Dual Banking Systems and Interest Rate Risk for Islamic Banks

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Abstract

In introducing Islamic banking in Malaysia, the basic strategy was to replicate the products/ services offered by conventional banks. The successful implementation of such a strategy has meant that Malaysia today has a truly dual banking system. Islamic banks in Malaysia not only have product similarity with conventional banks but share the same overall economic environment and a common customer base.

The ability of non Muslim customers/depositors to switch between the two banking systems, means that deposit / financing rates have to be similar – else give rise to arbitrage flows. The implication is that, though Islamic banks operate on interest free principles, the economic environment in a dual banking system inevitably exposes them to the problems of conventional banks; in particular interest rate risk. Using monthly data over the 10 year period 1994 – 2003, the paper argues that, paradoxical as it may seem, Islamic banks operating within a dual banking system may also be subject to interest rate risk.

Introduction

In introducing Islamic Banking, the basic strategy, at least in the Malaysian case has been to transform the sources and applications of funds of conventional banks into Islamically acceptable ones. Thus, on the source of funds side, savings and current account were redesigned as Al-Wadiah accounts. (Safe custody) while term loans (on the uses side) as Mudarabah accounts and Musharakah financing. Aside from term loans, which typically constitute a large percentage of total uses of funds, conventional banks have two other major categories of lending facilities, this being short-term financing or overdraft facilities and trade financing. Islamic banks offer these same services through use of a number of items. Short-term working capital financing in the form of Murabaha (cost-plus) and trade financing largely thru Bai Bithaman Ajil (deferred sale). In addition Ijarah, Kafalah and Hiwalah facilities of Islamic banks match leasing, Letters of Guarantee (Bank Guarantees) and the Fund transfer services, respectively, of conventional banks.

By choosing a strategy of replicating the products of conventional banks, Islamic Banks (Ibs) have grown in tandem with the overall growth of the banking sector in Malaysia. Figures 1 (a) and (b) show the sustained growth over the 10 year period 1994 – 2003. The real impetus for Islamic Banking in Malaysia came with the push by the Central Bank for all local conventional banks to offer Islamic Banking Windows. With the compulsory opening of these SPTF[1] windows, total deposit growth within the Islamic Banking System took off. As shown in Fig. (2), the Percentage of Deposits within Islamic Banking[2] to that of Total Bank Deposits has been increasing substantially. From about a tenth of one percent (0.1%) in

[1] *SPTF – Sistem Perbankan Tanpa Faedah – Interest Free Banking System.*
[2] *Islamic banking/banks is defined broadly to include the activities of Interest Free Windows of conventional banks.*

January 1994, it has grown to 7.5% of Total Deposits in July 2003. This constitutes a highly impressive average annual growth rate of 62.5%.[3]

Thus, Malaysia today has a truly dual banking system with both conventional and Islamic banks operating side by side. Though each system operates theoretically within its own sphere, it is inevitable that given a common macro environment, the two systems interact. A very substantial conduit connects the two. These being the very large non Muslim customer base – even of the Islamic banking system. Given Malaysia's multi racial profile, non Muslim depositors/customers are indeed a very large constituency for both banking systems. The ability of non Muslim customers/depositors to switch between the two systems means that deposit and financing rates between the systems have to be similar. In a sense, the activity of this non Muslim customer base would act to arbitrage rate differentials and fund flows. The fact that the Islamic Banking system in Malaysia has moved away from traditional profit and loss financing like Mudarabah and Musyarakah into instruments that mimic conventional ones – Murabaha and Bai Bithamin Ajil (BBA) has made the interface between the systems that much easier.

This situation has an important implication for Islamic Banks in Malaysia. The implication being that, though Islamic Banks operate on interest-free principles, the economic environment in a dual banking system inevitably exposes them to the problems of conventional banks; in particular interest rate risk. Ironical as it may be, this paper argues that Islamic banks in Malaysia may be affected by interest rate movements in the conventional sector. This paper is divided into four parts. Part two below, examines interest risks experienced by conventional banks, explains why it matters and how conventional

[3] *From Jan 1994 to July 2003*

banks manage the risk. Using empirical data, section three examines the extent of this risk on Islamic banks. Section 4, looks at the alternatives available to Islamic Banks (IBs) to manage such risk and concludes.

Section 2 : Rate Risk and Conventional Banking

Banks, more so than other businesses are faced with the risk-return tradeoff. While a typical bank faces several types of risks, there are three key risks that stand out. Credit risk, liquidity risk and interest rate risk. Often these risks are intertwined. For example, an increase in interest rates can cause an increase in (NPLs)[4]; credit risks. Similarly, rising interest rates can also lead to liquidity problems. The close link between interest rate risk and the others were most evident in Malaysia during the East Asian Currency Crisis. Interest rate risk is often the trigger for other forms of risks.

In this section, we examine Interest Rate Risk from a conventional bank's viewpoint. We see how conventional banks can estimate the extent of their interest exposure and manage them. From a bank's point of view, interest rate risk can be defined broadly as the impact of an interest rate change on a bank's *profits*, *cash flows* and *net worth*. Since banks are intermediaries between depositors and borrowers and earn their income largely from the interest differential or spread between the two, banks are inherently exposed to interest rate risk. This risk has been made worse by the fact that banks have little influence over the composition of their liabilities – i.e. their deposit structure.

[4] *NPLs – Non Performing Loans.*

2.1: Why Interest Rate Risk Matters?

When interest rates rise – especially if the rise is consistent, banks face a number of problems;

i. Cost of funds increase – since a bank would have to pay higher rates in order to attract new deposits.

ii. In competitive environments, the bank would have to pay higher rates even on existing deposits (eg. savings accounts). Failing which the bank could see outflows on the deposit side. (withdrawals, non-renewals etc.).

iii. The deposit profile could change; that is the proportions in current accounts could reduce while that of short term FDs, savings etc. could increase. This results from depositors switching accounts.

iv. While the bank faces higher costs on the liabilities side, its earnings from assets would most likely not keep pace with the rate of increase. ***As a result, the bank's income margin gets squeezed.***

v. Given the typically longer maturity structure (duration) of the asset side compared to liabilities, there will be a differential impact in terms of ***market values.*** That is, the value of the assets would fall ***more*** than the fall in liability value. ***As a result, the bank's net worth gets squeezed.***

Thus rising interest rates impact a bank in three ways (i) a potential reduction in income (ii) reduction in net worth and (iii) a potential mismatch in liquidity. All of these

would be undesirable. (Note: A steady and consistent fall in interest rates would have the opposite effect). We now turn to examining each of these problems and analyze how a bank could "manage" or hedge the risk.

