Impact of Interest Rate Changes on Performance of Islamic and Conventional Banks

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Abstract: This study investigates the impact of interest rate changes on the performance of Islamic and conventional banks in terms of demand for deposits and financing. Theoretically, changes in the interest rate would lead to a shifting effect between Islamic banks and conventional banks if customers are guided by the profit motive. Using monthly data from May 1999 to June 2007, it is found that Islamic bank customers behaved rationally and acted according to the profit motive. No shifting effect on deposits is evident possibly because customers are indifferent since returns on Islamic deposits move fairly closely to the interest rates of conventional deposits. Nevertheless, a shifting effect on financing is found. A rise in the base lending rate would induce customers to obtain financing from the Islamic bank and vice versa. This study concludes that because customers are profit motivated, Islamic banks in the dual system are exposed to interest rate risks despite operating on interest-free principles.

Keywords: Deposit, financing, interest rate, Islamic banking, Malaysia
JEL classification: G15, G21

1. Introduction

Islamic banking was introduced in Malaysia in 1983 with the long-term objective of having a full-fledged Islamic banking system running parallel with the existing conventional banking system. To be competitive in the dual banking system, the basic strategy has been for Islamic banks to offer *Shariah*-compliant services which match those offered by the conventional banks (Bank Negara Malaysia 2005). Since interest is prohibited in Islam, Islamic bank services are based on profits and other interest-free Islamic principles. Hence, Islamic banks accept demand and savings deposits based on safe-keeping (*wadiah*) and investment deposits based on profit sharing (*mudarabah*). Islamic bank financing is offered on a variety of principles such as credit sale (*bai bithamin ajil*), profit sharing (*mudarabah, musyarakah*), leasing (*ijarah*) and hire-purchase (*ijarah thumma al-bai*).

The dual banking system provides a relative advantage to customers in terms of banking choice. Whilst pious Muslims are indifferent and would stick to the Islamic bank, others who are profit-motivated would tend to compare the returns on deposits and the cost of financing between the two banking systems. Any differential between the Islamic and conventional rates as a consequence of changes in market interest rates would induce these customers to switch from the Islamic bank to the conventional bank and vice-versa. This study aims to examine the occurrence, if any, of such a shifting effect in Malaysia.

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Specifically, the objective of this study is to investigate the impact of interest rate changes on the performance of Islamic and conventional banks in terms of deposit and financing. It is important to understand this phenomenon; especially so in the context of Islamic banks because a negative consequence, if not mitigated, would affect the growth of these new comers in the dual system.

The significance of this study is attributed to the following. First, this study looks at the impact of interest rates on the deposit and financing of both systems. This is in contrast with past studies which concentrated on the deposit side only (Haron and Ahmad 2000; Obiyatullah 2004; Rahmatina 2007). Second, most of the earlier studies looked at the issue in the context of rising interest rates before the Asian financial crisis. In contrast, the scope of this study is on the period of low or falling interest rates after the Asian financial crisis. The study is interested in investigating whether the savings and financing behaviour of customers during such a period is consistent with theoretical expectations.

This study is organised into six sections. Following the introduction, Section 2 elaborates the theoretical discussion on how interest rate changes are expected to influence Islamic and conventional bank deposits and financing. Section 3 reviews existing literature. Research methodology is presented in Section 4 while data analysis and findings are discussed in Section 5. Conclusions and recommendations are given in Section 6.

2. Theoretical Discussion

Rosly (1999) provides a theoretical explanation of the impact of interest rate changes on Islamic banks' performance in the dual system. He emphasises that Islamic banks are exposed to potential interest rate risks because of the over dependency of these banks on fixed rate asset financing namely *bai bithamin ajil (*BBA).

From the outset, Rosly notes that over 80 per cent of the assets of Islamic banks in Malaysia are in the form of BBA. BBA is commonly used for property and asset financing. It is a sales contract whereby the bank purchases the asset required by the customer at the market price and then sells it to the customer at a mark-up price. As required by *Shariah*, the profit rate and the selling price are fixed throughout the financing period. Repayment of the selling price by the customer to the bank is by instalments. In practice, BBA financing is collateralised which implies that the profit to the bank is almost certain. In this respect, BBA financing is a fixed rate instrument which is not much different from the conventional bank loan.

Rosly explains that for the conventional bank, the base lending rate (BLR) and rates of return on deposits would change according to changes in the market interest rate. A rise in the market interest rate would cause the rate of return on deposits to increase. This would increase the bank's cost of funds which would in turn cause the interest rate on loans to rise, at least in proportion to the increase in the deposit rate. As a result, the conventional bank's profit margin will not be affected. The Islamic bank, on the other hand, cannot increase the BBA profit margin (as stipulated by the *Shariah*) when the market interest rate rises and therefore cannot raise the rate of returns on its deposits. If the Islamic bank chooses to increase its deposit rates in order to compete with conventional banks, it will reduce the Islamic bank's profit margin.

Since the Islamic bank is offering lower deposit rates, it cannot compete with the conventional bank in attracting new deposits. Hence the rate of growth of new deposits will

tend to decline. At the same time, depositors who want to take advantage of the higher interest rates will transfer their deposits from the Islamic bank to the conventional bank. Customers may also want to keep their deposits for a shorter duration. Overall the volume of Islamic deposits would be negatively affected.

On the asset side, customers may find that the instalments for existing BBA financing are relatively cheaper than the instalments for existing conventional loans during times of rising interest rates. More customers would choose BBA financing if they expect interest rates to rise further in the future. Hence the demand for BBA financing would rise.

However, the Islamic bank may not be able to fulfil this increased demand for BBA financing due to the fall in total deposits and the short-term nature of its deposits. The Islamic bank may not be willing to borrow from the Islamic inter-bank money market because the cost of funds in the money market is usually higher than that of bank deposits.

During falling market interest rates, the conventional bank is able to adjust both the deposit and base lending rates downwards. As a result, the conventional bank's profit margin will not be affected by the declining interest rate. Similarly the Islamic bank would also reduce the rates of return on its deposits in line with the conventional deposit rates. Since the profit rate of BBA financing is fixed, it is rational for the Islamic bank to lower its deposit rates in order to widen its profit margin.

When interest rates fall, the existing BBA profit rate remains fixed. Hence customers would find that existing BBA financing is relatively more costly than existing conventional loans. If consumers expect the interest rate to decline further, they would prefer conventional loans rather than opt for BBA financing. Hence, the demand for conventional loans would increase while the demand for BBA financing would fall. Lower demand for BBA financing would also mean that it would be rational for the Islamic bank to maintain competitively low deposit rates. Relatively higher deposit rates would attract more deposits into the Islamic bank which would not be good in this situation. As demand for BBA declines, increased or extra deposits would result in high idle balances which would reduce the Islamic bank's earnings.

