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Interest Rate Risk Management and Islamic Banking: Evidence from Malaysia

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Abstract

The fluctuation of interest rate in the market has let the Islamic banks becoming more cautious and taking a step ahead in managing good risk management practices. This is an important element when a country adapts a dual banking system. The interest rate is obviously prohibited in Islam; however, it does not mean that the Islamic banks will not encounter any risk due to the interest rate fluctuation in the market. This is due to the nature of the Islamic banking balance sheet where it is fixed on asset side whereas in the conventional banking it looks more flexible to the asset, thus putting the Islamic banks unable to react expeditiously to the fluctuation in market interest rate which later leads to greater exposure to the rate of return risk. Therefore, the present study aims to investigate the effect of the interest rate risk towards the portfolios of the Islamic banks operating in the Malaysia. The quantitative result reveals that the majority of the Islamic banks are exposed to the interest rate risk and it is explained by the financial and economic variables. This study is expected to add value to the existing literature in risk management by proposing policy recommendations and methodological innovation.

Keywords: Interest Rate Risk, Islamic Banks, Malaysia

1. Introduction

Robust competition over recent period has caused an increase in investment complexity. John Kolhoff (2014) opines that complexity of financing products available today simply indicates larger opportunities for the increase in interest risk exposure despite financial institutions having sufficient levels of short-term liquidity. Great ranges of different activities that are engaged by modern bank consequent to vary of risk categories face in accordance to respected industries (Hull, 2007). The extant literature demonstrates that literal rudiment of financial risk can be classified into few types namely credit risk, market risk, operational risk and liquidity risk. Obviously, other non-financial risks such as strategic risk and business risk are equally essential. Sundararajan (2007) documents that the most dominant source of risk among banks is a credit risk. Below is the division of risks associated with an individual bank;

Table 1: Banking Risk Exposure

Financial Risks	Operational Risks	Business Risks	Event Risks
Balance Sheet Structure	Internal Fraud	Macro policy	Political
Income Statement Structure Adequacy	External Fraud	Financial Infrastructure	Contagion
Capital Adequacy	Employment practises and workplace safety	Legal Infrastructure	Banking Crisis
Credit	Client, products, and business service	Legal Liability	Other Exogenous risks
Liquidity	Damage to physical assets	Regulatory compliance	
Market	Business disruption and system failures (technology risk)	Reputational and fiduciary	
Interest Rate	Execution, delivery and process management	Country Risk	

Source: (Iqbal & Greuning, 2008)

Interest rate risk exposures are considered as highly important for both conventional banks and Islamic financial institutions. Financial institutions usually undertake interest rate risk when the return rate sensitivity of their asset differs from their liabilities. For the Islamic financial industry, this is defined as the rate of return risk (IFSB, 2005). The variation of interest rates in global credit markets is an essential concern among the financial institutions as to trigger precise valuation and management of interest rate risk. If this interest rate risk is sufficiently large (volatility in interest rate setting gets larger) and financial institutions lose its bet, hence, eventually may lead to insolvency.

In general, the net return income from financing activities represents the main source of income for commercial banks. Hence, the change in benchmark rate can affect the Islamic banks earning in the way that it disturbs the net return income and the level of other return-sensitive income and the operating expenses as well. In the conventional set-up, when the interest rate sensitivity of asset is higher than the interest rate sensitivity of deposits, an unexpected increase in interest risk will reduce the net worth of an institution (net profit). On the contrary, when an unexpected decrease in interest risk takes place, this will increase the net profit. A key source of interest rate risk is due to the common character of the financial institutions where when they borrow short and lend long that will consequently lead to a repricing mismatch or maturity mismatch.

In the contrary, the Islamic banks are more concern on the end of investment period as they are indulged with holding fixed-return assets such as in *Bai Bithamin Ajil* and *Murabahah* sales which are financed by the investment account. Here, Iqbal and Greuning (2008) urge that the rate of return risk differs from the interest rate risk in a way that since the Islamic banks apply equity-based and markup based, the level of uncertainty in the rate of return earned on investment is higher comparative to conventional banks operating on interest based with fixed income securities on its asset. In addition, the return on deposits of the conventional banks is predetermined, whereas the return deposit of the Islamic banks is anticipated but not agreed beforehand. This is further supported by Elgari (2003) who claims that when Shariah-based instrument deals with debt-based contracts, it changes the risk structure for the Islamic banks compared to the conventional banks. Moreover, Erturk and Yuksel (2013) demonstrate that any variation in the conventional interest rates disturbs not only the deposits and financing of the conventional banks but it similarly affects the deposits and financing instruments of the Islamic banks which may act as a confirmation for causality link between both systems.

