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The Impact of Interest Rate Changes on Islamic Bank Financing

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This study investigates the impact of interest rate changes on the demand for Islamic financing in a dual banking system. Theoretically, any change in the interest rate would lead customers who are guided by the profit motive to substitute Islamic financing for conventional bank loans and vice versa. Using monthly data from 1999 to 2007, the study found that any increase in the base lending rate would induce customers to obtain financing from Islamic banks and vice versa. The 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.

Field of Research: Islamic Banking

1. Introduction

The introduction of Islamic banking in Malaysia in 1983 is based on the long-term objective that a full-fledged Islamic banking system would run side by side the existing conventional banking system. By January 2008, there were 29 Islamic banking institutions in Malaysia comprising 12 full-fledge Islamic banks, 8 conventional banks offering Islamic windows, 4 Islamic investment banks and 5 development financial institutions offering Islamic banking services. Islamic banking is also expected to achieve a 20 per cent market share by 2010. For Islamic banks to be competitive, the initial strategy adopted in Malaysia has been for Islamic banks to offer financial services which match those offered by the conventional banks (Bank Negara Malaysia 2005).

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In most cases, the Islamic products were repackaged and adapted along features of conventional products with the non-shariah aspects eliminated. Hence, on the asset side it is found that Islamic financing is dominated by property and asset term financing.

Table 1: Islamic Financing By Concept (as at end of 2007)

Concept	RM million	(%)
Bai Bithamin Ajil (deferred payment sale)	31,630	37.1
Al-Ijarah thumma al-bay (hire purchase)	25,806	30.2
Murabaha (cost plus)	9,691	11.3
Ijarah (leasing)	1,153	1.4
Istisna' (contract manufacturing)	804	1.0
Musyarakah (equity financing)	374	0.4
Mudarabah (profit sharing)	109	0.1
Others	15,818	18.5
Total Islamic Financing	85,385	100.0

Source: Bank Negara Malaysia (2008)

The most popular financing product is *Bai Bithamin Ajil* (deferred payment sale) followed by *ijarah* (leasing) as shown in Table 1. Bai Bithamin Ajil (BBA) 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 installments. In practice, BBA financing is collateralized which implies that the profit to the bank is almost certain. In this respect, BBA financing is not much different from conventional bank loans.

The research question for this study is whether bank customers in the dual system are influenced by the substitution effect. Theoretically, a dual banking system provides customers a relative advantage in terms of bank choice. Whilst pious Muslim customers are expected to stay with the Islamic banks, other customers especially those who are profit-motivated would tend to compare between the cost of Islamic and conventional bank financing would choose the bank that offers the lower financing rate. Rising market interest rates would increase the cost of conventional loans hence inducing new customers to opt for the relatively cheaper BBA financing. The reverse occurs when interest rates are falling. Such substitution effect implies that Islamic banks are exposed to interest rate risks even though operating on interest-free principles. It is important to understand this phenomenon because a negative consequence if not mitigated, would jeopardize the growth of Islamic banks which are the new comers in the dual banking system.

This study is significant due to two reasons. Firstly, the focus of this study is the impact of interest rate changes on the demand for Islamic bank financing. It is found that past studies have only concentrated on the impact of interest on Islamic bank deposits (Sudin & Ahmad 2000, Obiyatullah 2004, Rahmatina 2007). No past studies has looked at the impact of interest changes on Islamic bank financing, Hence this study fills that gap. Secondly, the context of this study is the period after the Asian financial crisis when interest rates are falling or remain low. It is of interest to investigate if the financing behavior of customers in the dual banking system during such period is consistent with that in theory. Our hypothesis is that, during low or falling interest rates, profit motivated customers would notice that BBA monthly payments are relatively higher than the installments for conventional loans. Hence they would opt for conventional loans if they expect that interest rate will continue to fall in future. Such behavior would slower the growth of Islamic financing and eventually affect the competiveness of Islamic banks in the dual system. This study is organized into five sections. Section 2 provides a review of the existing literature. The research methodology is presented in section 3. The data analysis and findings are discussed in section 4 while the conclusion and recommendations are given in section 5.

2. Literature Review

Rosly (1999) provides the theoretical explanation of the impact of interest rate changes on Islamic bank performance in the dual system. He emphasizes that Islamic banks are exposed to interest rate risks and the root cause of this phenomenon is the overdependence of Islamic banks on BBA financing where the profit rate (financing rate) is fixed. Rosly explains that when interest rates are rising, the base lending rate (BLR) and rates of return on deposits of the conventional bank would change accordingly to changes in the market interest rate. As a result, the profit margin of the conventional bank will not be affected. However, the Islamic bank cannot increase the rate of returns on its deposits because the BBA profit margin is fixed. As a consequence, Islamic deposits give lower returns. The substitution effect comes into play where depositors prefer the conventional banks.