The above explanation theoretically shows that any change in the market interest rate would lead to a shifting effect from the Islamic bank to the conventional bank and vice versa. It is recognised that the root of this problem lies in the structural weakness of the fixed BBA mechanism. Hence, overdependence on BBA financing by the Islamic bank will limit the bank's ability to compete with conventional banks in both deposit mobilisation and financing in a dual banking system.

3. Literature Review

Several studies have been conducted to investigate the impact of interest rate changes on the demand for Islamic deposits. Overall, the findings show that a negative relationship exists between the two variables. Haron and Ahmad (2000) analysed the relationship between total Islamic deposits and the conventional rate of return on deposits for the period 1984 to 1999. They found a negative relationship between the interest rates of fixed deposits of conventional banks and the volume of interest- free investment deposits of Islamic banks. The finding is consistent with the theory that during rising interest rates, returns on Islamic bank deposits are relatively lower which cause customers to switch to the conventional banks. The study by Rahmatina (2007) also found that Islamic bank depositors in Indonesia

behaved in accordance with the dictates of the profit motive; responding positively to changes in the real rate of return and negatively to rising interest rates although it was not significant in the short run.

Another study by Obiyathulla (2004) examined the relationship between changes in the interest rate of conventional bank deposits and the rate of return on Islamic bank deposits for the period 1984 to 2003. Dividing the overall period into two segments (rising and falling interest rates), the study found strong positive correlations between the two rates for both segments. The results showed both rates moved closely in the same direction regardless of rising or falling interest rates. Obiyatullah argued that the result supported the theory that falling interest rates had a favourable impact on Islamic banks but it also indicated that Islamic banks were forced to raise deposit rates when interest rates rose in order to remain competitive which would imply a potential squeeze on the banks' earnings.

The only empirical study on the impact of interest on Islamic financing is that by Nor Kamarul Haidi (2006) which examined the impact of interest rates on BBA financing using simple regression and Pearson correlation. The study revealed that a significant negative relationship exists between the prevailing interest rate and total financing under the BBA scheme. The study was extended by undertaking an explanatory interview study on Muslims and non-Muslims. The findings show that the switching motives amongst the BBA subscribers are driven by two factors, namely the high cost of financing and delay in loan processing. In addition the BBA subscribers switched to conventional bank refinancing mainly because of the higher cost of BBA although their original subscription to BBA financing was attributed to the religious factor.

4. Methodology

The main objective of this study is to investigate the impact of interest rate changes on the deposits and financing of Islamic and conventional banks in Malaysia. Thus we can envisage two different systems in which deposits are referred to as the first system and financing as the second system.

The main variables selected to examine the first system are total fixed deposits in conventional banks (FDcv), total investment deposits in Islamic banks (IDis), interest rate for 1-month fixed deposit at conventional banks (IR1Mcv) and rate of return for 1-month investment deposit of Islamic banks (RR1Mis).

Interest rate for 1-month fixed deposit in conventional banks and the rate of return for 1-month investment deposit in Islamic banks are used as proxy for the returns on total fixed deposit in conventional banks and total investment deposit in Islamic banks respectively. One month's return is chosen to reflect the ability of the depositors to shift from the Islamic bank to the conventional bank and vice versa where they are not bound by the terms and conditions restricted by the longer term deposits. We use the one month lag of the Islamic bank return instead of the real return to reflect the nature of the investment deposit account whereby depositors do not know the exact rate of return on these deposits. The rate of return on the investment deposit is usually declared at the end of the month. Thus, the previous month's rate of return is used as the indicative rate (Rahmatina 2007).

Total residential property financing of conventional banks (RPFcv), total residential property financing of Islamic banks (RPFis), and the base lending rate (BLR) are the main variables selected to examine the second system.

The level of Islamic BBA financing is measured by total residential property financing of Islamic banks since such financing solely deals with the concept of *al-bai' bithamin ajil*. In comparison, the level of conventional loans is measured by total residential property loans of conventional banks.

Data for this study were taken from the *Monthly Statistical Bulletin* published by Bank Negara Malaysia. Monthly data covering the period May 1999 to June 2007 (98 monthly observations), the period after the Asian financial crisis, were used for the analysis.

The method of analysis included time series econometric techniques of unit root test, cointegration, vector autoregressive (VAR), Granger causality and impulse response function (IRF). To avoid the problem of heteroscedasticity, total fixed depositss in conventional banks (FDcv), total investment deposits in Islamic banks (IDis), total residential property financing of conventional banks (RPFcv), and total residential property financing of Islamic banks (RPFis) were log-transformed.

The first step of the analysis was to test for the presence of unit roots of the variables by using the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) unit root tests as well as unit root with structural break proposed by Phillip and Perron (1988).

Once the stationarity condition was examined, the next step was to conduct a cointegration test developed by Johansen and Juselius (1990) or known as JJ test. If no cointegration was found, the analyses will be based on the regression of the first difference of the variables using a standard VAR model. Next, the Granger causality test under the environment of VAR will be employed to investigate the relationship among the variables. If cointegration is found, a Vector Error Correction Model (VECM) would be constructed. The Granger causality test must be conducted under the VECM instead of the VAR model. To examine the responses of the variable due to one-time shock in any of the other variables, generalised impulses under the Impulse Response Function (IRF) will be employed for this purpose. A summary of the analysis procedures is illustrated in Appendix 1.

5. Findings

5.1 Preliminary Study

Figure 1 shows the movements of fixed and investment deposits and their respective rates of return. Total fixed deposits in conventional banks (LNFDcv) and total investment deposits in Islamic banks (LNIDis) are found to show positive trends from 1999 to 2007. Interestingly the interest rate for 1-month fixed deposit of conventional banks (IR1Mcv) and the rate of return for 1-month investment deposit of Islamic banks (RR1MLAG1is) moved fairly closely during the period. Overall, the returns on deposits were quite low with the interest rate on conventional deposits being higher than the yield of Islamic deposits.

Based on Figure 1, it is hard to investigate the impact of interest rates on the level of conventional fixed deposits and Islamic investment deposits because the series does not show any clear pattern of direction. Overall, the series was found to fluctuate mildly during the period and was not normally distributed (see Appendix 2).