Global financial crunch has been considered as main trials to the modern theory of finance model. Lesson learnt from it depicts that the risks which are not priced by the market position and moral hazard issues of the market can easily put the market into a state of crisis. On top of that, the effect of this is relatively hard, which may prolong and lead to the great recession.

Due to this, the international and domestic, the microeconomic and macroeconomic variables shocks are transmitted into the rate of return, leading to high volatility in the rate. Mismatching is an escapable part of the financial intermediation. Thus, the research objective is to descriptively analyse from economic and financial assessments as below;

i. To determine either the Islamic banks are exposed to the interest rate risk or not by calculating the duration gaps.
ii. To examine what are the determinants of the Islamic bank's duration gap.
iii. To propose the best way to mitigate the rate of return risk associated with the Islamic banks.

The continuation of the study is as follows; next part discusses further on the overview of the current state of thinking on literature and highlights on the role of banks in risk business and risk factor. Next section is the discussion on the rate of return risk and its exposure to the Islamic banks. The subsequent section discusses the elaboration on research methodology applied for the study and followed by the empirical finding and analysis of the results. Finally, we conclude and further recommendation is addressed in the last section.

2. Literature Reviews

Interest rate risk is an essential issue depicted from financing activities of banks that require serious attention. In response to that, an analysis which focuses merely on income gap analysis is not sufficient enough as it only measures the impacts of interest rate risk on income. Due to this, the previous study by Ghannadian and Goswami (2004) claims that the major difference that exists in the Islamic bank is merely due to the prohibition of interest that forces the bank to act as an investment company. In this capacity, the bank does not have a duration gap management issue which is said to be the western or conventional bank's general functional issues.

Extant literature proves that the exact valuation of change in interest rate risk is severely vital. For instance, Lileikiene and Likus (2011) find that risk potentially results from different evaluation terms of assets and liabilities in the balance sheet items. Due to changes in market interest rate, cost related to debt management can supersede income from assets of commercial banks. On the same occasion, the change on interest rate risk also impacts the market value of balance sheet items and the impact on net worth.

Crouhy at al. (2000) suggest that the interest rate risk level depends on the interest rate risk recognition process in banks which is expressed through the pursued policy for the asset and liability management. Every single change in interest rates drives to numerous issues upon banks. For instance, an increase in the cost of fund is found to be a disrupting factor for banks to pay a higher rate to attract new and maintain existing deposits. Elmendorf (1996) states that the rises in interest rate would increase personal saving which then results in the decrease in consumer spending thus slows down the economy. Therefore, banks should be aware of reduced earnings that could threaten their financial stability as Eregha (2010) reveals that variation in interest rate plays a negative and greatly significant role in investment decision in the economy for both short and long run. Consequently, the Basel Committee on Banking Supervision (2004) claims that the interest rate risk in the banking setting leads to changes of banks incomes and their economic value.

Similarly, Bodie (2006) finds that the asset-liability mismatch was the principal cause of the Savings and Loan Crisis of 1980, where the huge losses had to be covered by taxpayers. Thus, there is a significant need to explore further the impact of Islamic banks' rate of risk in order to alleviate unpredicted crisis for the industry.

Islamic banks encounter risks more than their counterpart due to the nature of its balance sheet and Shariah compliant requisite (Ahmed and Khan, 2007). Due to this, the rate of return risk management shall be a concern to Islamic banks especially those countries with dual banking environment. The reason being is due to the misconception that Islamic banks are not correlated with the variation of interest rate in their dealings. This had been verified by Abedifar et al. (2012) where they find that Islamic bank poses higher sensitivity of net interest margin to interest rate movement than a conventional bank. Subsequently, when the variation in the interest rate affects the rate of return risk, an imbalanced sensitivity among the

asset and liabilities will take place in Islamic banks. However, Abdul Karim and Verhoeven (2005) document in their research that unlike conventional bank which is more flexible to asset side, Islamic banks have a fixed rate of an asset which is not sensitive to market interest rate fluctuations as per variation taken place in liability side. Consequently, Islamic banks are unable to react expeditiously to the fluctuation in market interest rate which later leads to greater exposure to the rate of return risk.

In order to determine the exposure of Islamic banks on the rate of return risk, few variables are tested. With concern to loan variables, the study by Avery and Berger (1991) on loan commitment and bank risk exposure indicates that commitment loans tend to possess a bit healthier than average performance, suggesting that either commitment generates little risk or that this risk is offset by the selection of safer borrowers to receive commitments. Thus the impact of loan variables in the perspective to the rate of return risk towards banks is further measured.

In term of variable size, Ali (2006) finds that the size of Islamic finance banks grows its exposure to macro-level shocks in an affirmative manner. Ballester et al. (2009) further agree that factor contributing to the interest rate risk exposure by the Spanish banks using the Panel data analysis are found to have a significant positive association between bank sizes (total asset) to banks' interest rate exposure. Thus, Islamic banks should always engage in advanced monitoring and anticipate the developmental issues.