On the asset side, customers may find that the installments for existing BBA financing are relatively cheaper than the installments for existing conventional loans during times of rising interest rates. Hence profit motivated customers would choose BBA financing if they expect interest rates to rise in future. Hence, the demand for BBA financing would rise. However, the Islamic bank may not be able to fulfill this increased demand for BBA financing due to the fall in total 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.

In the case of falling market interest rates, the conventional bank is able to adjust both the deposit and base lending rates downwards hence maintaining its profit margin. It is interesting to note that the Islamic bank would also reduce the rates of return on 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 the deposit rates hence widening its profit margin. In the case of Islamic financing, because existing BBA profit rates remain fixed customers would find that existing BBA financing is relatively more costly than existing conventional loans. If customers expect the market interest rate to decline further, they would prefer conventional loans rather than BBA financing. Hence, the demand for conventional loan increases while the demand for BBA financing falls. The above explanation theoretically shows that any changes in the market interest rate would, on the asset side, lead to a substitution effect between Islamic and conventional bank financing. It is recognized that the root of this problem is the structural weakness of the fixed BBA mechanism. Hence overdependence on BBA financing by the Islamic bank has limited the bank's ability to compete with the conventional bank in the dual system.

3. Research Methodology

As mentioned earlier, the objective of this study is to examine the impact of interest rate changes on Islamic bank financing. The main variables for the study are total residential property financing of conventional banks (RPFcv), total residential property financing of Islamic banks (RPFis), and the base lending rate (BLR). Total residential property financing is chosen because Islamic bank financing is mainly dealt with the concept of BBA. In comparison, the level of conventional loan is measured by total residential property loan of conventional banks. Data for this study is taken from the *Monthly Statistical Bulletin* published by Bank Negara Malaysia. Monthly data covering the period May 1999 to June 2007 (98 monthly observations) is used.

The method of analysis includes 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 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 is 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. Once the stationary condition is examined, the next step is to conduct a cointegration test developed by Johansen and Juselius (1990) or

known as JJ test. If no cointegration is found, the analyses will be based on the regression of the first differences of the variables using a standard VAR model. If cointegration is found, a Vector Error Correction Model (VECM) is constructed. The Granger causality test will then be conducted. To examine the responses of the variable due to one-time shock in any of the other variables, generalized impulses under the Impulse Response Function (IRF) will be employed for this purpose. A summary of the analysis procedures is illustrated in Appendix 1.

4. Findings

4.1. Preliminary Findings

Figure 1 shows the movements of conventional and Islamic residential property financing as well as the base lending rate for the period May 1999 and June 2007. It indicates that total residential property financing of conventional banks (LNRPFcv) and total residential property financing of Islamic banks (LNRPFis) showed a positive trend from 1999 to 2007. It is noticed the base lending rate (BLR) is falling or remains constant over most of the period. Overall, the series are not normally distributed (see Appendix 1).

Figure 1: Total Residential Property Financing of Conventional Banks, Total Residential Property Financing of Islamic Banks and Base Lending Rate (May 1999 – June 2007)

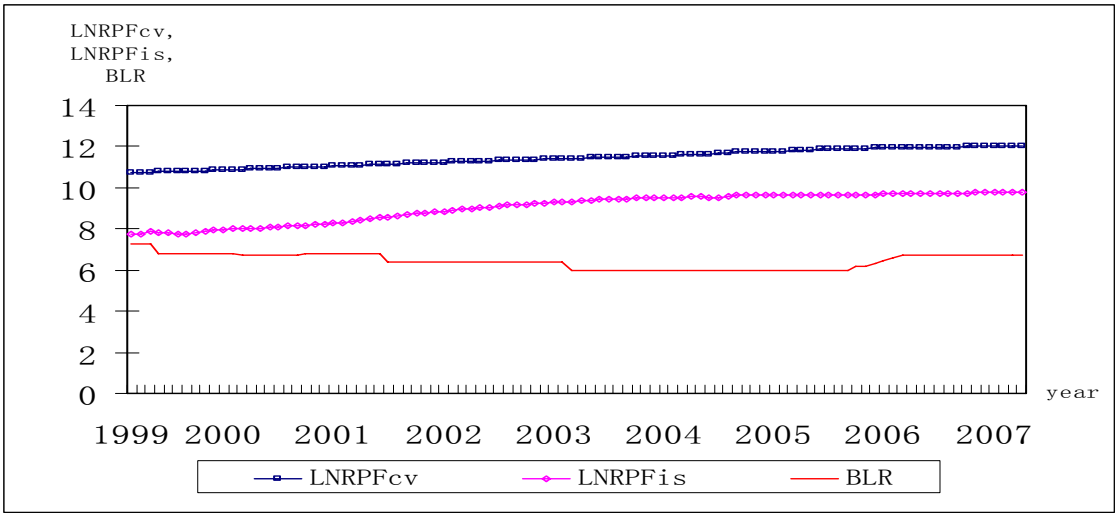


Table 2 indicates a highly positive correlation between conventional financing (LNRPFcv) and Islamic financing (LNRPFis). This implies that any changes in the level of residential property financing of conventional banks will strongly influence the level of residential property financing of the Islamic banks in the same direction.

