Cause IBROR	131.967*	7.E-22
IBROR does not Granger Cause CBINT	4.43995**	0.0369
LNIBTD does not Granger Cause IBROR	1.32567	0.2516
IBROR does not Granger Cause LNIBTD	5.10435**	0.0254
LNCBTD does not Granger Cause IBROR	0.02646	0.8710
IBROR does not Granger Cause LNCBTD	0.46015	0.4987
LNIBTD does not Granger Cause CBINT	0.08970	0.7650
CBINT does not Granger Cause LNIBTD	0.91641	0.3401
LNCBTD does not Granger Cause CBINT	0.02145	0.8838
CBINT does not Granger Cause LNCBTD	0.29037	0.5909
LNCBTD does not Granger Cause LNIBTD	2.19613	0.1406
LNIBTD does not Granger Cause LNCBTD	0.68484	0.4094

Note: * ,** and *** denote significant at 1% , 5% and 10% significance level, respectively.

4.5 Impulse Response Function (IRF)

As shown in Figure 1, the Islamic rate of return responds positively and immediately to innovations in the conventional banks' interest rate lasting for approximately 22 months. This result confirms the co-movement between the two rates and consistent with the Granger causality results. The result has an important implication that the significant relationship and particularly the impact of interest rate on Islamic deposit rates indicate the exposure of Islamic banks to rate of return risk.

More importantly, the IRF results show that Islamic banks' total deposits respond significantly to the conventional banks' interest rate, but not the Islamic rate of return suggesting the important influence that the conventional banks' interest rate has on the Islamic banks' total deposits. This finding suggests two important implications; first, since the changes in Islamic banks' total deposits depend on the level of conventional banks' interest rate, this could mean that there is a deposit-

flight from the Islamic banks to the conventional banks when the conventional banks' interest rate increases. This is an evidence of DCR. Second, the important relationship between conventional banks' interest rate and Islamic banks' total deposits suggests that the customers of Islamic banks are sensitive to the reward received on their deposits and their saving behavior is driven by profit motive (Haron and Ahmad, 2000 and Haron and Wan Azmi, 2008). This also implies a rate of return risk whereby a higher rate of return would increase the level of Islamic deposits, and *vice versa* (Kasri and Kassim, 2009).

Figure 1: Results of the Impulse Response Function

Response to Cholesky One S.D. Innovations ± 2 S.E.
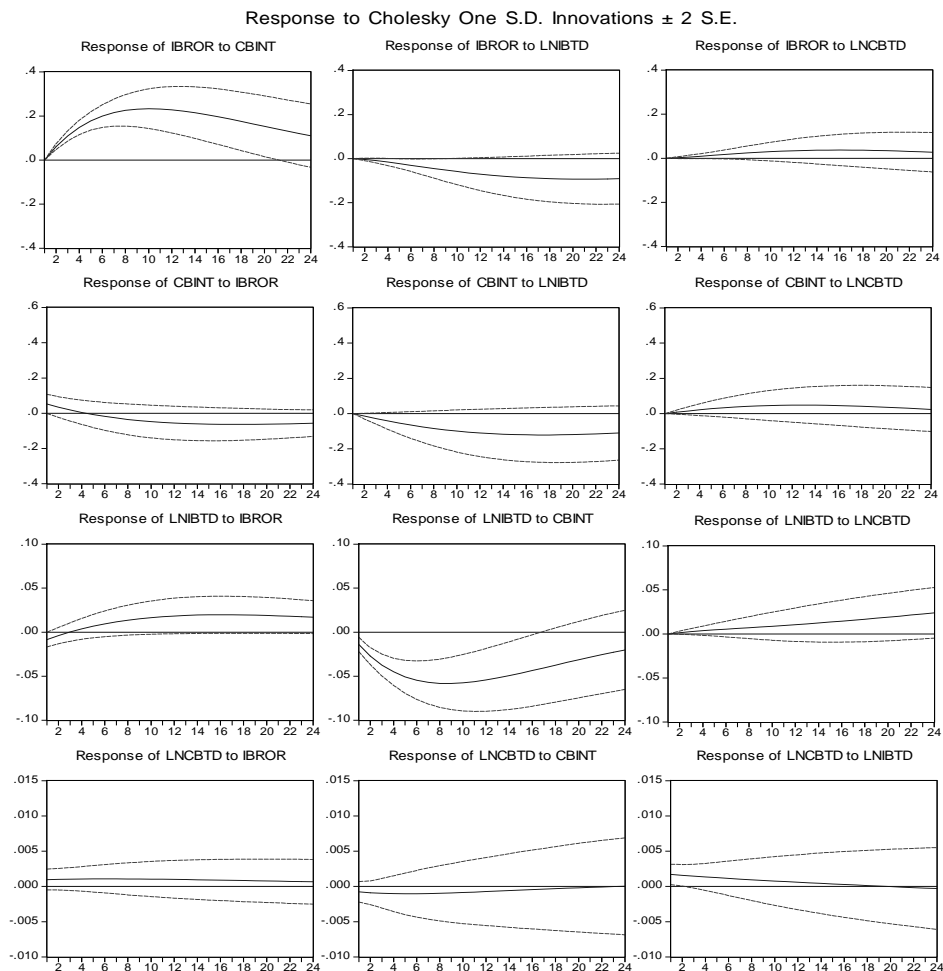
4.6 Variance Decomposition Analysis (VDC)