With regards to return on assets (ROA), Tafri et al. (2009) empirical study on the impact of financial risk on the profitability of Malaysian commercial banks document that credit risk has a substantial impact on ROA for both Islamic and conventional banks. The influence of interest rate risk on ROA is found to be significant for the conventional banks. Another study by English et al. (2012) indicates that the volatility in the interest rates disturbs the bank profitability predominantly through the influence on net interest margin. An increment in short-term interest rate significantly enhances banks' net interest margins because most institutions' interest-earning assets are funded with noninterest-bearing liabilities. In addition, this paper also highlights that large maturity gap significantly tunes negative impact toward rate of return risk.

As for GDP and inflation, when the investment and consumption activities boost, it will assist on the rise in transactions of banks, especially for short term and long term loan, which later contributes to wider duration gap given any variation in the market interest rate that causes a mismatch in asset and liabilities gap. On the other hand, Inflation plays a vital role in determining deposit withdrawal behaviour. As the purchasing power decreases during inflation, depositors tend to withdraw their fund from banks and spend it immediately in order to protect themselves from further deterioration of monetary value. This will cause banks to have higher exposures which result in financial instability. This is confirmed by Mishkin and Westelius (2008) where his theoretical model shows that inflation and GDP component are crucially needed to respond to the shocks in the economy and financial institution.

Many studies also prove that Islamic deposits are related to the change of interest rate. For instance, Kasri and Kassim (2009) research on the dynamic interaction of Islamic Mudarabah investment deposit, real interest rate, Islamic bank branch and real income based on Vector Auto-regression (VAR) methodology reported that the conventional interest rate is one of the major determinants of saving in the Islamic banks in Indonesia. In addition, the study also opined that Islamic banks are exposed to the various types of risks such as the rate of return risk, the DCR, the benchmark risk and the Sharia compliance risk.

However, the risk element entails in Islamic financial institutions (IFI's) are unique comparative to the conventional due to its different operational framework. Rulindo (2009) research on the unique risk of Islamic banks indicates that the IFIs face unique risk arising from Mudarabah based investment accounts and trade, equity and lease based modes of financing. This can be classified into Shariah non-compliance risk which is derived from the operational risk side, the rate of return risk and displaced commercial risk (DCR). Later, Farooq and Vivek (2012) in their study of DCR and value of alpha for Islamic banks express that DCR is a unique risk relevant to the Islamic bank particularly due to dual banking environment. This DCR risk is defined as risk arises from assets managed on behalf of the Investment Account Holder which is transferred to the Islamic financial institutions own capital. It's an attempt taken by the financial body to waive a portion or entire of the *Mudarib's* share (profit) on the fund. Apparently, this is the consequence of commercial pressure payable to Investment Account Holder in order to increase the return (IFSB, 2005). Alternatively, the DCR risk is also known as accruals to Islamic banks due to the

commercial pressure in equalizing the rate of return to the market competitive rate of return. In this case, the financial institution has to absorb a portion of losses normally borne by the Investment Account Holders in order to avert substantial withdrawal of deposits.

From the literature review above, even though there are some similarities in term of findings, none of the studies applied the duration gap analysis to measure the sensitivity of Islamic banks' rate of return risk. Therefore, to fill the gap, this paper aims to make use of duration gap analysis to produce a comprehensive finding result pertaining to the Islamic bank rate of return risks by incorporating financial and economic variables.

3. Methodology

This study employs the duration gap analysis to measure the Islamic bank's sensitivity of bank assets and liabilities towards the rate of return risk due to the conventional interest rate volatility. The rates of change or sensitivity rely on the asset or liability's duration (Bacha, 2012). The empirical data and analyses in this paper cover a 5 – year – period using annually based data (2008 – 2012) which should be adequate to test the Islamic bank's duration gap. The data for each Islamic banks are obtained from Bank Negara Malaysia Statistics, Bank Scope IMF's International Financial Statistics database (IFS) and complemented by data from www.econstats.com for selective years.

According to Bacha (2012) the Duration Gap Analysis involves the following steps;

i) Determine the duration of each asset and liability components in the balance sheet on which interest income is earned or paid by the bank.
ii) Find the weight (proportion of each item within its category. For example, the weight of the asset item to total interest earning assets*.
iii) Using the result of step (i) and (ii), determine the weighted duration of assets and liabilities.
iv) Determine the gap – by subtracting the duration of liabilities from the duration of assets†.

If the Duration gap is positive, it indicates that on average, the assets are more price sensitive than the liabilities. Thus, when interest rates rise (fall), assets will fall proportionately more (less) in value than liabilities and equity or the net worth of Islamic bank will fall (rise) accordingly. On the other hand, if the Duration gap is negative, it indicates that the weighted liabilities are more price sensitive than the weighted assets. Therefore, when interest rates rise (fall), assets will fall proportionately less (more) in value than the liabilities and the net worth of Islamic bank will rise (fall).