Table 2: Correlation Matrix (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

LNRPFcv and LNRPFis show negative correlations with BLR which indicate that any increase in the rate of BLR will 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.

4.2 Unit Root Test

The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests are conducted to test each variable for a unit root in level with a constant term and 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 employ the ADF and PP tests with 1, 3, 6 lags to overcome the problem of serial correlation in residuals. Table 3 depicts the result of unit root test. The ADF test indicates that all the series are non-stationary. For the first differenced series, all the series are stationary at the 1% level of significance except for LNRPFcv and LNRPFis at lag 6. However, the PP test indicates all the series are stationary at 1 per cent level of significance after taking first difference. These results suggest that all the variables are integrated of order one. This suggests that long-run relationship may exist between the variables.

Table 3: Unit Root Test

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 significant at the 1% and 5% levels, respectively

4.3 Johansen-Juselius (JJ) Cointegration Test

The trace test is conducted from 1 to 6 lags before the optimal lag length (m) is determined. The optimal lag length (m) is the lag length that minimizes the AIC or BIC in the VAR. Table 4 shows the results of the multivariate Johansen-Juselius (JJ) cointegration test. The results of the trace statistics show two cointegrating vectors (r = 2) for lag 1 to lag 3. The maximum eigenvalue statistic also gives similar results, except in lag 3, where the maximum eigenvalue statistic suggests that there is no cointegrating vector. Johansen (1991) 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 statistic.

The use of SIC suggests that one lag is the optimal lag length for the system. However, other criterions such as FPE and AIC suggest that two lags is the optimal lag length for the system (see Appendix 2. In the conflicting results, SIC will be used because the AIC and FPE overestimate the order of AR(p) time series model and SIC which penalizes the degree of freedom more harshly tends to choose models that are more parsimonious. Therefore, lag 1 is chosen. Thus, there are two cointegrating vectors that exist in this system that define the long-run movements of the variables. In other words, two ECT should be added in the VAR. The exclusion of the ECT can lead to model misspecification. The modified model of VAR is referred to as the VECM.

Table 4: Multivariate JJ Cointegration Test

Variable : LNRPFcv LNRPFis BLR						
Lag Length	Trace			Maximum Eigenvalue		
	$r = 0$	$r \leq 1$	$r \leq 2$	$r = 0$	$r \leq 1$	$r \leq 2$
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 significant at the 1% and 5% levels, respectively

4.4. Vector Error Correction Model (VECM)

As reported in the previous section, there are two cointegrating vectors existing 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:

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

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

The VECM model for the second system is tabulated in Table 5 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% in the following month. The adjustment is a decrease of 0.3% 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 one unit deviation from the first and second long-run relationships one month before is a reduction of 6.3% and 3.1%, respectively. For the base lending rate, for one unit deviation from the first long-run relationship, the adjustment is a rise of 19.5% and the adjustment is a reduction of 13.1% for one unit deviation from the second long-run relationship.

Table 5: Vector Error Correction Model (VECM)

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)
$\Delta\text{LNRPFcv}_{t-1}$	0.040953 (0.38466)	0.365622 (1.00661)	-1.830961 (-1.63221)
$\Delta\text{LNRPFis}_{t-1}$	-0.019164 (-0.59934)	0.216626 (1.98572)	-0.680122* (-2.01865)
ΔBLR_{t-1}	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 significant at the 1% and 5% levels, respectively

The results of the F-test in Table 6 indicate that all the variables in the second system adjust to disequilibrium at the 5% significance level. Interestingly, the error correction terms are 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.

Table 6: F-Test for Adjustment to Disequilibrium

Variable	F-Statistic
$\Delta LNRPF_{cv}$	8.824553**
$\Delta LNRPF_{is}$	4.518449*
ΔBLR	4.977546**

Note: ** and * denote significant at the 1% and 5% levels, respectively

4.5. Granger Causality Test

The existence of a cointegration relationship between the 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 will be performed because the cointegration test does not indicate the direction of the causal effect. Since the series are co-integrated, the Granger-causality test will be conducted in the environment of VECM. Table 7 indicates 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 performance respectively. The results suggest that there is a bi-directional 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 determine the level of residential property financing of Islamic and conventional banks.