Managing Interest Rate Risk

Gap Analysis or "Gapping", is a common technique used in managing interest rate risk. Gap Analysis is often used by banks in two common forms i.e. ***Income Gap Analysis*** and ***Duration Gap Analysis***. Income Gap Analysis focuses solely on the impact of an interest rate change on a bank's ***income.*** Duration Gap Analysis on the other hand analyses the impact of an interest rate change on a bank's ***net worth***.

(I) Income Gap Analysis (IGA)

The simplest form of an IGA is the basic gap analysis. Here, a bank treasurer takes a given time horizon, for example the current year and examines the impact of interest rate change on current annual income/earnings. The first step in this analysis would be to determine the total ringgit amounts of ***rate sensitive assets*** and ***rate sensitive liabilities*** for the one year horizon. The treasurer does this by examining the bank's current balance sheet and identifying which asset and liability items are rate sensitive. Given the one year time horizon, each balance sheet item that has to be ***repriced*** or interest ***reset within the year*** is identified. By this logic, items like floating rate loans (assets), variable rate deposits (liabilities), loans maturing within the year, marketable securities maturing within the year, money market deposits accounts etc., would all be considered rate sensitive.

While there are some obvious rate sensitive assets and liabilities such as those above, there are also some obviously ***non rate sensitive*** assets and liabilities. Assets such as cash, liquidity reserves, physical assets and liabilities like share holders equity and long term

borrowings would fall in this category. In between these obviously rate sensitive and non sensitive items are items where the treasurer may have to make a judgement call. For example, medium and long term loans provided by the bank on fixed rates clearly do not involve a reset, yet some amount of this may be prepaid. Similarly, current accounts pay no interest and are not rate sensitive, however, in rising interest rate environment switching could occur. Given these realities, the treasurer would have to make an estimate of the likely percentage of prepayment and account switching. Examining the bank's past experience with prepayment should give the treasurer a reasonable estimate. Once this first step is done (determining the total amount of rate sensitive assets and liabilities) the next two steps are straight forward. The second step involves determining the gap between rate sensitive assets and liabilities. With the gap estimate, the treasurer can determine the ringgit impact on earnings as a result of his forecast change in interest rate.

Basic Gap Analysis – An Illustration

Suppose a treasurer on examining his bank balance sheet identifies the following items as having ***less than one year maturity***.

Assets

• Marketable Securities	RM 60 mil.
• Overdrafts	RM120 mil.
• Variable rate housing loans	RM100 mil.
• Variable rate term loans	RM120 mil.
• Loans & Advances (fixed < 1 yr.)	RM140 mil.

Total	RM540 mil.

Liabilities

• NCDs / NIDs	RM160 mil.
• Short term deposits (< 1 yr.)	RM200 mil.
• Other variable rate borrowings	RM260 mil.

Total	RM620 mil.

In addition, to these obvious items, let us say the treasurer considers that, 3% of fixed rate loans (RM40 mil.) on the asset side and 6% of Fixed Deposits with greater than 1 year maturity (RM80 mil.) can be considered rate sensitive based on prior experience.

Thus,

Rate Sensitive Assets	=	RM540 + RM40 = RM580.
Rate Sensitive Liabilities	=	RM620 + RM80 = RM700.

Based on these amounts, the gap is

Gap = RSA – RSL

Gap = RM580 – RM700 = -RM120 mil.

If the treasurer expects interest rates to rise an average 5% this year ($\Delta i = 5\%$), the impact on the banks income/earnings for the year can be determined as follows;

Δ Income	=	Gap x Δi
Δ Income	=	-RM120 mil. x 5%
	=	-RM 6 mil.

Thus, given the bank's current situation and interest rate outlook, the bank's earnings for the year will be ***reduced*** by approximately RM6mil.

That changes in interest rates can set off liquidity problems for banks is well established. The liquidity problems are the result of potential mismatches in cash flows as a result of rate hikes. To estimate the extent of a potential mismatch in cash flows, banks use what is often termed, the maturity bucket approach. The maturity bucket approach essentially builds upon the above 'gap' analysis to provide a view from the cash flow angle.

The Maturity Bucket Approach

This approach is intended to overcome the problem of knowing when the gap is most acute. Furthermore, by being a multi-period approach and extending beyond a year, the time horizon restriction is overcome. Though the underlying logic and analytical steps are the same, the maturity bucket approach splits the gap analysis into several interval periods. For example, to determine the gaps on a monthly or quarterly basis.

Illustration

Suppose, a treasurer has just determined based on a 6-month time horizon that the total Rate Sensitive Assets and Liabilities are RM480 and RM600 respectively. He realizes that a 3% increase in average interest rates can have serious consequences on his company earnings.

Gap	=	RM480 – RM600
	=	-RM120 mil.
Δ Income	=	-RM120 x 3%
	=	-RM3.60 mil.

While he does know what the overall impact would be, he intends to refine the analysis on a monthly basis to examine where the main gaps are. Table 1, below shows the maturity bucket analysis based on an assumed breakdown of assets and liabilities.

Table 1

Monthly Maturity Bucket Analysis

	1	2	3	4	5	6	Total
Rate Sensitive Asset (Maturing) *(RM Millions)*	40	60	80	80	100	120	480
Rate Sensitive Liab.(Maturing) *(RM Millions)*	100	60	280	60	60	40	600
Gap *(RM Millions)*	-60	0	-200	+20	+40	+80	-120

The earlier basic gap analysis showed that the bank above could have a problem if interest rates rose. The maturity bucket approach refines the analysis and shows exactly where the problem lies. Clearly the bank's serious problems are in the one month and three month periods (buckets).

The negative gaps of RM60 million and RM200 million in the one and three month buckets imply a net outflow of funds. Since maturing assets would mean inflows while maturing liabilities, outflows, months with excess liabilities have potential shortfalls. These have to be met either by raising the needed funds in the interbank market or by offering rates to attract new deposits. Either way funding cost increases.

Duration Gap Analysis

The impact of rate changes on a bank's on net worth is the result of changes in the market values of assets and liabilities. When interest rates change, the market values of assets and liabilities change. The rate of change or sensitivity depends on the asset or liability's ***duration***. Duration as we know is quite simply the weighted average of the maturities of the

asset's (or liability's) component cash flows. It therefore differs from maturity. Since duration is maturity adjusted for interim cash flows, the only situation when duration and maturity would be equal is when there are no interim cash flows, for example, – zero coupon bonds. Thus, duration and not maturity, is the correct measure of an item's interest rate sensitivity. As in the earlier case of Income Gap Analysis, the impact of interest rate change arises from having a non zero gap. Duration Gap Analysis involves the following steps;

(I) Determine the duration of each asset and liability item of the balance sheet on which an interest income is earned or paid by the bank.