Secondly, this study analyses the data based on the panel regression method using the random effect model and the cross-sectional model by using the E-views software. Therefore, in order to test the main factors that may influence the duration gap of Islamic banks, we divide the variables into two variations: (i) financial and (ii) economic indicators. The generic model applied takes the form as given below:

$$DGAR_{IB\ i,t} = \beta_0 + \beta_1 Size_{i,t} + \beta_2 ETA_{i,t} + \beta_3 Loan_{i,t} + \beta_4 ROA_{i,t} + \beta_5 GDP_{i,t} + \beta_6 ISLAMIC\ DR_{i,t} + \beta_7 INF_{i,t} + \varepsilon_{i,t}$$

* Some Islamic banks do not disclose the information about the number of year for short term and medium term financing. Therefore, for simplicity, we used 5 years as benchmark. As for the rate of return, we used the average of 3 percent Islamic deposit rate for 3 - Month (tabulated from various Bank Negara Quarterly Bulletins) as benchmark to calculate Macaulay Duration manually.

† Where the total amount of interest bearing assets and liabilities are not equal: Duration Gap will be equal Duration. $Assets - \left(\frac{Liabilities}{Assets} \times Duration\ of\ Liabilities\right)$

Table 2: Variables and Definition

Variables	Definition	Database	Literature Review
	Financial Indicators		
Size	- Measured by total assets - Based on annual basis	Bankscope/IFS	(Ballester et al., 2009), (Zainol and Kassim, 2010), (Saporoschenko, 2002)
ETA	-Based on annual basis Equity/Total Assets	Bankscope/IFS	(Fraser et al., 2002), (Drakos, 2001) (Salman, 2006)
Loan	-Based on annual basis	Bankscope	(Bacha, 2004)
ROA	-Net Income / Total Assets - Based on annual basis	Bankscope/IFS	(Tafri et al, 2009)
	Economic Indicators		
GDP	-Gross Domestic Product (Real) -Based on annual basis	International Financial Statistics	(Mishkin and Westelius, 2008)
Islamic DR	-3 - month Islamic deposit rate	Bank Negara Malaysia	(Kaleem, 2006), (Bacha, 2004) (Ayub, 2007)
INF	Inflation based on CPI -Based on annual basis	International Financial Statistics/Bank Negara Malaysia	(Salman, 2006)

Source: Author's own

4. Findings

4.1 Duration Gap Analysis

Table 3 shows the exposure of the Islamic banks towards the rate of return risk. Basically, most of the Islamic banks are having positive duration gap between 2008 and 2012 which means that the duration of Islamic banks total assets is greater than the duration of liabilities, therefore the fall in market value of assets as a result of a rate of return increases will be approximately more than the fall in the value of liabilities which will definitely squeeze the net worth of Islamic banks. From Table 3, the Standard Chartered Saadiq, Public Islamic Bank Bhd, EONCAP Islamic Bank Bhd, Alkhair International Islamic Bank Bhd, Al-Rajhi Bhd, Maybank Islamic, CIMB, Affin Islamic Bank Bhd and the Bank Islam Malaysia Bhd are exposed to the higher rate of return risk whereas other banks are relatively exposed to the least risk.

Broadly speaking, in Islamic banks, the rate of return risk is one of the most crucial and critical issues. Interestingly, in Malaysia, the banking system is based on dual banking structures, therefore, it becomes the main responsibility of the Islamic banks to manage their risk management in a proper way especially in the rate of return risk management. As mentioned by How et al. (2005), banks which provide Islamic financial services are exposed to the higher rate of return risk compared to those banks without such services. They further concluded that in the Islamic banking; the rates of assets are fixed compared to the conventional banking which is more flexible. Due to this, it may restrict the Islamic bank from taking quick action whenever they face interest rate risk. In addition, most of the Islamic banking financing in Malaysia concentrate more on assets type of financing such as the *Murabahah* and the *Bai Bithaman Ajil* (BBA). Due to this, the duration gap for the Islamic banks will get wider when the interest rate is volatile and it may squeeze the Islamic banks profit as they have to change the rate of return. Therefore, the Islamic banks are at the disadvantage position when interest rate changes.

There are few studies examining the vulnerability of Islamic banks towards the rate of return risk. Bacha (2004), for example, documents that when Bank Negara increases the interest rate, the Islamic banks have to increase the deposit rate to avoid the withdrawal of fund in Islamic banks which may then

lead to a liquidity problem. In addition, Islamic bank used to follow the conventional interest rate as a benchmark to adjust their deposit rate.