Table 1 shows that LNIDis is negatively correlated with IR1Mcv which indicates that any increase in the conventional interest rate will decrease the level of investment deposits in Islamic banks. This result supports the previous findings by Haron and Ahmad (2000)

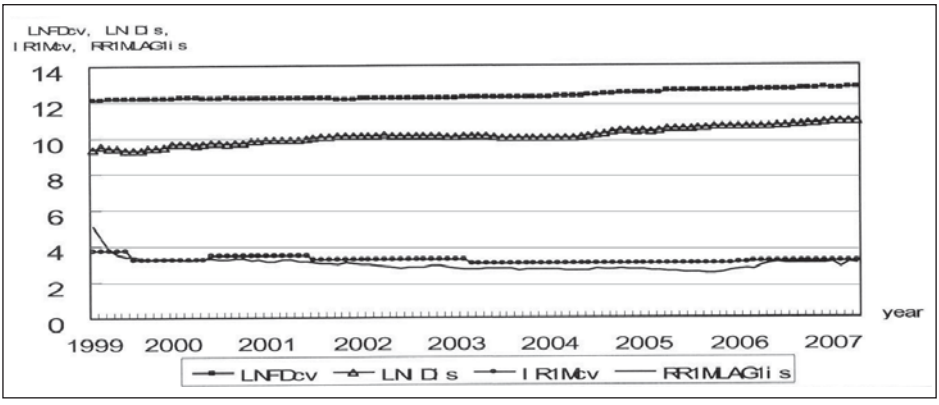

Figure 1: *Performance of the respective fixed deposit and investment deposit in the dual banking system and their interest rate and rate of return (May 1999 – June 2007)*

Table 1: Correlation matrix for the first system (deposit)

Variable	LNFDcv	LNIDis	IR1Mcv	RR1MLAG1is
LNFDcv	1.000000	0.862450	-0.333297	-0.346943
LNIDis	0.862450	1.000000	-0.564365	-0.562963
IR1Mcv	-0.333297	-0.564365	1.000000	0.963891
RR1MLAG1is	-0.346943	-0.562963	0.963891	1.000000

and Rahmatina (2007) which suggest that the Islamic bank depositors are driven by the profit motive. Thus any change in the conventional interest rate would lead to a shifting effect between Islamic and conventional deposits.

Figure 2 shows the movements of conventional and Islamic residential property financing as well as the base lending rate for the period May 1999 to June 2007. It indicates that the trends of total residential property financing of conventional banks (LNRPFcv) and total residential property financing of Islamic banks (LNRPFis) are positive over the period. It is noteworthy that the BLR was falling or remained constant over most of the period, marking a period of falling interest rates. Overall, the series are not normally distributed (see Appendix 3).

Table 2 indicates that LNRPFcv and LNRPFis have negative correlations with BLR respectively which show that any increase in the rate of BLR would cause a decrease in the level of residential property financing in both banking systems. This result is consistent with the fact that any increase in the rate of BLR will increase the cost of borrowing to customers which would in turn lower the demand for customer financing. Nevertheless the significance of the relationship cannot be seen from this rough measure only.

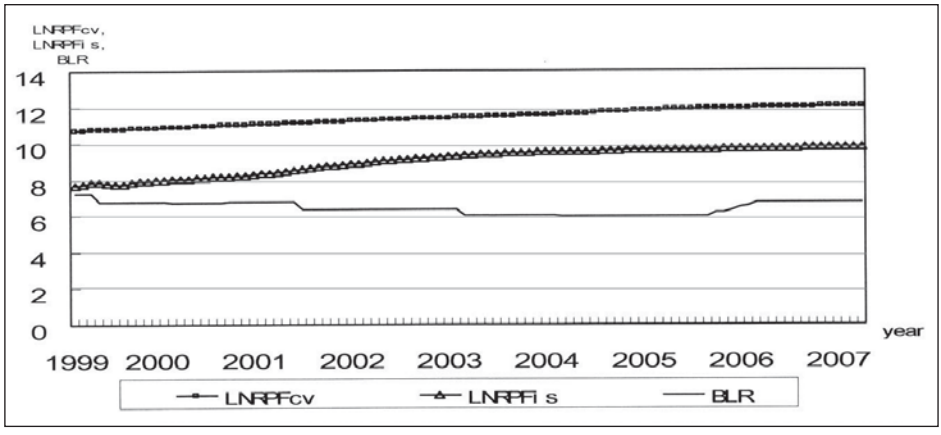

Figure 2: *Performance of the respective total residential property financing of conventional banks, total residential property financing of Islamic banks and base lending rate*

Table 2: Correlation matrix for the second system (financing)

Variable	LNRPFcv	LNRPFis	BLR
LNRPFcv	1.000000	0.960271	-0.485087
LNRPFis	0.960271	1.000000	-0.651507
BLR	-0.485087	-0.651507	1.000000

5.2 Unit Root Test

The order of integration of the time series data can be identified by running the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. The ADF and PP unit root tests were conducted to test each variable for a unit root in level with a constant term and the deterministic time trend. A constant term is included since all series have a non zero mean, while the trend term allows for a deterministic trend. We employed the ADF and PP tests with 1, 3 and 6 lags to overcome the problem of serial correlation in residuals.

Table 3 presents the result of the unit root test for the first system. The ADF test indicates that the unit root hypothesis cannot be rejected for all the series at their level form with 5 per cent significance level except for IR1Mcv at lag 3 and RR1MLAGlis at lag 1. However, the PP test decisively rejects RR1MLAG1is at 1 per cent significance level which implies that RR1MLAG1is is stationary in level. In other words, RR1MLAG1is is integrated of order 0.

After taking first difference, the ADF test indicates that the LNFDcv, LNIDis and IR1Mcv are stationary in first difference except LNFDcv and LNIDis at lag 6. However, the PP test rejects LNFDcv, LNIDis and IR1Mcv at 1 per cent significance level. These results suggest that the LNFDcv, LNIDis and IR1Mcv are integrated of order one.