The ordering of the variables for VDC in this study is based on the Cholesky decomposition method which suggests the following order of the variables: IBROR, CBINT, LNIBTD, and LNCBTD. Results of the VDC method are presented in Table 5. Similar to IRF, the results are reported for a 24-month horizon.

According to Table 5, in the case of Islamic banks' rate of return, 84.9 percent of the variations are contributed by other variables. Among all the variations, conventional banks' interest rates are the most significant variable, explaining about 56.7 percent of the Islamic banks' rate of return forecast error variance. This result is consistent with that of Granger causality tests. On the other hand, only 13.2 percent of the variations of conventional interest rate are explained by variations of Islamic banks' rate of return, while 23.1 percent are explained by conventional banks' total deposits. Interestingly, about 62.6 percent of the variations in Islamic banks' total deposits are explained by the conventional banks' interest rate. This finding suggests that conventional banks' interest rate is an important factor in affecting changes in total deposits in Islamic banks. Thus, any changes in interest rate will affect the total deposit in Islamic banks and Islamic bank will be affected by the rate of return risk.

Table 5: Results of Variance Decompositions Analysis

Variance Decomposition of	Period	Innovations in			
		IBROR	CBINT	LNIBTD	LNCBTD
IBROR	1	100	0	0	0
	4	51.748	47.708	0.319	0.224
	8	32.214	64.930	0.240	2.616
	12	23.785	66.325	0.141	9.749
	24	15.122	56.705	1.300	26.877
CBINT	1	5.321	94.680	0	0
	4	11.300	87.021	0.380	1.300
	8	17.442	73.660	0.538	8.360
	12	15.763	69.797	0.472	13.968
	24	13.178	62.257	1.431	23.134
LNIBTD	1	4.667	9.658	85.676	0
	4	5.696	52.807	41.327	0.170
	8	3.931	66.163	28.525	1.382
	12	2.474	70.543	22.679	4.305
	24	7.682	62.616	24.225	5.477
LNCBTD	1	0.866	1.497	5.438	92.200
	4	2.511	0.808	7.103	89.578
	8	5.862	1.136	3.861	89.140
	12	5.741	2.192	3.507	88.560
	24	11.518	1.710	4.953	81.820

5. Conclusions

In a dual banking system such as in Malaysia, the Islamic banking system operates in parallel with its conventional counterparts. Customers are free to choose either system and also given the right to switch between them. In this regard, there is a tendency for the customers to take advantage of any arbitrage opportunity due to the rate differentials and fund flows. As a consequence, though the Islamic banks are operating on interest-free basis, the economic environment in

a dual banking system may expose them to the problem of rate of return risk. Thus, the aim of this study is to analyze the potential of interest rate risk for Islamic banks as they may be affected by the interest rate movements in the conventional system.