Table 3: Duration Gap of Islamic Banks in Malaysia

No.	Islamic Banks	Years				
		2008	2009	2010	2011	2012
		Duration Gaps				
1	Standard Chartered Saadiq	9.3005	8.8006	4.1000	1.9000	-7.0000
2	RHB Islamic Bank Bhd	1.0100	-0.14	0.5850	0.5260	0.4730
3	Public Islamic Bank Bhd	9.6006	5.9000	5.9000	5.9000	5.8000
4	OCBC Al-Amin Bank Bhd	0.2300	0.3800	0.1400	-0.6000	0.3100
5	Maybank Islamic Bhd	8.6000	-5.9000	6.5200	4.8200	3.5300
6	Malaysia Building Society Bhd	1.8100	0.6600	0.1820	0.0880	-0.0400
7	Kuwait Finance House (Malaysia) Bhd	2.6800	2.1600	1.9100	1.6900	1.5000
8	HSBC Amanah Malaysia Bhd	0.0310	0.0290	0.0240	0.0200	0.0170
9	Hong Leong Islamic Bank Bhd	1.7900	2.2400	2.5600	2.7800	2.9200
10	EONCAP Islamic Bank Bhd	3.4000	3.0005	2.7005	0.00014	0.0003
11	CIMB Islamic Bank Bhd	5.4700	4.7300	-4.900	4.1800	2.3500
12	Bank Muamalat Malaysia Bhd	1.6000	0.6600	0.6400	0.6300	-0.0006
13	Bank Islam Malaysia Bhd	6.0000	9.6000	8.0000	6.7000	5.6000
14	Bank Islam (L) Ltd	0.0094	0.00845	0.00793	0.00743	0.00697
15	AmIslamic Bank Bhd	-0.1400	-0.9000	-0.2300	-0.3200	-0.3900
16	Alliance Islamic Bank Bhd	2.0000	2.2000	2.1000	2.0000	1.9000
17	Alkhair International Islamic Bank Bhd	0.00016	0.00014	0.00015	8.7005	4.2005
18	Al- Rajhi Bhd	5.6000	9.2000	8.8000	11.0001	11.005
19	Bank Pertanian Malaysia Berhad-Agrobank	0.00523	0.00426	0.00406	0.00387	0.00368
20	Affin Islamic Bank Bhd	8.6000	11.3000	12.8000	14.1000	15.2000

Source: Author's own

Note: Positive value means duration gap is positive whereas a negative value means duration gap is negative. Due to the limited information on a number of years involved financing activities offered by an Islamic bank, for simplicity, we used 5 years as a benchmark to calculate duration gap.

Table 4 present the descriptive statistics for all the regression variables. The average (median) of duration gap is 79.20 percent (40.20 percent). This means that, on the average, the duration gap for the Islamic bank is about 79.20 percent implying that the dependent variable can explain about 79.20 percent of the duration gap.

The average (median) size is 16.163 percent (16.161 percent) which can be considered as low. The equity to total assets has a mean (median) of 12.90 percent (7.60 percent). On the other hand, the loan has a mean (median) of 9.61 percent (5.22 percent). Deposit to total asset mean (median) is 83.60(68.80) followed by the return on assets of 68.10(54.80). The gross domestic product (GDP) has a mean (median) of 5.91(5.60). Whereas, the rental index and inflation are 5.10(5.00) and 16.30(41.60) respectively.

Table 4: Descriptive Statistics of Islamic Banks Duration Gap Analysis

Details	DGAP	SIZE	EQUITY/TA	LOAN	ROA	GDP	ISLAMIC DR	INF
Mean	0.792	16.163	12.90	9.61	68.10	5.91	5.10	16.30
Median	0.402	16.161	7.60	5.22	54.80	5.60	5.00	41.60
Max	0.093	18.331	90.5	6.18	3.672	7.49	5.90	95.30
Min	-0.008	13.057	2.80	4.06	-4.472	5.22	4.80	75.50
Std.Dev	0.002	1.078	18.40	10.80	1.280	8.39	3.00	71.90
Skewness	0.216	-0.846	3.602	2.430	-2.224	1.200	1.38	22.10
Kurtosis	5.096	4.182	14.862	9.977	10.732	2.793	3.199	12.48
Jarque-Bera	17.761	16.537	746.42	280.22	308.43	22.49	29.93	12.64
Prob	0.009	0.006	0.000	0.000	0.000	0.0013	0.000	0.001

Source: Authors' Own

Table 5 shows the correlation matrix of the variables. This is a preliminary test to indicate the correlative properties of each independent variable against one another as shown in Table 4. The table shows that most of the variables are not highly correlated. Therefore, it can be concluded that there is no multicollinearity problem in this variables.

Table 5: Correlation Matrix of Islamic Banks Duration Gap Determinations.