Table 3: Unit root test for the first system (deposit)

Variable	Lag	Level		First difference	
		ADF	PP	ADF	PP
LNFDcv	1	-0.968588	-0.931879	-6.305870**	-8.244151**
	3	1.518582	-0.967930	-4.817758**	-8.267179**
	6	-1.310814	-0.961004	-3.044772	-8.218571**
LNIDis	1	-1.740466	-1.667809	-5.801713**	-8.949028**
	3	-1.740466	-1.763263	-5.801713**	-8.999166**
	6	-2.199152	-1.758295	-3.406610	-8.998092**
IR1Mcv	1	-3.191289	-3.011866	-7.072538**	-9.888624**
	3	-3.775473*	-3.016537	-4.993043**	-9.893818**
	6	-2.095702	-3.021093	-4.379742**	-9.900836**
RR1MLAG1is	1	-3.915781*	-7.479280**	-9.009435**	-8.481240**
	3	-1.047464	-6.815524**	-7.377162**	-8.897515**
	6	-0.665095	-6.422097**	-4.793476**	-9.139719**

Table 4: Unit root test for the second system (financing)

Variable	Lag	Level		First difference	
		ADF	PP	ADF	PP
LNRPFcv	1	-0.898202	1.214135	-5.399294**	-8.284774**
	3	0.233603	0.917074	-4.309540**	-8.386302**
	6	0.570606	0.899124	-3.102384	-8.445079**
LNRPFis	1	0.146989	0.542291	-6.539550**	-7.419174**
	3	0.649395	0.510542	-4.387177**	-7.288120**
	6	-0.687650	0.449353	-2.584145	-7.236951**
BLR	1	-1.278432	-1.168147	-6.499247**	-9.509247**
	3	-0.635678	-1.223171	-4.713193**	-9.525438**
	6	-0.827648	-1.277211	-3.583579*	-9.535279**

Note: ** and * denote significance at the 1 and 5 per cent levels, respectively.

Table 4 shows the results of the unit root test for the second system. The ADF test indicates that all variables are non stationary in level but stationary in first difference at the 1 per cent significance level except for LNRPFcv and LNRPFis at lag 6. However, the PP test rejects the null hypothesis for all the variables at 1 per cent significance level after taking first difference. These results suggest that all the variables are integrated of order one.

5.3 Unit Root Test with a Structural Break

The conventional unit root tests (ADF and PP tests) do not take into consideration the existence of any structural break in time series data which could misinterpret a trend

Table 5: Unit root test with a structural break for the first system (deposit)

Variable	Lag	Level	First difference
LNFDcv	1	0.122188	-6.844958**
	3	-0.501905	-5.409572**
	6	0.154958	-3.669028
LNIDis	1	-3.472897	-5.943538**
	3	-3.082510	-5.010358**
	6	-3.402853	-3.562945
IR1Mcv	1	-3.946858	-6.886596**
	3	-5.516841**	-4.825941*
	6	-2.760016	-3.376940
RR1MLAG1is	1	-5.122995**	-8.804579**
	3	-1.745529	-7.217203**
	6	-1.416366	-4.662272*

Note: ** and * denote significance at the 1 and 5 per cent levels, respectively.

stationary series with a structural break as a random walk process. Additionally, the inclusion or exclusion of an intercept term and a deterministic trend in the conventional unit root tests can possibly bias the results toward accepting the null hypothesis. Therefore, allowance for a breakpoint in the specification of the unit root test seems more reasonable.

To run the unit root test with a structural break, we followed Perron's procedure where the breakpoint was treated as exogenous. We treated the full sample period as having a breakpoint when there was a significant change in the trend of the data series attributed in this case to the introduction of the Islamic Variable Rate Mechanism within the framework of the Islamic rate of return by Bank Negara Malaysia in January 2003.

Due to this, the breakpoint was fixed at December 2002. Thus the number of observations before and on the breakpoint date was 44 with the remaining 54 being the number of observations after the breakpoint date. The value of break fraction (λ)was then calculated by T_B / n , $\frac{44}{98} = 0.647 \approx 0.6$. At the 5 per cent level, the critical value was -4.24, whereas at the 1 per cent level, it was -4.88.

Table 5 reports the results of unit root test with a structural break for the first system. Overall the results indicate that the unit root hypothesis cannot be rejected for all the series at their level form except for IR1Mcv at lag 3 and RR1MLAG1is at lag 1. After taking first difference, LNFDcv, LNID is and IR1Mcv were found to be stationary. However, there some extreme cases were found where LNFDcv, LNIDis and IR1Mcv at lag 6 were not significant in first difference. This result shows similar findings with the ADF test.

Overall results suggest that the LNFDcv, LNIDis and IR1Mcv are first-differenced stationary except for RR1MLAG1is which implies that the RR1MLAG1is is not in the same order with the other variables.

Table 6: Unit root test with a structural break for the second system (financing)

Variable	Lag	Level	First difference
LNRPFcv	1	0.173566	-5.788138**
	3	-0.238382	-4.604111*
	6	0.282314	-3.486919
LNRPFis	1	-3.198686	-8.628100**
	3	-4.364636*	-5.498182**
	6	-3.094344	-5.831797**
BLR	1	-3.041030	-6.542657**
	3	-2.900711	-4.881535**
	6	-2.767529	-3.801595

Note: ** and * denote significance at the 1 and 5 per cent levels, respectively.

Table 7: Multivariate JJ cointegration test for the first system (deposit)

Variable : LNFDcv LNIDis IR1Mcv

Lag	Trace			Maximum eigenvalue		
length	r = 0	r ≤ 1	r ≤ 2	r = 0	r ≤ 1	r ≤ 2
1	21.91157	4.092331	0.171046	17.81924	3.921285	0.171046
2	23.67024	5.742305	0.064480	17.92794	5.677826	0.064480
3	36.85871**	5.753360	0.004777	31.10536**	5.748583	0.004777
4	42.58959**	6.996105	0.047293	35.59348**	6.948812	0.047293
5	34.26240*	13.20500	0.364314	21.05740*	12.84068	0.364314
6	41.42959**	17.33522*	0.540037	24.09437*	16.79518*	0.540037

Note: ** and * denote significance at the 1 and 5 per cent levels, respectively.

Results of the unit root test with a structural break for the second system are reported in Table 6. The results indicate that all variables except for LNRPFis at lag 3 are non-stationary in level at 5 per cent significance level. However, using a higher level of significance (1 per cent), LNRPFis also becomes non stationary in level. The test on the first difference indicates strong rejection of the null hypothesis in almost all the cases except for LNRPFcv and BLR at lag 6. It can be concluded that all variables are first-differenced stationary and are of the same order.

5.4 Johansen-Juselius (JJ) Cointegration Test

The requirements for the Johansen-Juselius Cointegration test are that the series are non stationary and integrated of the same order. From the results of the unit root tests obtained earlier, all variables were first difference stationary except for RR1MLAG1is which was stationary in level.

Since RR1MLAG1is was not integrated in the same order, we had to omit this variable from our analysis despite it being an important variable in determining the level of demand for Islamic and conventional deposits.