Table 7: Granger Causality Test (Financing)

Independent Variable	Dependent Variable (F-statistics)		
	ΔLNRPFcv	ΔLNRPFis	ΔBLR
ΔLNRPFcv	7.463595**	3.537029*	3.565966*
ΔLNRPFis	5.886164**	8.534088**	8.579158**
ΔBLR	5.980295**	3.054419*	3.494254*

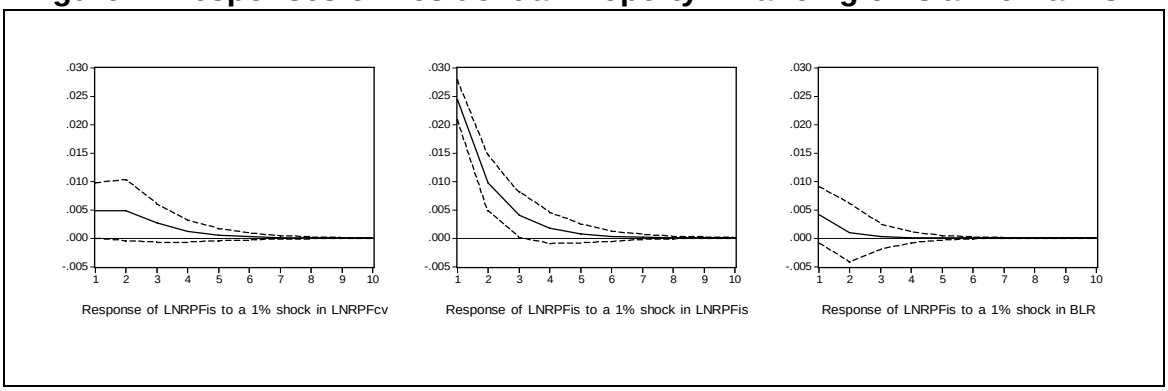
Note: ** and * denote significant at the 1% and 5% levels, respectively

4.6. 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 the particular variable. The generalized impulses constructed by Pesaran and Shin (1998) will be employed in transforming the impulses. The impulse responses will be presented by graphs as discussed in the following paragraphs. The IRFs are plotted in Figures 2. Each panel 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 2 reveals that RPF_{is} starts to react to a shock in RPF_{cv} only after one month. This implies that any shock in RPF_{cv} will not immediately affect the changes in RPF_{is}. 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 or conventional 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.

Figure 2: Responses of Residential Property Financing of Islamic Banks



In terms of the BLR, Figure 2 shows that RPF_{is} seems to respond readily to a shock in BLR and the response seems to diminish by the fourth month. This finding suggests that given the fixed rate of BBA financing, any change in the

base lending rate would immediately 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 is relatively cheaper and that 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.

5. Conclusion and Recommendations

Conceptually, customers of the Islamic bank are not guided by the profit motive and thus, any changes in the base lending rate should not have any significant changes to the level of Islamic bank financing. However, this study found that RPF_{is} seems to respond positively to shocks in RPF_{cv} & BLR respectively. However the response to BLR shocks is relatively more immediate. This implies that Islamic bank customers are profit motivated and their decisions to obtain BBA financing will be influenced by the substitution effect based on the movement of the BLR (interest rates). During rising interest rates, BBA financing would be more popular and during falling interest rates customers would prefer conventional loans rather than Islamic financing. Hence we can conclude that because customers are profit motivated, Islamic bank financing in the dual system is exposed to interest rate risks despite operating on interest free principles.

Referring to the period of study, as shown in Figure 1, the BLR in Malaysia has been falling or remained at low levels during that period. This implies that Islamic bank financing has been relatively more expensive than conventional loans during falling interest rates. It follows that the demand and growth of Islamic financing would have been slower relative to conventional loans during the period. Since the root cause of the interest rate risks is Islamic banks' overdependence on BBA financing, it is recommended that Islamic banks detach themselves from interest rate movements by moving away from fixed rate instruments (BBA) into more profitsharing financing or rent based financing (leasing). In profitsharing such as *mudarabah* or *musharakah*, financing, returns are based on real sector performance. Hence interest-rate is an exogenous factor in profitsharing. In the case of leasing, the cost of financing is based on the rental rate which is flexible and not fixed like the BBA rate. The rental rate can be revised periodically to reflect market conditions. Hence the Islamic bank would be in a better position to mitigate the interest rate risks compared to its ability under the BBA fixed rate system.

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Appendix 1: Descriptive Statistics for the 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
Observation	98	98	98

Appendix 2: Determination of Lag Length for the System

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

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