Details	DGAP	SIZE	EQUITY/TA	LOAN	ROA	GDP	ISLAMIC DR	INF
DGAP	1.000000	-0.15166	0.433282	-0.243322	0.076543	-0.64221	-0.019854	-0.011147
SIZE		1.000000	-0.367111	0.713421	0.218293	0.143290	-0.056472	-0.046785
EQUITY/TA			1.000000	-0.26955	0.023841	0.005432	-0.001234	0.003295
LOAN				1.000000	0.234970	0.221355	-0.15379I	-0.081427
ROA					1.000000	0.241322	-0.143124	-0.014794
GDP						1.000000	-0.204777	-0.525788
RI							1.000000	0.516222
INF								1.000000

Source: Authors' Own

4.2 Determinants of duration gaps

Secondly, this study analyses the data based on the panel regression analysis to determine the contributing factors towards Islamic banks duration gap. The panel data analysis has been performed and the results are shown in Table 6.

Table 6: Panel Data Analysis

Panel A: Baseline Model
Method: Panel Least Square

C	SIZE	ETA	LOAN	ROA	GDP	Islamic DR	INF	R^2	F	DW
-0.011 (-1.47)*	0.00 (2.41)**	-0.51 (-3.97)**	7.30 (2.81)**	-0.00 (-0.58)	1.84 (0.66)**	0.00 (0.05)***	-0.00 (-0.44)*	0.89	9.67	1.71

Panel B: Islamic Bank –specific Random Effects Model
Method: Panel EGLS (Cross – Section Random Effects)

C	SIZE	ETA	LOAN	ROA	GDP	Islamic DR	INF	R^2	F	DW
-3.12 (-1.77)*	0.03 (12.26)***	-0.16 (-2.90)*	2.59 (5.53)*	-0.00 (-0.05)	1.13 (2.38)**	5.62 (5.90)***	-0.03 (-0.09)*	0.85	9.85	1.72

Panel C: Islamic Bank –specific Random Effects Model Robust to Time Heteroscedasticity
Method: Panel EGLS (Cross – Section Random Effects)
White Period Standard Covariance

C	SIZE	ETA	LOAN	ROA	GDP	Islamic DR	INF	R^2	F	DW
-3.12 (-1.80)*	0.04 (10.91)***	-0.16 (-2.74)*	2.59 (6.11)**	-0.00 (-0.76)	1.13 (2.33)**	5.62 (4.94)*	-0.03 (-1.58)*	0.85	9.85	1.72

Notes: The table shows the main results of the panel estimation for the determinants of Islamic Banks duration gap.

$$DGAP_{IB\,i,t} = \beta_0 + \beta_1 Size_{i,t} + \beta_2 ETA_{i,t} + \beta_3 Loan_{i,t} + \beta_4 DTA_{i,t} + \beta_5 ROA_{i,t} + \beta_6 GDP_{i,t} + \beta_7 Islamic\ DR_{i,t} + \beta_8 INF_{i,t} + \varepsilon_{i,t}$$

Panel A presents the result of the panel estimation without the Islamic bank – specific effects. Panel B contains the results from the Islamic bank – specific random effects. Finally, Panel C shows the final results from the Islamic banks – specific random effect model with coefficient covariance robust to period Heteroscedasticity. The value in parenthesis is the corresponding t-statistics and ***, **,* represent significance at the 10%, 5%, and 1%.

The results without bank – the specific effects shows that seven out of the eight variables are statistically significant at the usual confidence level (see Panel A). From this baseline specification, a number of tests have been carried out to improve the economic interpretation and the statistical properties of the model.

Firstly, an investigation with regards to the existence of unobserved heterogeneity across Islamic banks has been carried out. This is to see whether there are inherent features of banks that affect their sensibility to the rate of return risk and are not captured by the eight explanatory variables. To do this, a fixed effect test has been tested out against the baseline model. The probability associated with the F-statistics and the Chi-Square statistics are 0.0583 and 0.0216 respectively. This result predicts that there is an evidence against the null hypothesis stating that the fixed effect is redundant.

The next step is to carry out the Hausman test to check whether these effects are uncorrelated with the explanatory variables. The Hausman test probability value is 0.5118, thus the null hypothesis is rejected. Therefore, the random model has been chosen as a good specification to run the analysis.