After omitting RR1MLAG1 is, all the variables were now integrated in the same order, making it meaningful to proceed with the Johansen and Juselius (1990) multivariate cointegration test to determine their long-run equilibrium relationships.

As there were two systems with three variables in each system, we had two multivariate models with three variables each. The trace test was conducted for each system from lags 1 to 6 before the optimal lag length (m) was determined. The optimal lag length (m) is the lag length that minimises the AIC or BIC in the VAR.

The results of the multivariate JJ cointegration test for the first system are reported in Table 7. The trace statistics show no cointegrating vector for lags 1 and 2. The null hypothesis of zero cointegrating vector (r = 0) was rejected at lag 3 to lag 6 under the 5 per cent critical value. This means that the three variables are cointegrated with one cointegrating vector and are moving together in the long run. The maximum eigenvalue statistics also show similar results.

In order to determine the optimal lag length, the lag length criterion such as the Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and Hannan-Quinn Information Criterion (HQ) were used (see Appendix 4). All four criteria were unanimous in suggesting that one lag is the optimal lag length for the first system. Since the LNFDcv, LNIDis and IR1Mcv series were not cointegrated at lag 1, it implies that the series are bound in the short run. Therefore, the simple VAR model will be used for further analysis of the first system.

The results of the JJ cointegration test for the second system is shown in Table 8. The results of the trace statistics show two cointegrating vectors (r = 2) identified for lag 1 to lag 3. The maximum eigenvalue statistics also give similar results except in lag 3, where the maximum eigenvalue statistic suggests the absence of the cointegrating vector. Johansen and Juselius (1990) argued that the trace test tends to have more power than the maximum eigenvalue statistic since it takes into account all N-r of the smallest eigenvalues. Hence, in conflicting cases, the decision is made based on trace statistics.

Table 8: Multivariate JJ cointegration test for the second system (financing)

Variable : LNRPFcv LNRPFis BLR

Lag	Trace			Maximum eigenvalue		
length	r = 0	r ≤ 1	r ≤ 2	r = 0	r ≤ 1	r ≤ 2
1	40.75593**	19.93291*	1.849448	20.82303	18.08346*	1.849448
2	36.63446**	16.25418*	1.163657	20.38027	15.09053*	1.163657
3	32.87581*	16.17630*	3.271316	16.69951	12.90498	3.271316
4	33.75817*	16.98503*	4.397794*	16.77314	12.58724	4.397794*
5	49.78613**	26.45730**	6.929833**	23.32883*	19.52747**	6.929833**
6	37.53505**	18.94912*	4.939703*	18.58593*	14.00941	4.939703*

Note: ** and * denote significance at the 1 and 5 per cent levels, respectively.

Table 9: VAR for the first system (deposit)

Independent variable	Dependent variable		
	Δ LNFDcv	Δ LNIDis	Δ IR1Mcv
Δ LNFDcv	0.178641 (1.81415)	-0.033530 (-0.11080)	-0.071088 (-0.14719)
Δ LNIDis	0.087923** (2.74054)	0.132551 (1.34444)	0.303660 (1.92979)
Δ IR1Mcv	0.018446 (0.88120)	0.001551 (0.02411)	-0.007224 (-0.07036)
Constant	0.003632* (2.29344)	0.012449* (2.55773)	-0.011323 (-1.45761)

Note: *t*-statistics are reported in parentheses.
** and * denote significance at the 1 and 5 per cent levels, respectively.

The use of SIC suggests that one lag is the optimal lag length for the second system. However, other criteria such as FPE and AIC suggest that two lags is the optimal lag length for the second system (see Appendix 5). In the conflicting results, SIC will be used because the AIC and FPE tend to overestimate the order of AR(p) time series model whereas SIC which penalises the degree of freedom more harshly tends to choose models that are more parsimonious. Therefore lag 1 was chosen for the second system.

Thus two cointegrating vectors were found to exist in the second system that defines the long-run movements of the variables. In other words, two error correction terms (ECT) should be added in the VAR. The exclusion of the ECT can lead to model mis-specification. The modified model of VAR is referred to as the VECM.

5.5 Vector Autoregressive (VAR)

As reported in the previous section, the series in the first system (LNFDcv, LNIDis and IR1Mcv) were not cointegrated. Therefore a simple VAR model without error correction term would be sufficient to investigate the dynamics among the series. The optimal lag length determined by the SIC was 1. Hence, the VAR (1) model was analysed for the short run.

Table 9 shows the results of VAR for the first system. The individual *t*-test indicates that Δ IR1Mcv is not significant in the Δ LNIDis. This implies that the lagged changes in 1-month interest rate for conventional fixed deposit do not affect the changes in the 1-month investment deposit of Islamic banks in the short run. This result is not consistent with our preliminary finding which shows a negative correlation between IR1Mcv and LNIDis.

5.6 Vector Error Correction Model (VECM)

As reported in the previous section, two cointegrating vectors exist in the second system which implies that two error-correction terms are present in the VECM. The two error-correction terms for the second system are:

Table 10: VECM for the second system (financing)

Independent variable	Dependent variable		
	ΔLNRPFcv	ΔLNRPFis	ΔBLR
$\hat{z}_{11,t}$	-0.004399 (-0.66480)	-0.063879** (-2.82994)	0.195518** (2.80461)
$\hat{z}_{12,t}$	-0.003378 (-0.84795)	0.031082* (2.28710)	-0.131573** (-3.13479)
LNRPFcv	0.040953 (0.38466)	0.365622 (1.00661)	-1.830961 (-1.63221)
LNRPFis	-0.019164 (-0.59934)	0.216626 (1.98572)	-0.680122* (-2.01865)
BLR	0.007187 (0.78058)	0.013420 (0.42721)	0.060755 (0.62625)
Constant	0.013231** (8.14991)	0.011776* (2.12615)	0.033944 (1.98435)

Note: *t*-statistics are reported in the parentheses below the coefficient estimates. ** and * denote significance at the 1 and 5 per cent levels, respectively.

$$\hat{z}_{11,t} = \text{LNRPFcv}_{t-1} + 0.700074563\,\text{BLR}_{t-1} - 15.93436601$$

$$\hat{z}_{12,t} = \text{LNRPFis}_{t-1} + 1.940732051\,\text{BLR}_{t-1} - 21.51610494$$

The VECM model for the second system is tabulated in Table 10 which indicates that given a unit deviation from the first long-run relationship, the residential property financing in conventional banks adjusts by a reduction of 0.4 per cent in the following month. The adjustment is a decrease of 0.3 per cent in response to a unit deviation from the second long-run relationship one month before.