(II) Find the weight (proportion) of each item within its category. For eg. weight of the asset item to total interest earning assets.

(III) Using the result of steps (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.[5]

An illustration of a Duration Gap Analysis is provided in Appendix 2.

[5] *Where the total amount of interest bearing assets and liabilities are not equal; Dur. Gap = Dur. Assets* – $\left(\frac{L}{A} \times Dur.Liab.\right)$.

Hedging the Interest Rate Risks

It is obvious from the above discussion that interest rate risk affects bank's in several ways. Because the impact can be severe, conventional banks have several techniques by which to manage the risk. Most of these involve *off Balance Sheet* techniques using derivative instruments. In an emerging market like Malaysia, banks can hedge interest rate risk by using derivatives such as, Interest Rate Futures (IRF) contracts, Forward Rate Agreements (FRAs) and Interest Rate Swaps (IRS). In addition, *on Balance Sheet* techniques such as using Floating rate loans and adjusting durations are also used. For purpose of our later discussion on rate risk management for Islamic Banks, we examine briefly each of these techniques.

(i) Interest Rate Futures (IRFs)

IRFs are a highly popular means by which conventional banks manage rate risk. They are particularly useful in managing rate risks arising from Income Gaps and Maturity Bucket Analysis. A worked example of how IRFs can be used for the Maturity Bucket Analysis discussed above, is shown in Appendix 1. Generally, when one's underlying exposure is such that rising interest rates could hurt, the hedge strategy using IRFs should be to ***short*** IRF contracts. The number of contracts shorted would depend on the size of the exposure. In Malaysia, the 3 month KLIBOR[6] futures which is available in serial month contracts would be suitable for hedging short term needs while, the 3 and 5 year MGS (Malaysian Government Security) Bond Futures could be used for longer term maturities.

[6] *The underlying asset is an interbank deposit of RM1 million, at a yield dependent on the 3 month Kuala Lumpur Interbank Offer rate.*

(ii) Forward Rate Agreements (FRA)

Whereas IRFs are standardized and exchange traded derivatives, a FRA is a customized agreement between two parties. A commonly used hedge instrument, a FRA specifies a target interest rate and a notional principal. A FRA works as follows; if the actual interest rate prevailing at some agreed upon future date, is higher than the target interest rate, one party will compensate the other. Vice-versa if the actual interest rate turns out to be lower. The amount compensated will equal the interest differential (between actual and target) multiplied by the notional principal.

Thus, if our underlying exposure is such that rising interest rates could hurt, we go into a FRA as the party that will receive compensation if rates are higher than target rate but will pay if rates go lower than target. By setting the target rate in the FRA equivalent to our intended cost of interest and the notional principal to the size of our exposure, a near perfect hedge could be established.

(iii) Interest Rate Swaps (IRS)

An Interest Rate Swap (IRS) is an OTC[7] derivative instrument used for hedging interest rate risks. In an IRS, two parties agree to swap interest rates based on a predetermined reference rate[8] and notional principal. One party, the fixed rate payer, pays a fixed interest rate, for example 10% of a notional RM10 million principal. The other party, the floating rate payer, pays in exchange, for example, the prevailing 3 month KLIBOR rate based on the same notional amount. Since the cash flow streams are netted off, depending on whether short term rates have risen or fallen, one party will have to pay the other. For example, if during a certain predetermined period, short-term rates have risen and the 3 month KLIBOR

[7] *Over the Counter – not a exchange traded instrument.*
[8] *For example, the 3 month KLIBOR in Malaysia or the LIBOR internationally*

is at say 12.5%, the floating rate payer has to pay the 2.5% differential (12.5 – 10%) on the RM10 million principal to the fixed rate payer. The opposite happens if rates fall and the 3 month KLIBOR is below 10%.

Thus, in using an IRS for hedging, we would enter an IRS agreement as the fixed rate payer if we want protection against rising interest rates and as the floating rate payer if we want protection against falling interest rates. As with all derivative positions, the gain or loss made on the IRS is intended to offset the loss (or gain) made on the underlying position.

On Balance Sheet Techniques

In addition to the use of *off Balance Sheet* derivative instruments, conventional banks can also use *on Balance Sheet* techniques to manage rate risks. The use of these *on Balance Sheet* techniques often require changes in the way one does business and as such, are less popular in highly competitive markets.

(iv) Floating / Adjustment rate loans

The use of a floating or adjustable interest rate on medium and long term loans is a common way of reducing duration gaps and rate risk. In pricing loans using floating rates, the bank essentially transfers the interest rate risk on to the customer. Since the loan rates are adjustable when interest rates change, a bank's risk is minimized. The duration of such a loan is no more dependent on the maturity of the loan, but on the reset period of the interest rate. For example, a 20 year housing loan provided at a floating rate of say KLIBOR + 2% with annual reset, would have a duration of only one year. The switch to floating from fixed rate loans can therefore substantially reduce a bank's duration gap and rate risk.

(v) Adjusting Asset/Liability Durations

If the size of a bank's duration gap is a measure of its susceptibility to interest rate movements, then an obvious risk reduction measure would be to minimize the gap. For example, in the earlier illustration, the bank had a large positive gap of 7.2 years and this meant substantial interest rate exposure. The logical way to manage this would be to reduce the duration on the asset side and lengthen it on the liability side. Switching to floating rate loans, avoiding fixed rate long term loans etc, would reduce asset duration. Liability side duration could be lengthened by emphasizing longer term deposits or locking in longer term deposits through marketing incentives and penalizing early withdrawals.

Since both the above off Balance-Sheet techniques require a change in the way a bank does business and often leaves the customer disadvantaged, these techniques would be less usable in highly competitive markets. Competitive pressure would automatically put a limit on a bank's ability to use these methods.

Section 3 : Rate Risk and Islamic Banks

Having examined interest rate risks and how conventional banks manage them, we now turn to the potential for interest rate risk for Islamic banks. It was argued earlier that in Malaysia, with its dual banking system, a number of features exist that invariably link the Islamic banking system with the conventional one. In particular, the existence of a large non-muslim customer base and the use by Islamic banks of instruments that mimic conventional ones leads to several implications. First, there is extensive linkage between the two systems. As such, arbitrage between the systems is entirely possible, especially by non muslim customers who have access to both banking systems. This in turn implies that when interest

rates change in the conventional systems, deposit rates must change within the Islamic banking system. This is inevitable since, in the absence of corresponding changes in Islamic bank deposit rates, rate differentials will prevail leading to easy arbitrage opportunity. The possibility of such riskless arbitrage through fund flows leads to the third implication, the consequences of interest rate movements that apply to conventional banks, applies to Islamic banks too. When the cost of funds changes to conventional banks, the cost of funds to Islamic Banks too must change. While the impact of interest rate change may be indirect on Islamic banks, the consequences would be similar.