In efforts to achieve its objectives, this study relies on several empirical tests. First, the Pearson correlation analysis was conducted and the results show a significant relationship between all the variables being considered. The study shows that both Islamic banks' rate of return and conventional banks' interest rate are cointegrated and have a long-run equilibrium. This finding is further supported by the Granger causality test which indicates a bi-directional causality between the Islamic banks' rate of return and conventional banks' interest rate. The results from the IRF and VDC are supportive of the earlier results and provide more detailed findings. In particular, the IRF shows that the Islamic banks' rate of return and deposits respond significantly to changes in the conventional interest rates. This is again, evidence that the Islamic banks are exposed to the rate of return risk. When the interest rate rises, Islamic banks have to follow the market trend by raising the deposit rate accordingly, or otherwise the Islamic banks will face the liquidity problem.

At the same time, this study indicates the profit motive among the Islamic bank depositors as reflected by the significant impact of the Islamic banks' rate of return on Islamic banks' total deposits. The implication of this finding is that the Islamic banks might be exposed to the rate of return risk. Ironically, the depositors will increase their deposits only when the rate of return is increase. Otherwise, when the rate of return decreases, they will definitely decrease their total deposits in Islamic banks and they could switch their funds to the conventional banks. This also implies the problem DCR in the Islamic banking system.

Furthermore, the study also finds a possibility of DCR as shown by the significant negative relationship between Islamic banks' total deposits and conventional banks' interest rate. This particular finding shows that when the conventional banks interest rate increases, the Islamic bank depositors will transfer their funds from the Islamic banks to the conventional banks. The implication of the DCR or the practice of

forgoing part or all of the shareholders' profits may adversely affect the bank's own capital which can lead the banks to insolvency risk in extreme cases.

In accepting such major findings of this study, the policymakers should be aware that the Islamic banks are vulnerable to the rate of return risk. As suggested by Bacha (2004), to protect Islamic banks from the risks that caused by the interest rate movements, reducing the maturity on loans on the asset side is the only way can Islamic bank do but this methods is dangerous since it can harms the Islamic banks structure in general. Thus, two alternatives are recommended for the Islamic banks. Firstly, the Islamic banks should move away from fixed rate instruments like *murabahah* and BBA into profit and loss sharing contracts like *musyarakah* and *mudharabah*. The advantage of the profit and loss sharing contracts is that the financing will be detached from the rate movements since they are directly independent on profit or loss from the financed business. Secondly, a risk-sharing agreement between Islamic banks and their customers should take into account that the customer of long maturity loans agrees to partially compensate the banks if the average rate of return exceeds the predetermined level. In return, the banks agree to reduce the mark-up on outstanding balance if the rate is below the predetermined level.

This study however, has its own limitation whereby it is conducted within a limited time period and variables. Further extension of this research should consider a wider scope of deposits by conducting the same approach on different type of deposits available in Islamic banks and specific financial institutions categorized under Islamic financial institutions. The study will then identify the risk exposures across different type of deposits and different characteristics of Islamic financial institutions. In addition, identification of the rate of return risk can be done by analyzing the individual bank using the bank level data in order to compare the performance of the banks particularly in rate of return risk management.

Further extension of the study could consider the determinants of rate of return of the Islamic banks. Since most of the study focused on the determinants of the Islamic banks' deposits, the determinants of the rate of return should also be given an equal attention by researchers. In order to enrich the study on risk management in Islamic banks, the

determinants of rate of return can provide evidence on the risk exposure in the Islamic banks and thus can provide the appropriate solution to mitigate such risks. This can help to provide an alternative to the risk management tools which believed are still lacking as argued by Iqbal (1999).