Correspondingly, the adjustment of residential property financing in Islamic banks in response to a unit deviation from the first and second long-run relationships, one month before, is a reduction of 6.3 and 3.1 per cent, respectively. Whereas for the base lending rate, a unit deviation from the first long-run relationship resulted in a rise of 19.5 per cent but the adjustment for a unit deviation for the second long-run relationship was a reduction of 13.1 per cent .

The individual *t*-statistics reveal both the error-correction terms to be significant at 5 per cent level for the equation of residential property financing in Islamic banks and base lending rate but none of the error-correction terms were significant for the equation of residential property financing in conventional banks.

Table 11: *F*-test for adjustment to disequilibrium for the second system (financing)

Variable	*F*-Statistic
ΔLNRPFcv	8.824553**
ΔLNRPFis	4.518449*
ΔBLR	4.977546**

Note: ** and * denote significance at the 1 and 5 per cent levels, respectively.

Table 12: Granger causality test for the first system (deposit)

Independent variable	Dependent variable		
	ΔLNFDcv	Δ LNIDis	ΔIR1Mcv
LNFDcv	3.291146	0.012277	0.021665
LNIDis	7.510541**	1.807530	3.724084
IR1Mcv	0.776517	0.000581	0.004951

Note: *F*-statistics are reported in the table.
** and * denote significance at the 1 and 5 per cent levels, respectively.

5.7 Adjustments to Disequilibrium

Due to the presence of two error-correction terms existing in the second system, joint tests of the error-correction terms were carried out to establish which variable adjusts to disequilibrium in the system. For a variable that adjusts to disequilibrium, the error-correction terms should be jointly significant.

The results of the *F*-test in Table 11 indicate that all the variables in the second system adjust to disequilibrium at the 5 per cent significance level. Interestingly, the error-correction terms were not individually significant in the equation of residential property financing in conventional banks but highly significant when they join together. The findings suggest that the residential property financing in Islamic and conventional banks as well as the base lending rate are likely to be involved in the adjustment towards any disequilibrium from the long-run relationship.

5.8 Granger Causality Test

The existence of a cointegration relationship between the two series implies that there is at least a causal effect running from one variable to another. To test the direction of the effect, the Granger-causality test was performed because the cointegration test does not indicate the direction of the causal effect.

As discussed in the previous section, all the variables in the first system were not co-integrated. Therefore the Granger causality test was conducted in the environment of a simple VAR model without the error-correction term.

Table 13: Granger causality test for the second system (financing)

Independent variable	Dependent variable		
	Δ LNRPFcv	Δ LNRPFis	Δ BLR
LNRPFcv	7.463595**	3.537029*	3.565966*
LNRPFis	5.886164**	8.534088**	8.579158**
BLR	5.980295**	3.054419*	3.494254*

Note: *F*-statistics are reported in the table.
** and * denote significance at the 1 and 5 per cent levels, respectively.

The estimated results of Granger causality for the first system are summarised in Table 12. The results indicate that each variable in the first system is not Granger-caused by itself at the 5 per cent significance level. This implies that its own past influence has very little impact on its current performance.

The results indicate that the lagged changes in 1-month interest rate for conventional fixed deposit do not have the predictive ability for the movements in the 1-month investment deposit of Islamic banks. This implies that in the short run, the interest rate of conventional fixed deposits does not influence the demand for Islamic investment deposits. This result is consistent with the result of the VAR analysis.

Table 13 reports the results of the Granger causality test based on the VECM for the second system. The results indicate that all variables are Granger-caused by themselves. This implies that the future demand for residential property financing of Islamic and conventional banks as well as the base lending rate would be influenced by their respective current performances.

The results also suggest that there is a bidirectional causality relationship between the residential property financing of Islamic and conventional banks as well as the base lending rate. This may reflect the importance of the residential property financing of Islamic and conventional banks in determining the rate of the base lending rate and conversely the base lending rate acts as a leading indicator that determines the level of residential property financing of Islamic and conventional banks.

5.9 Impulse Response Function

It is insufficient just to interpret the results from the Granger causality test as doing so only indicates the direction of the causal effects. It is useful to employ the Impulse Response Function (IRF) to examine the transmission mechanism of innovations in one variable to a particular variable. The generalised impulses constructed by Pesaran and Shin (1998) were employed to transform the impulses. The impulse responses are presented by graphs as discussed in the following paragraphs.

The IRF of the systems are plotted in Figures 3, 4, 5 and 6. The solid line in each figure represents the accumulated impulse responses over a period of ten months. All shocks are at one per cent. The vertical axis shows the approximate percentage change in response to a one per cent shock. The horizontal axis indicates the time period. The dotted lines denote two standard error confidence bands around the estimate.