Panel B shows the finding using a random model. In order to check whether the model developed for this study fits to explain the duration gap, we have to check the F- statistics. The F- statistics should be below the significance level of alpha (α) 0.05@ 5%. Based on the Panel B it can be clearly seen that the probability of F-statistic is less than 5% (0.00 < 0.05). This indicates that statistically the model used in this study is really fit. In addition to that, it can be clearly seen, the R-Square is 85 %, it means that the

independent variables can predict or explain the dependent variables about 85 %. In this case, the financial and economic indicators can explain or predict 85 percent of the duration gap in the Islamic banks. The balances of 15 percent are determined by other factors which are not incorporated in this study. In addition, the significant result remains the same as before where *SIZE, ETA, LOAN, GDP, ISLAMIC DR and INF* are statistically significant whereas, *ROA* is insignificant. In addition, the Durbin –Watson (DW) is 1.72 shows that there is no autocorrelation problem in the model. Together with the Durbin – Watson, the Ramsey test (7.337, p = 0.0041) has also proved that there is no issue with the data and the results presented in the study in terms of misspecification of the functional form.

Lastly, the test of Heteroscedasticity or the test to identifying the equality of the variances of the residual by the bank in one hand or another has been performed. The p- value produced using the Breush – Pagan Godfrey test (p=0.5548) shows that there is no bank Heteroscedasticity. In addition, the standard errors robust to period Heteroscedasticity are calculated using the White period method and the final outcome of this is reported in Panel C.

5. Discussion of Results

Generally speaking, all variables are significantly contributed towards the duration gap with a positive and negative coefficient and the alpha value is significant at 5 percent. A positive coefficient means it has positive direction from one variable to another variable and vice versa. In this research the variables with positive correlation are size, equity to total assets, GDP and Islamic deposit rate whereas loan, deposit to total assets, return on assets and inflation are found to have a negative correlation.

The estimation result shows that the relationship between the size of the assets and the duration gap is positively significant (p=0.0000). This is true where when the size of the assets is greater, the duration gap for Islamic bank would be larger as most of the financing activities are assets concentrated. Therefore, if the rate of return highly fluctuates, it will definitely cause volatility in assets and squeeze the net profit to the Islamic bank. This is consistent with Ballester et.al (2009) where the banking institution especially Islamic banks in the Spanish banking market normally hold their assets fixed in nominal (not – inflation adjusted) terms, hence are especially sensitive to the rate of return fluctuations. In addition, generally banking system traditionally performs a maturity transformation function using short-term deposits to finance long-term loans. The outcome of this activity resulted in a mismatch between the maturity of assets and liabilities exposes banks to re-pricing risk, which is often seen as the major source of the rate of return sensitivity of the banking system. Similar results are found by Saporoschenko (2002). In addition, Zainol and Kassim (2010) also find that in Malaysia, the larger the assets size, the larger would be the duration gap of Islamic banks.

A negative significant relationship (p=0.0047) is postulated between the duration gap and equity to total assets. This implies that when the duration gap is positive, it represents that the assets are more price sensitive than the liabilities, on average. Therefore, when the rate of return increases, the assets will fall proportionately more or faster than the liabilities and this will make the duration gap getting wider and squeezes the equity value of the Islamic banks. This inverse relationship is similar to Fraser et al. (2002) and Drakos (2001) where the rate of return risk exposure is negatively related to the equity to total assets, the ratio of demand deposits to deposits, and the proportion of loans granted by banks for financing purposes. However, Salman (2006) reports an interesting result with regards to the equity to total assets where the lower proportion of equity to total assets will not give much significant impact towards the Islamic banking financial stability as the nature of investment deposit account are totally different from the conventional banks. In the Islamic banking, the profit and loss are shared between the investment account holder and the Islamic bank and the face value of amount if not guaranteed by the bank. The depositors are also bound to carry these deposits to maturity hence lesser protection would be required in the form of owners' equity.

In addition, a positive significant relationship is found (p=0.0000) between loan and the duration gap of an Islamic bank. This positive relationship implies that when the proportion of loans increases, it will add the extension of the typical maturity mismatch between assets and liabilities and expose the bank to the rate of return risk because the maturity of bank loans is longer. It seems natural to predict a positive significant relationship between these two variables. This study supports the finding by Bacha (2004),

where Islamic banks are found to be restricted from adjusting their rates on outstanding loan cost of funds when the deposit side increases. Therefore, when interest rate goes up, the Islamic banks will have to raise their deposit rates otherwise, they will be exposed to the displaced of commercial risk which will pose liquidity problem to the Islamic banks. Due to this, there would be a decrement in the net income and the net worth of the Islamic bank will be greater compared to the conventional as the conventional banks have flexibility in adjusting their assets rates.