Data & Methodology

In analyzing the extent of potential interest rate risk for Islamic Banks, two key variables; rates of return and total deposit amounts are examined. The logic being that these two variables would be the first to be directly impacted by interest rate changes. Interest rate and fund flow changes, move together. In empirically examining these two variables for both the Islamic and conventional banking sectors, aggregate monthly data sourced from Bank Negara Malaysia (BNM) is used. The period of study covers a total of 113 months from January 1994 to July 2003[9]. A total of four variables, two each for each sector is examined.

The four variables are, the 3 month deposit rate of return and total deposits for the Islamic banking sector and the equivalent, 3 month rate of interest paid for fixed deposits in Conventional banks and total deposits. The reported interest/return data is averaged across players in each sector while the deposit amounts are monthly total across all accounts[10]. A strong relationship across both pair of variables would imply that Islamic banks have the potential for interest rate risks.

[9] *A total of 113 months – data for 2 months Nov, Dec. 1996 were not available.*
[10] *Includes, savings, current and term deposits.*

Consequently, two hypotheses are tested the first that, there is ***no link*** between 3 month interest rates and the 3 month Islamic bank rate of return. The second, that there is no link in deposit formation. I.e., that there is no link between the total deposits of the two banking systems. In analyzing the extent of these linkages, two statistical techniques are used. First, the use of Pearson Correlation and second, OLS Regression. Two regression models were used with and without lag. The models were specified as;

$$3\,MIBROR = \alpha + \beta \bullet 3MCBINT + e \quad .....(i)$$
$$3\,MIBROR = \alpha + \beta \bullet 3\,MCBINT_{T-1} + e \quad .....(ii)$$

where,

$3\ MIBROR$; is the average indicative rate of return offered by the Islamic Banking sector for 3 month deposits.

$3\,MCBINT$; is the interest rate paid on 3 month fixed deposits. (where t – 1, is the one period lagged variable).

In examining the linkage between total deposits in the two systems.

$$IBTot.Dep = \alpha + \beta\ CBTot.Dep. + e \quad .....(iii)$$
$$IBTot.Dep_t = \alpha + \beta\, CBTot.Dep_{t-1} + e \quad .....(iv)$$

To see if a causal relationship might exist, the Granger Causality (with 4 lags) is used to test for causality both ways. Eyeballing the data and data plots showed two distinct time segments within the overall 113 month period. A first segment of steadily rising interest rates from Jan. 94 – Aug. 98 followed by a second segment from Sept. 98 – July 03, of steadily falling rates (see Fig. 3). Consequently, the same analysis described above was carried out on the two segments.

Results

Figures 1(a) and (b) plot the growth of total deposits within the Islamic and conventional systems respectively. Notice the steady growth in deposits for both systems over the 10 year period. Following slow growth from 1994 to mid 1998, total deposits within the Islamic banking system takes off rapidly. As mentioned earlier, this had to do with the push by the Central Bank for Islamic windows in all commercial banks/finance houses. Confirming the faster growth of Islamic deposits, Fig. 2 shows the increase in percentage to total banking system deposits. From virtual absence in 1994, Islamic deposits account for approximately 8%, 10 years later. This growth however has been more volatile (Figure 4) relative to growth in conventional deposits. This perhaps being a reflection of its much smaller size. Table 2 below provides some descriptive statistics.

Table 2

Total Deposits: Islamic Vs. Conventional
(Jan. 1994 – Jul. 2003)

Total Deposits	**Conventional**	**Islamic**
Mean (RM mils)	396,285	14,656
Annual % Growth	1.06%	7.22%
Std. Dev. (Growth)	0.91	9.67
Avrg. % Islamic / Conv.		3.70%

Results for the test of our first hypotheses that there is no relationship between the rates of return in Islamic banking and conventional interest rates are shown in Table 3 in Appendix. Panels A, B and C, show the results of the Pearson correlation coefficient, the OLS regression and the Granger causality tests. These results confirm the marked co-movement in rates seen

in Figure 3. Recall that based on Figure 3, the overall period was segmented into the First Segment (rising rates) and the Second – falling rates.

The Pearson correlation coefficients are all above 90% and are highest for the later period (segment two). It also shows the closeness in movement between the two rates, regardless of whether it is a rising or falling interest rate environment. The regression results in Panel B, confirm this. The hypotheses that there is no relationship between conventional interest rates and Islamic rates of return would be rejected. The test that βeta = 0, is rejected even at a 1% level of significance. The results are consistent across all time periods. Finally, the test for a causal relationship shows interesting results (Panel C). Notice that there is a significant unidirectional relationship. It appears that changes in conventional bank interest rates *Granger Cause* changes in Islamic bank rates of return.

Results of our second hypothesis that there is no relationship between the total deposits in the two banking sectors is shown in Table 4 (Appendix). Once again we see similar results. There is very strong correlation between total deposits and the regression model again rejects the hypotheses. The Granger causality test again shows one way causality. Changes in total deposits of conventional banks Granger Cause changes in deposits in the Islamic banking system.

These results are broadly consistent with the findings of Haron, S & Ahmad, N (2000), who provide evidence of a relationship between the amount of deposits placed in the Islamic banking system in Malaysia and returns given to these deposits. They argue that the negative relationship they find between the interest rate of conventional banks and the amount deposited in interest-free deposit facilities, is evidence of Islamic bank depositors being

guided by the profit motive. They also argue that, this also proves the existence of the utility maximization theory among Muslim customers.

Section 4: Evaluation & Conclusion

The key implication of our results is that though Islamic Banks operate within an interest free framework their cost of funds and inflows (deposits) are closely correlated with that of the conventional system. In a sense these results are statistical proof of the earlier argument that with equal customer access to both systems, arbitrage flows should keep rates in line. If interest rate risk resulting from changing interest rates are an omni present risk for conventional banks, it follows that if the cost of funds for Islamic banks are equally changing, then they must face similar risk. Paradoxical as it may seem, Islamic banks operating within a dual banking system may also be subject to interest rate risk.

An evaluation of the balance sheet for potential asset and liability side impact, points to higher risk to Islamic banks relative to conventional ones. This is largely due to the fact that unlike unconventional banks that typically price medium and long term loans on floating rates, Islamic banks do not have the flexibility to raise rates on outstanding loans when their cost of funds on the deposit side increase. Our results imply that when interest rates rise, individual Islamic banks will be forced to raise their deposit rates or face potentially serious liquidity problems. This inability to raise rates on the asset side even with rising cost of funds implies that the potential squeeze on income and net worth may be greater for Islamic banks relative to conventional ones. Going by this argument, the impact of *falling* interest rates would be more favorable to Islamic banks than conventional ones.

If Islamic banks share the same consequence of rate risk as conventional ones, what can they do to protect themselves? It is obvious that they cannot use the derivatives based off Balance Sheet techniques, so commonly used by conventional banks. The alternative would therefore be on Balance Sheet adjustments. Even here, they cannot automatically reprice loans the way conventional banks do with floating interest rates. Given the five alternatives for conventional banks that we examined in Section 2 earlier, only the last one, reducing the maturity of loans on the asset side might be available for Islamic banks. However, such a strategy of only emphasizing short-term loans has consequences inimical to the development of Islamic banking in general.

Two alternative For Islamic Banks

There are however at least two ways by which Islamic banks can minimize potential rate risk. The first, would be to move away from "fixed rate" instruments like Murabaha and BBA (Bai Bithamin Ajil) and into profit and loss sharing ones. Though the former financing methods lock-in a predetermined rate of return Islamic banks, they would also be most susceptible to value – loss when rates rise. Customer financing under profit – loss sharing modes on the other hand would be detached from rate movements, being dependent on profit/loss from the financed business. A second possible way by which Islamic banks can minimize potential rate risk would be by introducing a risk-sharing agreement with their customers. Under this arrangement, customers of long maturity loans agree to partially compensate the bank if average deposit rates go beyond a predetermined level. In return, the bank agrees to reduce the mark-up on outstanding balance if its cost of funds go below predetermined levels[11]. While this proposal appears to push, at least partially, the rate risk

[11] *Such a risk-sharing arrangement is practiced in international trade where the rate used to settle/make payments depend on how far spot exchange rates have moved from predetermined expected exchange rates.*

on to the customer, it does have the benefit of being shariah compliant, in that there are no predetermined fixed rates to both parties.

In conclusion, one might ask, why, if interest rate risk is so evident have Malaysian Islamic banks not been affected thus far? There are several reasons why it has not been a problem thus far. The first is that until recently, Islamic banking was a small specialized niche. Furthermore, this small niche has for the most part been a monopoly and later a duopoly. The absence of competition has meant that the banks have had even larger spreads than their conventional counterparts. Given limited choices and religious preference, most customers have been willing to put up with "halal premiums". Given large spreads, potential income squeeze can be easily absorbed. Finally, the interest rate environment has also been favourable. With the exception of sharp increases in rates during the period of the 1997/98 currency crisis, interest rates in Malaysia (and elsewhere) have been falling steadily the last several years. Falling rates are obviously favourable to banks. Today, interest rates in the US and elsewhere are at 45 year lows. Over the next few years rates are likely to move upwards. With a more competitive environment and a secular rise in interest rates, Islamic banks in Malaysia are poised for a major challenge.

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Figure 1(a)
Monthly Total Deposit of Islamic Banks
(Jan-1994--July-2003)

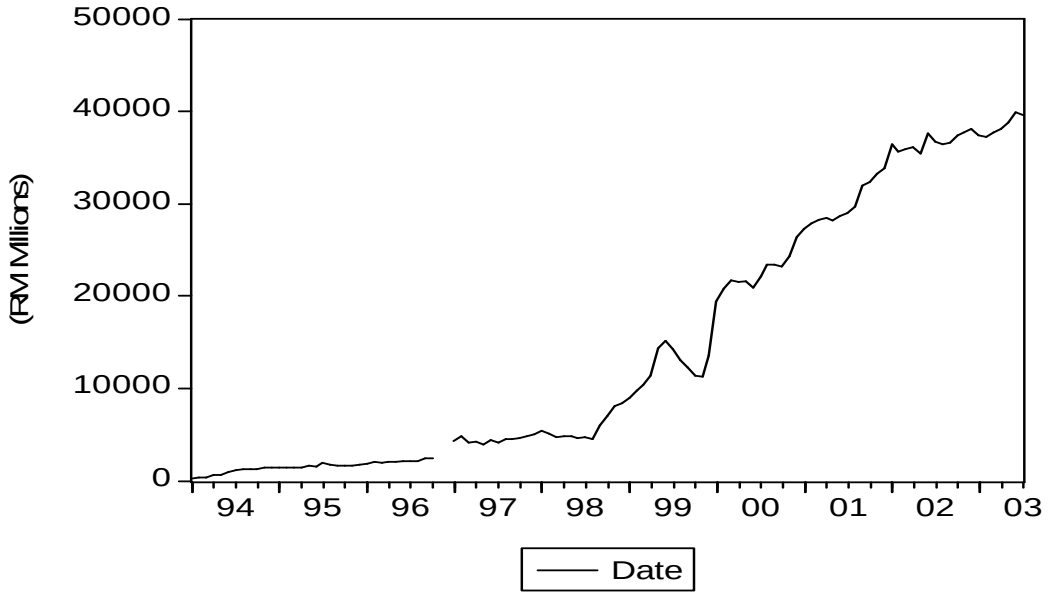

Figure 1(b)
Monthly Total Deposit of Conventional Banks
(Jan-1994--July-2003)

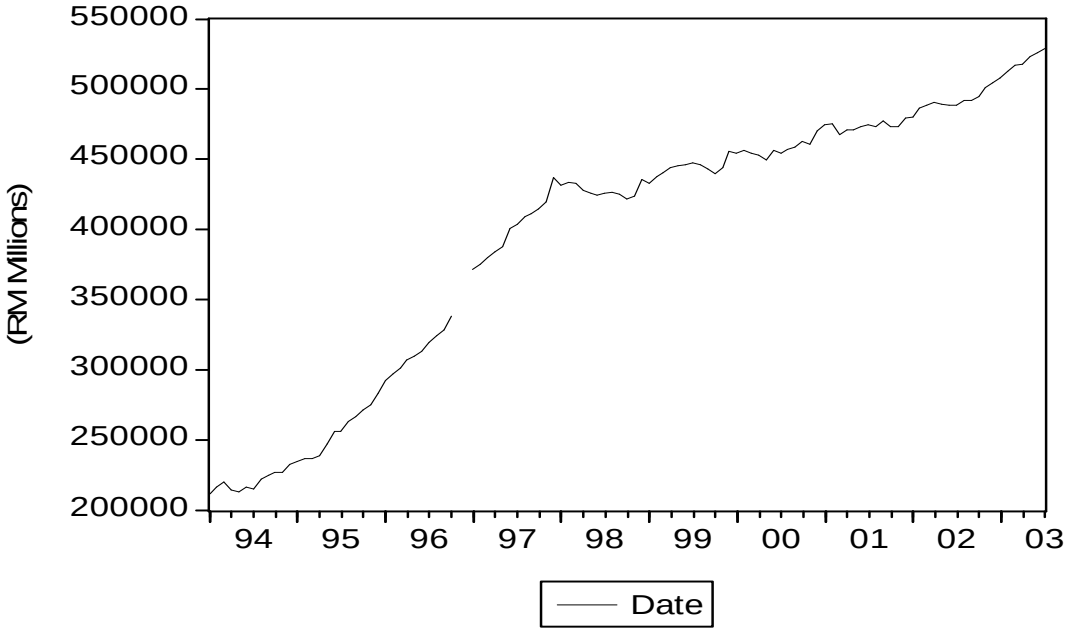

Figure 2
Islamic Bank Total Deposit as percentage of
Conventional Bank Total Deposit
(Jan-1994--July-2003)