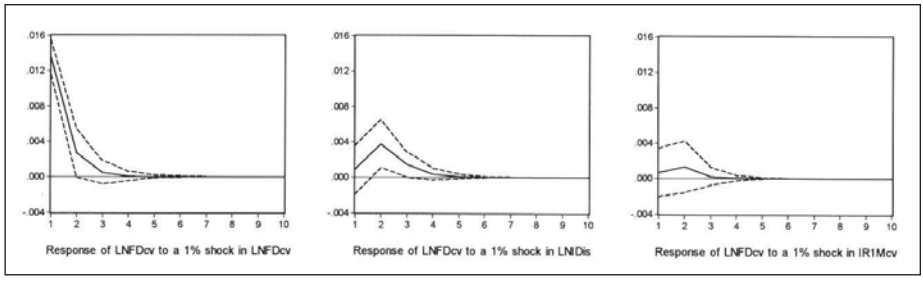

Figure 3: *Responses of fixed deposit in conventional banks*

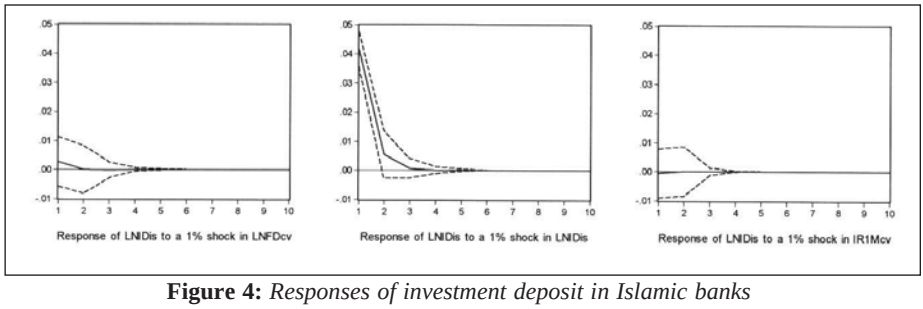

Figure 4: *Responses of investment deposit in Islamic banks*

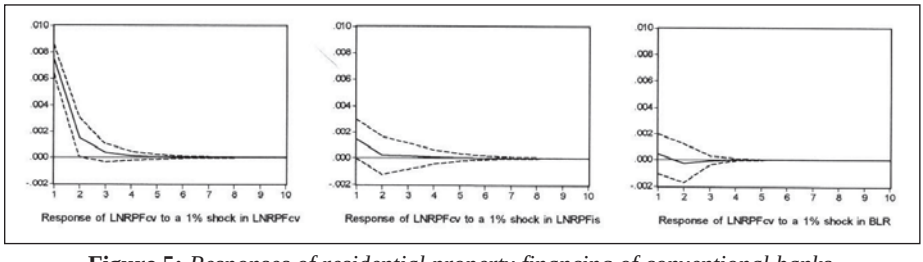

Figure 5: *Responses of residential property financing of conventional banks*

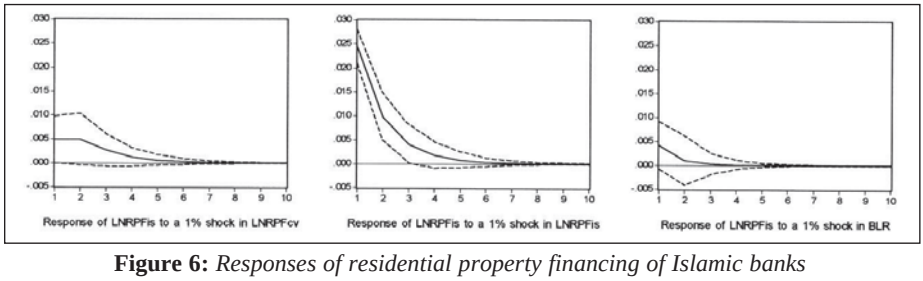

Figure 6: *Responses of residential property financing of Islamic banks*

Figures 3 and 4 respectively illustrate the IRF for the first system. As we can see, the variables in the first system (FDcv, IDis) respond immediately and significantly to a 1 per cent shock generated from within their own markets, dampen in month 2 and die out by month 6. Figure 3 shows that the FDcv responds positively to shocks in IDis and IR1Mcv in month 1 before tapering thereafter. The response of FDcv is higher to shocks in IDis than IR1Mcv.

Figure 4 indicates that the response of IDis to a 1 per cent shock in FDcv is very small and the effect does not last long. Interestingly, IDis does not show any response to a shock in IR1Mcv. This result is similar to the results of the earlier analysis of VAR and Granger causality tests which indicate that the interest rate for 1-month fixed deposit does not influence the demand for investment deposit in Islamic banks.

The IRF for the second system are plotted in Figures 5 and 6. It is evident that the three variables respond significantly to a 1 per cent shock generated within their own markets. BLR adjusts quickly in the second month to absorb the shock in its own market whilst the residential property financing of both banking systems takes longer to do so.

Figure 5 shows that the conventional bank residential property financing (RPFcv) exhibits a positive and immediate response to a shock transmitted from its own market and it takes four months to fully absorb the shock. The response of RPFcv to any shock to the Islamic residential property financing (RPFis) is also positive but the effect is only of borderline significance. Meanwhile a one per cent shock in BLR does not significantly affect conventional bank residential property financing.

Figure 6 shows that Islamic residential property financing exhibits a positive and significant response to a shock in conventional residential property loans. It is interesting to note that the response is not immediate and takes place only after one month. This suggests that any shocks in RPFcv will not immediately cause changes in RPFis. A possible explanation for this lag is that, because the profit rate on outstanding BBA financing is fixed, customers may spend some time to reach a decision on whether to obtain financing from the Islamic bank based on their expectations of future interest rates movements. The effect seems to taper down gradually over the period until month 6 which again reflects time lags in the circulation of information or in customers' decision on what to do.

In terms of the BLR, unlike the RPFcv, RPFis seems to respond readily to a shock in BLR. This finding suggests that given the fixed rate of BBA financing, any change in the base lending rate would influence customers' decision in obtaining Islamic bank asset financing. This result is consistent with the theoretical discussion that an increasing base lending rate would mean existing BBA financing would become relatively cheaper and that in turn would induce customers to obtain financing from the Islamic banks. On the other hand, a decreasing base lending rate would induce customers to obtain financing from the conventional banks.

6. Conclusion and Recommendations

Our preliminary findings show that investment deposits in Islamic banks are negatively correlated with the interest rate offered by conventional banks which indicates the possibility of a shifting effect between Islamic and conventional banks. However, results of the VAR, Granger causality test and impulse response function show that the Islamic banks' depositors do not react to interest rate changes. This suggests that there is no shifting effect between

the Islamic and conventional deposits in response to changes in conventional interest rates. One possible explanation for this phenomenon is that the Islamic rates of return on deposits moved fairly closely to the conventional interest rate during the period of study (as shown in Figure 1). This result is consistent with the theoretical discussion. Given that the period of study represents that of falling interest rates, the rates of returns on Islamic and conventional deposits are almost similar. This is because when interest rates fall, the Islamic bank would also reduce the rates of return on its deposits in line with the conventional deposit rates as discussed earlier. Since both banking systems are giving competitive returns on deposits, any shock in the interest rates would not generate a response in Islamic bank deposits. It is also noteworthy that our finding is contrary to that of Haron and Ahmad (2000) which was based on a rising interest rate scenario.

In terms of financing, Islamic residential property financing seems to respond positively to shocks in the conventional residential property financing and the base lending rate respectively. This implies that customers' decision to obtain Islamic asset financing (BBA) will be influenced by the substitution effect based on the movement of interest rates. During times of rising interest rates, BBA financing would be more popular than conventional loans whilst the reverse happens during falling interest rates. Since the BLR in Malaysia has been falling from 1999 to 2007 (as shown in Figure 2), the above findings suggest that the demand and hence the growth of Islamic financing would have been slower relative to conventional loans during the period of study.