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APPENDIX

ARTICLE	OBJECTIVES	DATA/METHODOLOGY	FINDING/CONCLUSION
Bacha (2004)	To analyze the extent of potential interest rate risk for Islamic banks in Malaysia by investigating the linkages between 3 month interest rate and 3 month rate of return and also the linkages between the total deposits of the two banking systems	The study uses Malaysia's monthly data from January 1994 to July 2003. In this study, the methods employed are Pearson correlation, Ordinary Least Square (OLS) regression analysis and Granger Causality Test.	The results show that the changes in conventional banks interest rates and total deposits Granger cause changes in Islamic banks rate of return and total deposits respectively. The results imply that the Islamic banks operating within a dual banking system may also be subject to interest rate risk. When the interest rate rise, Islamic bank have to raise the deposit rate to avoid liquidity problem.

ARTICLE	OBJECTIVES	DATA/METHODOLOGY	FINDING/CONCLUSION
How, Abdul Karim and Verhoeven (2005)	To examine the exposure of Malaysian banks that offer Islamic financing to credit risk, interest rate risk and liquidity risk.	Using the sample of 23 banks in Malaysia from year 1988 to 1996, the study employs the parametric t-test, non-parametric Mann-Whitney test and OLS regression.	The results show that the commercial banks in Malaysia that offer Islamic financing facilities have significantly lower credit and liquidity risks but significantly higher interest rate risk than banks that do not offer such facilities. Therefore, the Malaysian Islamic banks should give attention to the interest rate risk (rate of return risk) management.
Rosly (1999)	To provide an empirical proof on the declining performance of Islamic banking during a period of rising interest rate	Using the sample of six banks in Malaysia (namely BIMB, Maybank, Bank Bumiputra, Public Bank, Oriental Bank and Pacific Bank) from year 1996 to 1997, the study compares the profit margin in the Islamic banks and interest margin in the conventional banks.	The study finds that the profit margins of BIMB decline during the period of rising interest rate, while the interest margins of conventional banks show a rising trend. Thus this study suggests that the Islamic banks should diversify into equity financing such as *mudharabah* and *musyarakah* to avoid the decline in income due to the interest rate volatility.

ARTICLE	OBJECTIVES	DATA/METHODOLOGY	FINDING/CONCLUSION
Kaleem and Md Isa (2003)	To examine the extent of substitutability between Islamic and conventional banking depository returns by comparing the Islamic and conventional term deposits returns (TDRs).	The data used are the TDRs offered by the commercial banks, finance companies and merchant banks from January 1994 to December 2002. The method used is the Granger Causality test.	The results show that conventional TDRs Granger cause Islamic TDRs. The overall results conclude that the interest rate affects the Islamic rate of return.
Ismail and Shahimi (2006)	To examine the provisioning behavior of Profit Equalization Reserve (PER) and to identify the underlying determinants of PER in Malaysian Islamic banks	This paper analyzes on a sample of 15 commercial banks that offer Islamic banking products and services from 2002 to 2004. The methods employed are the panel least squares for OLS and GLS (Generalized Least Square).	The results show that the provisioning decisions should be based on the entire future profile of expected losses and the PER decisions should be dependent on the way in which financings are priced.
Chong and Liu (2008)	To examine the relationship between the investment rates offered by the Islamic banks and the deposit rates offered by the conventional banks	The data used are the monthly series of Islamic and conventional rates based on the average rates across all financial institutions from April 1995 to April 2004. The methods used are the bi-variate Granger Causality test, Unit Root test (ADF and PP), Cointegration test (Johansen procedure) and Engle-Granger ECM.	The results show that the changes in conventional deposit rates cause changes in Islamic investment rates, not *vice versa*. The overall results show that the return on the Islamic banks deposit accounts are effectively pegged to the return on conventional banks deposit accounts.