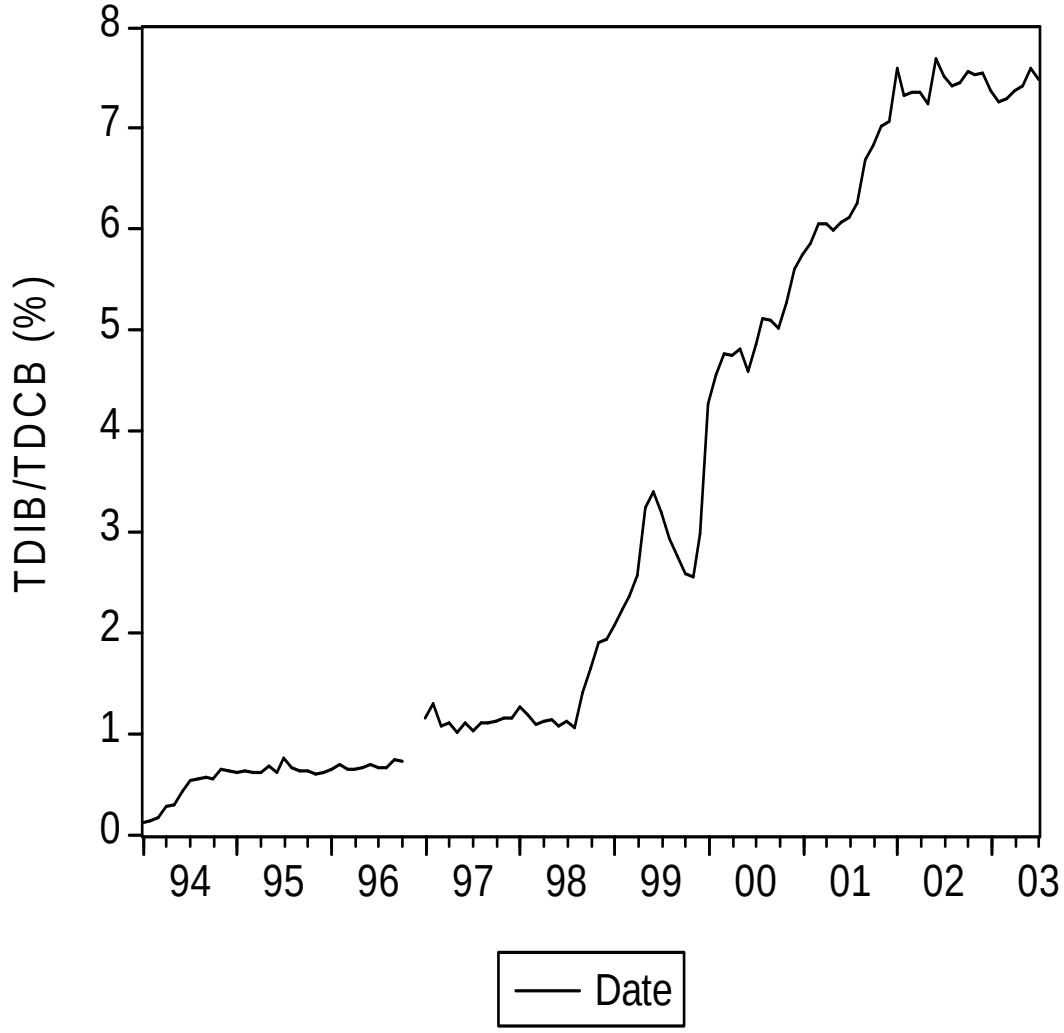

Figure 3
3-Month Deposit Rates of Conventional Banks vs. Islamic Banks
(1994:01-2003:07)

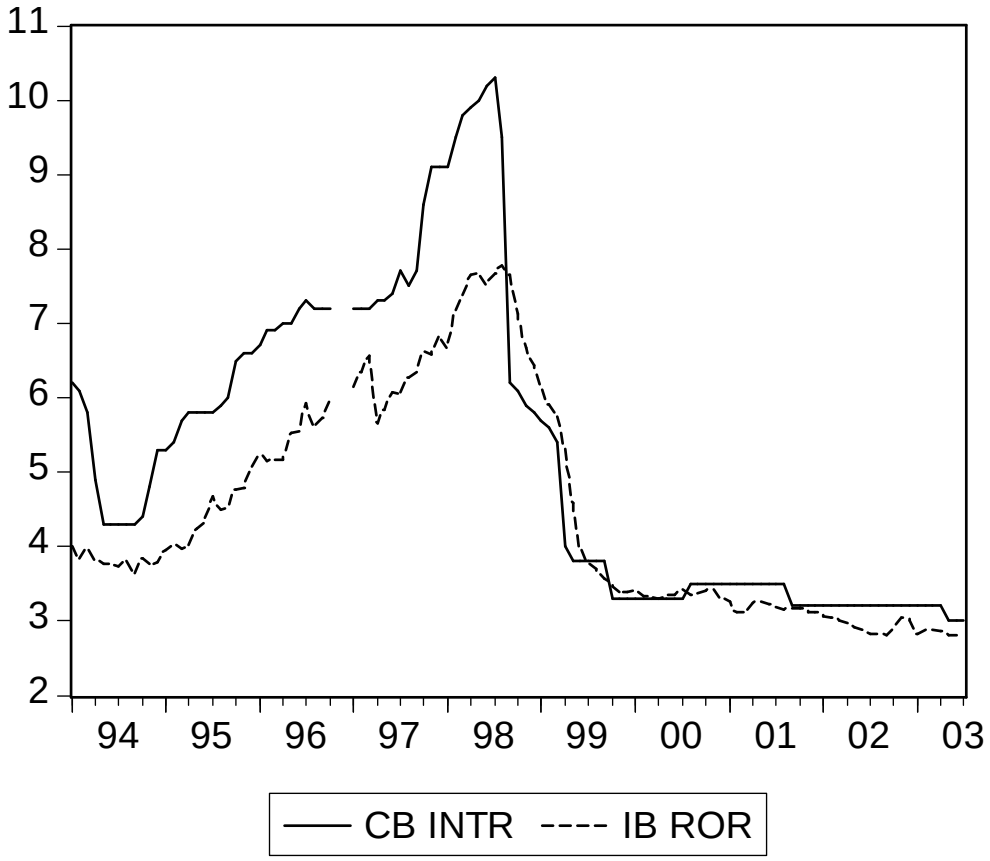

Figure 4
Percentage Change in Total Deposit of
Conventional Banks vs. Islamic Banks

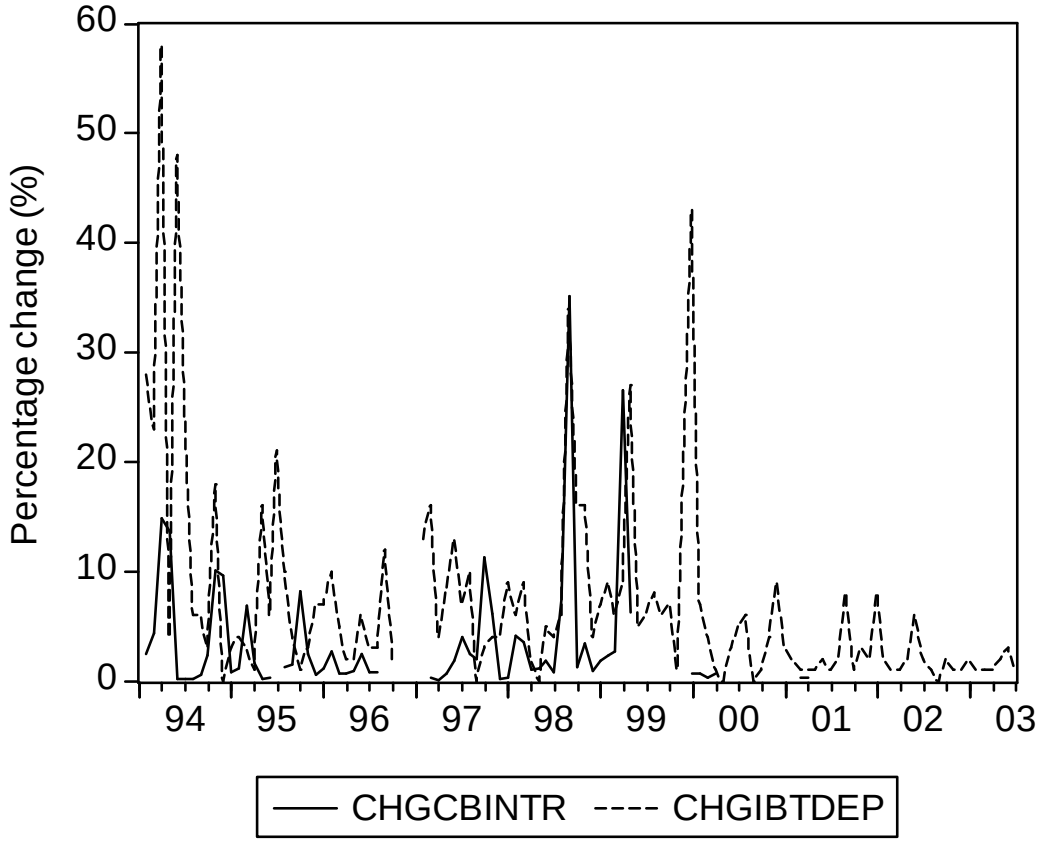

Table 3

Panel A **Correlation between 3-Month Rate of Return in IB and 3 Month Interest Rate**

	Overall	**First Segment**	**Second Segment**
	IB-3MTH-ROR	IB-3MTH-ROR	IB-3MTH-ROR
CB-3-MTH-INTR	0.921440738932	0.959127464741	0.97406915888

Panel B **Regression results of Hypothesis (1)**

Period covered	Coefficient (β)	Probability Value	R-Squared	Remark
Overall (Eq. 1)	0.660683	0.0000	0.849053	Sig. at 0.0 5% level
Overall With lag variable (Eq. 2)	0.6806059	2.43125656E-5	0.8957719	Sig. at 0.0 5% level
First Segment (Eq. 1)	0.739860	0.0000	0.919925	Sig. at 0.0 5% level
With lag variable (Eq. 2)	0.749074	0.0000	0.922381	Sig. at 0.0 5% level
Second Segment (Eq. 1)	1.367733	0.0000	0.948811	Sig. at 0.0 5% level
With lag variable (Eq.2)	1.235162	0.0000	0.965823	Sig. at 0.0 5% level

Overall is for the period: January, 1994 to July 2003.
First Segment is for the period January 1994 to August 1998.
Second Segment is for the period September 1998 to July 2003.

Result of Granger Causality Test of Hypothesis 1(4 lags)

Overall			
Null Hypothesis:	Obs	F-Statistic	Probability
IBMTHROR does not Granger Cause CBMTHINTR	105	0.82517246	0.5123061276
CBMTHINTR does not Granger Cause IBMTHROR	105	21.4384451	1.168395362e-12*
First Segment			
Null Hypothesis:	Obs	F-Statistic	Probability
IBMTHROR does not Granger Cause CBMTHINTR	46	1.79154	0.15129
CBMTHINTR does not Granger Cause IBMTHROR	46	1.64540	0.18353
Second Segment			
Null Hypothesis:	Obs	F-Statistic	Probability
IBMTHROR does not Granger Cause CBMTHINTR	55	1.12352	0.35709
CBMTHINTR does not Granger Cause IBMTHROR	55	5.89485	0.00065*

* Significant at 1%.

Table 4

<u>Panel A</u> Correlation between Total deposit of Commercial & Islamic Banks

	Overall	**First Segment**	**Second Segment**
	IB. Tot. Deposit	IB-Tot. Deposit	IB-Tot. Deposit
CB-Tot. Deposit	0.806191830717	0.972959979664	0.938987623641

<u>Panel B</u> Regression results of Hypothesis (2);

Period covered	Coefficient (β)	Probability Value	R-Squared	Remark
Overall (Eq. 3)	0.115048	0.0000	0.649945	Sig. at 0.0 5% level
With lag variable (Eq. 4)	0.115382	0.0000	0.650429	Sig. at 0.0 5% level
First Segment (Eq. 3)	0.019135	0.0000	0.946651	Sig. at 0.0 5% level
With lag variable (Eq. 4)	0.018901	0.0000	0.949130	Sig. at 0.0 5% level
Second Segment	0.372424	0.0000	0.881698	Sig. at 0.0 5% level
With lag variable (Eq. 4)	0.378883	0.0000	0.888630	Sig. at 0.0 5% level

Overall is for the period: January, 1994 to July 2003.
First Segment is for the period January 1994 to August 1998.
Second Segment is for the period September 1998 to July 2003.

<u>Panel C</u> Result of Granger Causality Test of Hypothesis 2 (4 lags)

Overall			
Null Hypothesis:	Obs	F-Statistic	Probability
IBTDEP does not Granger Cause CBTDEP	105	0.84711	0.49879
CBTDEP does not Granger Cause IBTDEP	105	2.90509	0.02566**
First Segment			
Null Hypothesis:	Obs	F-Statistic	Probability
IBTDEP does not Granger Cause CBTDEP	46	1.32014	0.28056
CBTDEP does not Granger Cause IBTDEP	46	2.64780	0.04859**
Second Segment			
Null Hypothesis:	Obs	F-Statistic	Probability
IBTDEP does not Granger Cause CBTDEP	55	0.89679	0.47364
CBTDEP does not Granger Cause IBTDEP		1.82492	0.14022

** Significant at 5%.

Appendix 1

The most obvious tool that the Treasurer of KL Finance could use to manage the gaps identified in the Maturity Bucket Analysis would be the KLIBOR Interest Rate Futures Contract. To hedge the two negative gaps; KL Finance would have to short the futures contracts. This is because, the negative gap implies that KL Finance would have to refinance or "borrow" amounts equivalent to RM60 million in month one and RM200 million in month three. The hedge position should be one that would ***profit*** when rates increase, such that the treasurer is able to ***"lock-in"*** the currently prevailing rates as shown by the futures contracts. To fully hedge the gaps, KL Finance should;

- Short 60, spot month futures contracts.
- Short 200, 3 month futures contracts.

Suppose the Treasurer observes the following quotes today;

1 Month KLIBOR	=	6.5%
3 Month KLIBOR	=	7.0%

Spot Month KLIBOR Futures	=	93.00
3 Month KLIBOR Futures	=	92.00

By shorting 60, spot month futures contracts and 200, 3 month futures contracts, KL Finance Bhd. would be able to fully offset the impact of any interest rate increase, by being able to ***lock-in*** the current 7% (1 mth.) and 8% (3 mth.). yields of the futures contracts. To see how this is possible we examine below the payoff to the hedged position at the end of one month and three months, (i.e. on the maturity dates) assuming a 1.5% increase in the one month rate and 2% increase in the three month rate.

Analysis of The Hedged One Month Position

Since $i\uparrow$ by 1.5%; the rates on maturity date would be:

1 Month KLIBOR	=	8%
Spot Month KLIBOR Futures	=	92.00

Result:

Profit from futures position = (93.00 – 92.00) x 100 x 60 x [RM25 x 1/3]

= RM50,000

Refinancing Cost = $8\% \times \left(\frac{30}{360}\right) \times$ RM 60 mil.

= RM400,000

Net Cost of Funds = RM400,000 – RM50,000

= RM350,000

Effective Cost % = $\frac{RM\,350{,}000}{RM\,60{,}000{,}000} \times 100 = 0.5833\%$

Annualized = 0.5833 x 12 = 7.00%

*Note: This equals the 7.00% refinancing cost that you wanted to "lock-in" for the one month bucket.

Analysis of The Hedged 3 Month Position

Since $i\uparrow$ by 2% over the 3 month period, the rates on maturity date would be:

3 Month KLIBOR	=	9.00%
3 Mth. KLIBOR Futures	=	91.00

Result:

Profit from futures position = (92 – 91.00) x 100 x 200 ctrts x RM25

= RM500,000

Refinancing Cost	=	$9\% \times \left(\frac{90}{360}\right) \times$ RM200 mil.
	=	RM4,500,000
Net Cost of Funds	=	RM4,500,000 – RM500,000
	=	RM4,000,000
Effective Cost %	=	$\frac{RM\,4mil.}{RM\,200mil.} \times 100 = 2\%$
Annualized	=	2% x 4 = 8%

**Note: This is the 8% refinancing cost that you intended to "lock-in" for the 3 month bucket.*

Appendix 2

Illustration : Duration Gap Analysis

Simplified Bank Balance Sheet

Assets	Liabilities
S.T. Loans (40%) => 1.5 yrs Dur = 1 yr.	C/A (40%) maturity 0 duration 0 yrs.
M.T. Loans (20%) => 4 yrs Dur = 3 yrs.	S/A (20%) maturity 1.5 yrs. duration 1 yr.
L.T. Loans (40%) => 25 yrs Dur = 20 yrs.	F.D's (40%) maturity 5 yrs. duration 4 yrs.
Weighted Average Dur. of Assets	Weighted Average Duration of Liabilities;
= .4 x 1 + .2 x 3 + 4 x 20	= .20 x 1 + .40 x 4
= 0.4 + 0.6 +8	= 1.8 yrs.
= 9.0 yrs.	

* Since Duration of Assets = 9.0 yrs.

and duration of Liabilities = 1.8 yrs.

Positive Gap = 7.2 yrs.

=====

What this means is that the above bank is highly exposed to interest rate risk. Since the duration of assets is 5 times that of liabilities, the fall in market value of assets as a result of an interest increase will be approximately 5 times more than the fall in the value of liabilities.

This can be seen from the following computation; (assuming current interest rate is 10% and increases by 5%).

$$\Delta \text{ in Value of Assets} = \%\,\Delta P = -D \times \left[\frac{\Delta i}{(1+i)}\right]$$

$$\Delta \text{ in Value of Assets} = -9 \times \left[\frac{.05}{1.10}\right] = -0.40909$$

$$= \mathbf{-40.9\%}$$

$$\Delta \text{ in Value of Liab.} = -1.8 \times \left[\frac{.05}{1.10}\right] = -0.0818$$

$$= \mathbf{-8.18\%}$$

- Thus, if interest rates increased 5% from current levels, the above bank's asset value will fall 40.9% while its liabilities 8.18%.
- (Notice that the fall in assets is 5 times the fall in liabilities – $40.9 / 8.18 = 5.0$).
- As a result of this differential fall, the bank's net worth will be squeezed.
- The impact on the bank's net worth can be determined using the following equation;

$$\% \Delta NW = -D_{GAP} \times \left[\frac{\Delta i}{(1+i)}\right]$$

- For the bank in our above example; the reduction in net worth as a result of the 5% increase in interest rate will be;

$$\% \Delta NW = -7.2 \times \left[\frac{0.05}{1.10}\right] = -0.3273$$

$$= \mathbf{-32.72\%}$$

- Clearly, the bank is highly exposed since a 5% interest rate rise will reduce Net Worth by approximately 33%.[12]

[12] *The Ringgit amount of this fall in Net Worth can be determined as;Tot. Assets x .33.*