Based on our findings, it is postulated that the ROA is not significantly (p=0.1943) contributing to the duration gap of Islamic banks in Malaysia. However, an opposite result was found by Tafri et al. (2009) where interest rate risk has a significant impact on the ROA for both the conventional and Islamic banks' rate of return in the context of Malaysia for the period of 1996 to 2005. In addition, a positive significant result is also obtained for both the GDP and the duration gap (p=0.0192). Furthermore, the findings also show that the Islamic bank deposit rate of return is found to have a positive significant relationship (p=0.0000) with the duration gaps of Islamic banks in Malaysia. This is because there is no specific benchmark that can be used to determine the profit rate of rate of return. Therefore, the Islamic bank has to rely on the conventional interest rate to determine the rate of return especially in determining the mark – up rate and so forth. However, this could lead to a wider duration gap in the Islamic bank, where if the market interest rate goes up, it may induce Islamic bank to increase their deposit rate of return. Otherwise, the depositor will switch their deposit to the conventional bank. This will further expand the duration gap of an Islamic bank. This supports the finding by Kaleem (2006) and Bacha (2004) where they have found the positive significant relationship among the conventional bank's interest, the Islamic bank's rate of return and the duration gap. Furthermore, the argument by Ayub (2007) makes sense in this issue where Islamic banks are not in the position to influence the market interest rate as this industry is still in the pioneering stage either in the local or international market compared to their conventional counterparts.

A significant negative relationship (p=0.0956) between inflation and duration gaps is observed. Higher inflation could lead to the reduction in the deposit of the Islamic banks since the public like to spend their money rather than deposit them in the banks since the value of money keeps on depreciating. When this event occurs, the involvement of the Islamic banks in the financing activities will be reduced as their deposit fund become lesser and therefore, the duration gaps will become smaller which may lead the Islamic banks to be less exposed to the rate of return risk. This finding supported the finding by Salman (2006) for the Turkey financial market.

6. Conclusion and Policy Recommendation

The research aims to descriptively analyse from the economic and financial assessment point of view; (i) to determine either Islamic banks are exposed to the interest rate risk or not by calculating the duration gap for the Islamic banks, (ii) to examine what are the determinant of the Islamic bank's duration gap, and (iii) to propose the best way to mitigate the rate of return risk associated with the Islamic banks.

To achieve its objective, this study relies on numerous empirical tests. Firstly, the duration gap analysis was used to determine whether the Islamic banks are exposed to the rate of return risk or not. In our study, it is very clear that most of the Islamic banks do face interest rate and rate of return risks as indicated by the duration gaps analysis. At the same time, this study also explores the determinants of Islamic banks duration; thus, the Panel Data analysis was carried out. The variables were divided into two parts namely; (i) financial and (ii) economic indicators. The size of total assets, equity to total assets, and loan were found to be statistically significant to the duration gap while the ROA was found to be insignificant. On the contrary, the economic indicators such as the GDP, the 3-month Islamic deposit rate of return and the inflation rate are found to significantly influence the Islamic bank's duration gap.

According to Makkar and Singh (2013**),** to push up the bank performance, it is vital to preserve the unit of mismatch between the assets and liabilities to controllable parameters; hence banks profitability will not be affected. To achieve this situation, banks are required to often monitor the sensitive- rate of assets and liabilities. This applies to the Islamic banks as well.

In addition, smoothing methods may assist the IFIs as one of the alternatives to the duration gap issue according to the IFSB (2010). The following are few alternatives apparatus the IFIs may opt to in order to mitigate the issue:

1. IFI's Mudarib fee – the IFI gives up part of its management fee in order to absorb expected losses

2. Profit Equalization Reserve (PER) - reserve is built up by setting aside the amounts from the investment profits before the allocation between the shareholders and the Unrestricted Investment Account Holder (UIAH) and the calculation of the Management fee.

3. Investment Risk Reserve (IRR) – Reserve is built up by setting aside the amounts from the investment profits attributable to the UIAH, after deducting the IFI's management fee.

4. Retained earnings – make a transfer from the shareholders' current or retained profits to a UIAH.

Furthermore, the IFSB (2011) documents two methods to combat the rate of return risk. The first is to exclude the risk-weighted assets funded by the profit sharing investment account hence the risk will be fully absorbed by the investment account holders. The second method requires a proportion of alpha% of the risk weight assets financed by the profit sharing investment account to be included in the calculation of capital adequacy ratio which is more aligned with the market practice where the alpha% will be representing the DCR and moves in a positive correlation to the DCR. The alpha % is decided by the respective central bank with all the Islamic banks are expected to apply this value in calculating their capital adequacy ratio (CAR).

Moreover, Bacha (2004) claims that if the rate of return on deposits for the Islamic bank's increases, it holds as beneficial tools to attract depositors. Ironically, Bacha (2004) mentions it is only possible to protect the Islamic banks from the risk by reducing the maturity on loans on the asset side. However, this seems to be dangerous in nature to the Islamic banks' structure in general. Thus, the recommendation would be to shift from the asset-based financing which is non-liquid financing such as *BBA* and *Murabahah* to *Mudharabah* and *Musyarakah.* Under these types of financing (*Mudharabah* and *Musyarakah),* the profit and loss determinant rates are detached from the market movement rate as they are independently agreed upon by the contractual parties.

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