Overall, this study found that the customers of Islamic banks are guided by the profit motive which supports the findings of earlier studies. It follows that Islamic banks in the dual system are exposed to interest rate risks despite operating on interest-free principles. Hence it is recommended that Islamic banks offer new deposit and financing products that offer rates which would match the rates offered by conventional banks. Alternatively, as suggested by Obiyatullah (2004), Islamic banks should detach themselves from interest rate movements by moving away from fixed rate instruments (such as BBA) and move into more profit sharing financing. Otherwise the problem of arbitrage flows will persist due to the ability of customers to switch between Islamic and conventional banks in the dual system.

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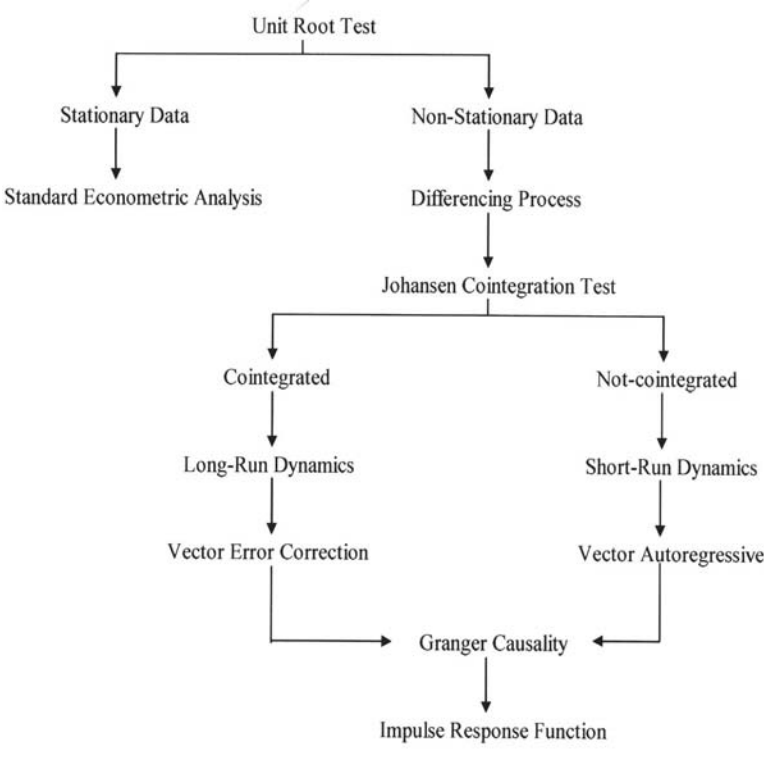
Appendix 1: Summary of the analysis procedures



Appendix 2: Descriptive statistics for the first system (deposit)

Statistics	LNFDcv	LNIDis	IR1Mcv	RR1MLAG1is
Mean	12.34519	10.12267	3.177653	2.932755
Median	12.23523	10.09485	3.130000	2.880000
Maximum	12.73610	10.92154	3.750000	5.060000
Minimum	12.14885	9.305059	3.000000	2.450000
Std. dev.	0.193182	0.411335	0.196620	0.381683
Skewness	0.820346	0.023934	1.346476	2.413801
Kurtosis	2.067726	2.361097	4.432913	12.96537
Jarque-Bera	14.54077	1.676159	37.99635	500.6750
Probability	0.000696	0.432540	0.000000	0.000000
Sum	1209.828	992.0213	311.4100	287.4100
Sum sq. dev.	3.619958	16.41207	3.749960	14.13116
No. of observations	98	98	98	98

Appendix 3: Descriptive statistics for the second system (financing)

Statistics	LNRPFcv	LNRPFis	BLR
Mean	11.43702	9.045388	6.433878
Median	11.43681	9.354624	6.390000
Maximum	12.02847	9.765314	7.240000
Minimum	10.73826	7.714369	5.980000
Std. dev.	0.406466	0.694710	0.358182
Skewness	-0.096637	-0.641813	0.036584
Kurtosis	1.723794	1.861153	1.873960
Jarque-Bera	6.803062	12.02406	5.199389
Probability	0.033322	0.002449	0.074296
Sum	1120.828	886.4480	630.5200
Sum sq. dev.	16.02583	46.81437	12.44453
No. of observations	98	98	98

Appendix 4: Determination of lag length for the first system (deposit)

VAR lag order selection criteria
Endogenous variables: LNIDis LNFDcv IR1Mcv
Exogenous variables: C
Sample: 1 98
Included observations: 88

Lag	LogL	LR	FPE	AIC	SC
0	119.5487	NA	1.42E-05	-2.648834	-2.564380
1	580.4306	879.8653*	4.92E-10*	-12.91888*	-12.58106*
2	588.7711	15.35414	5.00E-10	-12.90389	-12.31271
3	593.3795	8.169433	5.54E-10	-12.80408	-11.95953
4	597.3006	6.683786	6.23E-10	-12.68865	-11.59074
5	602.8311	9.049785	6.78E-10	-12.60980	-11.25852
6	611.4580	13.52862	6.90E-10	-12.60132	-10.99668
7	614.8922	5.151348	7.92E-10	-12.47482	-10.61682
8	622.5812	11.00915	8.29E-10	-12.44503	-10.33366
9	633.8946	15.42739	8.03E-10	-12.49760	-10.13287
10	641.0353	9.250471	8.60E-10	-12.45535	-9.837253

Note:* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5 per cent level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix 5: Determination of lag length for the second system (financing)

VAR lag order selection criteria
Endogenous variables: LNCV LNIS BLR
Exogenous variables: C
Sample: 1 98
Included observations: 88

Lag	LogL	LR	FPE	AIC	SC	HQ
0	3.990188	NA	0.000196	-0.022504	0.061950	0.011520
1	687.1547	1304.223	4.35E-11	-15.34443	-15.00661*	-15.20833
2	700.7772	25.07781*	.92E-11*	-15.44948*	-14.85830	-15.21131*
3	705.0697	7.609300	4.37E-11	-15.34249	-14.49795	-15.00225
4	705.8356	1.305644	5.29E-11	-15.15536	-14.05744	-14.71303
5	709.6617	6.260827	5.99E-11	-15.03777	-13.68649	-14.49337
6	714.3398	7.336081	6.66E-11	-14.93954	-13.33490	-14.29307
7	717.7040	5.046368	7.66E-11	-14.81146	-12.95345	-14.06291
8	728.7782	15.85626	7.42E-11	-14.85860	-12.74723	-14.00798
9	740.3538	15.78482	7.14E-11	-14.91713	-12.55240	-13.96444
10	742.6429	2.965470	8.54E-11	-14.76461	-12.14652	-13.70985

Note: * indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5 per cent level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion