UNIVERSITI TEKNOLOGI MARA
CAWANGAN JOHOR

# ACCON 2012

ACADEMIC CONFERENCE

# THE 8th UITMCJ ACADEMIC CONFERENCE

## Globalisation and Dynamics Towards a World Class University

# CD PROCEEDING

# ACCON 08

**Penyelenggara:**


**Rohani binti Jangga**

**Ainol Hasanal bin Jalaluddin**

**Dr. Carolyn Soo Kum Yoke**

**Noridah binti Sain**



**Terbitan:**

**BPJIA UiTM Cawangan Johor**

**2012**

**Cetakan Pertama 2012**

Perpustakaan Negara Malaysia Data Pengkatalogan-dalam-Penerbitan

**CD Proceeding for ACCON 08**

8th Academic Conference, UiTM Johor

1. Proceeding

**ISBN 978-967-0479-03-3**

**Diterbitkan oleh:**
Bahagian Penyelidikan Jaringan Industri dan Alumni
UiTM Cawangan Johor
KM 12 Jalan Muar
85000 Segamat
JOHOR DT

**Dicetak oleh:**

Percetakan Segamat

Jalan Orkid
85000 Segamat
JOHOR DT

Pereka grafik: Unit Korporat dan Media
UiTM Johor

# CONTENT

**CLICK ON THE TITLE TO LINK TO THE FULL PAPER.**

***A=Accouting; B= Information Management, Marketing & Management; C=Economy & Finance; D= FSKM; E=Other Discipline (CITU, APB, LAW)***

| | | | |
|---|---|---|---|
| **8.** | B113 | Cointegration And Causality Between Overnight Policy Rate And Commercial Bank Rate | 1. Abdul Razak Bin Jambari<br>2. Azizah Binti Daut<br>3. Noranita Abdamia |
| **9.** | C115 | Energy Consumption, Gross Domestic Product, Foreign Direct Investment And Co2 Emission In Malaysia | 1. Mohd Azim Sardan<br>2. Azman Ali<br>3. Tan Yan Ling<br>4. Abdul Razak Jambari |
| **10.** | C118 | Systematic Risk Of Malaysian Stock | 1. Tay Bee Hoong<br>2. Tan Yan Ling<br>3. Nur'asyiqin Ramdhan<br>4. Zulkifli Mohamed |
| **11.** | B119 | The Impact Of Semantic Web On Digital Libraries Development | 1. Muhammad Asyraf Bin Wahi Anuar<br>2. Isma Bin Ishak |
| **12.** | E120 | Penggunaan Kata Kerja Kini ( الفِعْل المُضَارِع) Dalam Al-Quran Dari Sudut Masa | Abd Rahman Jamaan |
| **13.** | B128 | Pusat Sumber Sekolah Sebagai Ejen Kecemerlangan Sijil Pelajaran Malaysia (Spm): Kajian Ke Atas Pelajar Baru Sesi Disember-April 2010, UiTM , Johor | 1. Nor Diana Bte Abd. Rahman<br>2. Nor Ezan Bin Omar<br>3. Zailani Bin Shafie |
| **14.** | E129 | Pengurusan Zakat Di IPTA : Pengalaman Dan Cabaran di UiTM | 1. Nazrudin Bin Hashim<br>2. Mohd Zainoddin Bin Mustaffa |
| **15.** | E130 | Kajian Ke Atas Penggunaan Partikel Mod UiTM al Pelajar Johor Dalam Pembelajaran Bahasa Mandarin | Chong Peng Hwa |
| **16.** | B135 | A Case Study Of Digi Telecommunications Sdn Bhd Strategic Marketing Analysis | 1. Rohanizan Md Lazan<br>2. Roslina Ali<br>3. Shaherah Abd Malik<br>4. Rabiatul Alawiyah Zainal Abidin |
| **17.** | B138 | Entrepreneurial Strategic Alliances And Partnership Of Marketing And Retailing In Small And Medium Enterprises In Agro Sapling Supply Chain | 1. Shaherah Abd. Malik<br>2. Wan Haslin Aziah<br>3. Syaidatul Zarina Mat Din<br>4. Roha Mohamed Noah<br>5. Norhayati Omar |

| | | | |
|---|---|---|---|
| **18.** | D139 | Student Timetable Asistant System (Stasys) | 1. Noor Azrin Binti Zainuddin<br>2. Nafisah Binti Jamingan @ Amin<br>3. Mohamad Azlan Shah Bin Mohamed Azman |
| **19.** | E141 | Using Readers Theatre To Improve Reading Fluency And Comprehension | 1. Evelyn Sharminnie Vasuthavan<br>2. Dr Carolyn Soo Kum Yoke<br>3. S Kunaratnam Sita Raman<br>4. Nor Haniza Hasan<br>5. Cecilia Bai Rajendran<br>6. Noridah Sain |
| **20.** | A142 | How Quantitative And Qualitative Of Data Research Can Be Embedded Together? | 1. Dr. Norhayati Alias<br>2. Pn Noraizah Abu Bakar |
| **21.** | B143 | Preliminary Study On Social Network Among Malay Smes Entrepreneurs: Gender Differences | 1. Oswald Timothy Edward<br>2. Ehsan Fansuree Surin |
| **22.** | E144 | Penambahbaikan Pembelajaran Di Sekolah Agama Kerajaan Negeri Johor: Kajian Pelaksanaan Sistem Anjal | 1. Prof. Madya Ahmad Nawawi Yaakob<br>2. Nor Rashidah Mohamed |
| **23.** | E137 | Representasi Semantik Lewat Adat-Istiadat Perkahwinan Dalam Alam Minangkabau | Ainol Hasanal Bin Jalaluddin |

**Cointegration and Causality between Overnight Policy Rate and Commercial Bank Rate**

Abdul Razak Bin Jambari.

Azizah Binti Daut.

Noranita Abdamia.

Lecturer, Faculty of Business Management,UiTM Johor.

**ABSTRACT**

Monetary economics theory suggests that certain commercial bank rate variables should be linked by a long-run equilibrium relationship. Although the commercial bank rate may drift away from equilibrium for a while, government actions may be expected to restore equilibrium. The purpose of this study is to investigate the cointegration and causal relationship between Overnight Policy Rate (OPR) and the commercial bank rate (Conventional bank rate and Islamic bank rate). The evidence generally supports the existence of long run relationship between the variables.

Keywords: Overnight Policy Rate, Commercial Bank rate, Causality.

## 1. INTRODUCTION

There are different views on the monetary transmission mechanism. One view, which is very common, is the financial market price view .This view stresses the impact of monetary policy on the prices and rates of return on financial assets including bond prices, interest rates, and exchange rates on the spending decisions of firms and households. Another view of the monetary transmission mechanism by Bernanke and Gentler (1995), which is frequently put forth as an alternative to the financial market price view, is the credit view.

In the case of Malaysia, the importance of the bank lending channel in the monetary transmission process within the country has been well-established. Several studies by Kassim and Abdul Majid (2008), has provided empirical evidences on the importance of the banking sector in transmitting the impact of monetary policy.

## 2. Literature Review

In Malaysia, the shift in the monetary policy strategy from monetary aggregates to one in which interest rates were the intermediate target was precipitated by four main considerations. First, the liberalization of interest rates since 1978 had led to a more market-oriented interest rate determination process. Second, financial deregulation and liberalization measures undertaken during the 1970s had enhanced the role of interest rates in the monetary transmission mechanism. Third, there was a notable shift in the financing pattern of the economy since the mid-1980s, following structural changes in the economy from an interest-inelastic market (government securities market) to a more interest sensitive market (bank credit and capital market). Fourth, as a matter of policy, Bank Negara Malaysia (BNM) has maintained positive real rates of return on deposits. The bank also holds the view that interest rate stability is an important policy variable to promote a stable financial system which will contribute towards a more effective transmission mechanism of monetary policy. Given these developments and an economic environment where investors had become increasingly more interest-sensitive, a monetary framework based on interest rate targeting proved more suitable in meeting the objectives of monetary policy. The preference for interest rates over other variables such as reserve money in the conduct of monetary policy had been further reinforced by the globalization of financial markets and global economic integration. Hence, movements in interest rates abroad vis-à-vis domestic rates could no longer be totally ignored in monetary policy implementation. At the same time, globalization has made it increasingly difficult to forecast the supply of and demand for bank liquidity in the banking system given the volatility of capital flows according to Merican (2005)

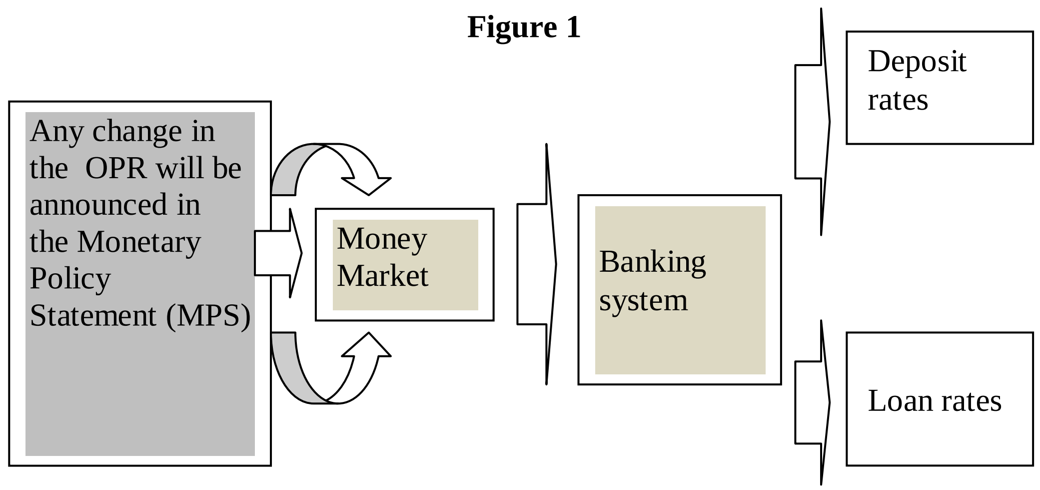
Since the OPR was only instituted from April 2004, the interbank overnight rate was used to proxy for the central bank policy rate for the period prior to April 2004. Prior to 2004, the policy rate was the 3-month interbank rate. Under this New Monetary Operating Procedures, the Overnight Policy Rate (OPR) will be the indicator of the monetary policy stance of Bank Negara. The OPR will have a dual role I) as a signalling device to indicate the monetary policy stance , ii) as a target rate for the day-to-day liquidity operations of the Central Bank. Any change in the monetary policy stance would be signalled by a change in the OPR. It will serve as the primary reference rate in determining other market rates, such as the Overnight Interbank Rate (OIR), Base Lending Rate (BLR) and deposit rate. Liquidity management of Bank Negara will aim at ensuring the appropriate level of liquidity that would influence the OIR to move closer to the OPR. Liquidity operations will also be conducted at other maturities but without targeting a specific interest rate level as well. Therefore, interbank interest rates at other maturities would be market determined, reflecting overall demand and supply conditions in the money market as well as interest rate expectations (BNM, 2004).

Interest rates are typically of two types. The ones which are decided by Bank Negara Malaysia (BNM) are called the Overnight Policy Rates. Other than Overnight Policy Rates, almost all rates are decided by market participants through methods of price discovery and are called market rates. Overnight Policy Rates are an important monetary policy tool and are often used by BNM to influence the direction and pace of the economy. Interest rates are raised to cool an economy and lowered to provide a fillip in bad times. These changes are usually gradual and are looked upon as economic fine tuning by the BNM. Then there are times when dramatic movements are needed. These are typically when imbalances are created, hurting the economy, needing an immediate resolution. Market rates are influenced by Overnight Policy Rates and should ideally move in lockstep. When this happens, transmission of monetary policy is said to be near perfect, and there is a distinct possibility that monetary policy aims will be achieved.

**2.1 Conventional and Islamic Interbank Market**

The interbank market for overnight loans is the channel of implementation of monetary policy and the anchor for the term structure of interest rates in the world's largest financial markets. Furfine (2002) suggests that interbank markets play at least two crucial roles in the modern financial system. First, it is in such markets that central banks actively intervene to guide their policy interest rate. Second, well-functioning interbank markets effectively channel liquidity from institutions with a surplus of funds to those in need, allowing for a more efficient financial intermediation. Thus, policymakers have an interest in having a financial system with a well-functioning and robust interbank market, that is, one in which the central bank can achieve its desired rate of interest and one that allows institutions to efficiently trade liquidity.

**Figure 1**




Given the links (Figure 1) that the money market has with both the capital market and the banking system, it has become the ideal avenue for BNM to conduct monetary operations. As such, the first impact of a monetary policy change is always felt first in the money market. It is the short-interest rate/yield, derived from money market trading that first responds to central-bank policy implementation. Adjustments in the bond-cum-equity market and banking system follow the money market reaction. Thus, a well-functioning money market properly transmits policy initiatives to the rest of the financial system.

Occasionally, central banks may also use the money market for credit allocation purpose.

Overnight money market rates play a crucial role for signalling the intended interest rate level and the stance of monetary policy. In recent years, central banks have redesigned their monetary policy instruments to ensure that the overnight rate closely follows the central bank's key policy rate and that its volatility remains well contained. Overnight Policy Rate (OPR) is the interest rate at which a depository institution lends immediately available funds (balances within the central bank) to another depository institution overnight. This is an efficient method for banks around the world to practice 'accessing short-term financing' from the central bank depositories. The interest rate of the OPR is influenced by the central bank, where it is a good predictor for the movement of short-term interest rates.

In Malaysia, changes in the OPR trigger a chain of events that affect Base Lending Rate (BLR), short-term interest rates, fixed deposit rate, foreign exchange rates, long-term interest rates, the amount of money and credit, and, ultimately, a range of economic variables, including employment, output, and prices of goods and services which is the micro and macro factors of the economy. The BLR is usually adjusted at the time in correlation to the adjustments of the OPR which is determined by Bank Negara Malaysia (BNM) during the Monetary Policy Meeting. An important feature of the Malaysian financial system is its dual banking system, where the non-interest rate based Islamic banking system operates alongside the interest rate based conventional banking system. The Islamic banking system is made up of independent full-fledged Islamic banks, Islamic banking subsidiaries and Islamic windows within the conventional banking institutions. In Malaysia, a relatively recent development in the financial sector is the rapid development of the Islamic banking and finance industry. Despite its recent history, Islamic banking has staged a very impressive growth. This is well reflected by the high growth of the asset of the Islamic banking industry in Malaysia which grew by approximately 30 percent per annum since its inception in 1983. In view of the increasing presence of Islamic banking in the Malaysian financial landscape, it is indeed time to investigate the relevance of Islamic banking in the transmission process of monetary policy in the Malaysian economy.

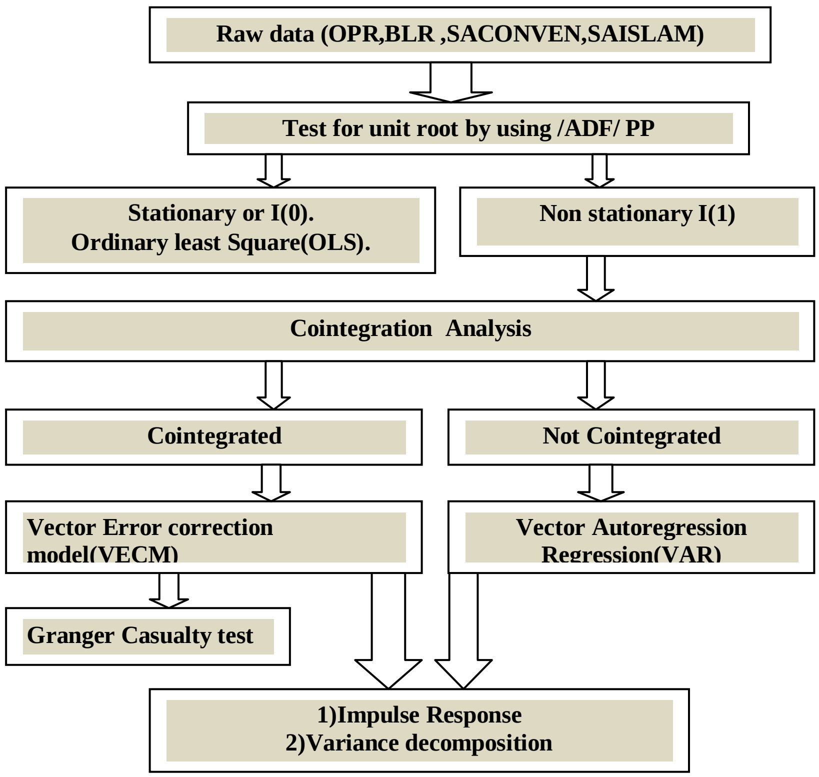
Referring to figure 1, objectives of this study are:

1) To investigate the relationship among Overnight Policy rate (OPR), Saving rate in conventional (SACONVEN) , Saving rate in Islamic (SAISLAM ) , and base lending rate (BLR).
2) To check the causal relationship between OPR and SACONVEN, SAISLAM and OPR .

Data for this study is taken from the Monthly Statistical Bulletin published by Bank Negara Malaysia (Downloadable from:www.bnm.gov.my). The monthly data covers the period May 2004 to Dec 2011. The method of analysis includes time series econometric technique of unit root test, cointegration test, and Granger casualty test. (Refer to figure 2)

**Figure 2**

**Step of the analysis (Diagnostic Test)**




.

## 3.2 Unit root test

A type of stochastic process that has received a great deal of attention and scrutiny by time series analysts is the so-called stationary stochastic process. Stochastic process is a collection of random variables ordered in time (Damodar, 2003). It is well known that a stationary time series is one in which the mean, variance and autocorrelation function do not change over time according to Charter (2008) and Koop (2008). Time series analysis is about the identification, estimation and diagnostic checking of stationary time series. A time series variable, $OPR_t$ is stationary if:

1) E ($OPR_t$ ) is the same for all values of t.

2) Var($OPR_t$) is finite and the same for all values of t.

3) Cov ($OPR_t$, $OPR_{t-s}$)depends only on s not on t .

The sequence $\{OPR_t\}$ is said to be covariance stationary if for all t and t-s

a) $E(OPR_t) = E(OPR_s) = \mu$ .

b) $E(OPR_t - \mu)^2 = E(OPR_{t-s} - m)^2 = \sigma^2$ .

c) $E(OPR_t - \mu)(OPR_{t-s} - \mu) = E(OPR_{t-j} - \mu)(OPR_{t-j-s} - \mu) = \gamma_s$.

There are many tests for determining whether a series is stationary or non-stationary. The most popular one is the Dickey-Fuller test-Unit root test (1979) and Philip Perron (1988). Time series analysis is about the identification, estimation and diagnostic checking of stationary time series. If our time series is a stationary process, then $OPR_t = \rho OPR_{t-1} + \upsilon_t$, $|\rho| < 1$, N~ (0, 1). On the other hand, if the time series is non-stationary (unit root) , then $OPR_t$ =

$OPR_{t-1} + \upsilon_t$ where $|\rho| = 1$ and , $\upsilon_t \sim N(0,1)$. Non stationary time series can be transformed to stationary time series by differencing them one or more times. Normally we cannot reject the null hypothesis of unit root in any of the series above. As a result, we should run a cointegration test in order to see if the series are co integrated.

**3.3 Cointegration test**

If there is a cointegration, there will be a stable long-run equilibrium in the model because if it is cointegrated, all variables move together to a single equilibrium. This study does not include the Vector Error Correction Model (VECM), Variance Decomposition and Impulse Respond Analysis that measure the acceleration and deceleration of momentum to equilibrium point.

According to Charter (2008) , The equation ( 1 ) describe a system in which each variables is a function of its own lag and the lag of the other variable in the system. Together, the equation constitutes a system known as VAR. Since the maximum lag is of order 1, we have a VAR (1).

$$OPR_t = \beta_{10} + \beta_{11} OPR_{t-1} + \beta_{12} SACONVEN_{t-1} + SAISLAM_{t-1} + BLR_{t-1} + v_t$$

$$SACONVEN_t = \beta_{20} + {}_{21}OPR_{t-1} + \beta_{22} SACONVEN_{t-1} + SAISLAM_{t-1} + BLR_{t-1} + v_t^{x}$$

$$SAISLAM_t = \beta_{10} + \beta_{11} OPR_{t-1} + \beta_{12} SACONVEN_{t-1} + SAISLAM_{t-1} + BLR_{t-1} + v_t$$

$$BLR_t = \beta_{20} + \beta_{21} OPR_{t-1} + \beta_{22} SACON_{t-1} + SAISLAM_{t-1} + BLR_{t-1} + v_t^{x} \qquad \ldots\ldots(1)$$

If we have two variables and if $OPR_t$ and $BLR_t$ are stationary I(0) variables, the above system can be estimated using least squares applied to each equation. If $OPR_t$ and $BLR_t$ are non-stationary I (1) variables and not cointegrated , then we work with the first difference. In this case the VAR model is:

$$\Delta OPR_t = \beta_{10} + \beta_{11}\Delta OPR_{t-1} + \beta_{12}\Delta BLR_{t-1} + v_t^{\Delta y}$$

$$\Delta BLR_t = \beta_{20} + \beta_{21}\Delta OPR_{t-1} + \beta_{22}\Delta BLR_{t-1} + v_t^{\Delta x} \quad \ldots(2)$$

The VAR model is a general framework to describe interrelationship between stationary variables, Thus if $OPR_t$ and $BLR_t$ are stationary I (0) variables, the system in equation 1 is used . On the other hand if $OPR_t$ and $BLR_t$ are I(1) but they are not co-integrated , we examine the interrelation between them using a VAR framework in first difference as in equation (2). If $OPR_t$ and $BLR_t$ are non-stationary I (1) and co-integrated, then we need to modify the system equation to allow for the co integrating relationship between I (1) variables. Introducing the co integrating relationship leads to a model known as vector error correction model (VECM).

Consider two stationary variables OPR and BLR that are integrated of order 1:

$OPR_t \sim I(1)$ and $BLR_t \sim I(1)$ and we have shown it to be cointegrated , so that $OPR_t = \beta_0 + \beta_1 \Delta BLR_t + e_t$

Since we have found cointegration, we do not need to worry about spurious regression problem. The long run multiplier is $\beta_{1.}$ This indicates that in the long run, an increase in the BLR $_t$ would cause an increase in OPR $_t$. Note that we could have chosen to normalize BLR. Whether we normalize OPR or BLR is often determined by the economic theory.

**3.4Testing for Cointegration**

A number of methods for testing cointegration have been proposed in the literature. Gujarati (2003) considers three comparatively simple methods:

(1) the DF or ADF unit root test on the residuals estimated from the co integrating regression

(2) the co integrating Durbin-Watson (CRDW) and

(3) the Engle-Granger or Augmented Engle-Granger test (1987) .

The test for cointegration described in this study is based on the test developed by Johansen (1988) and Johansen and Juselius test (1990). A test of cointegration is a test to determine whether or not there is a long run relationship between the variables as hypothesized by the economic theory. To implement the Johansen's cointegration test, the following Vector Error Correction Method (VECM) is estimated.

$$\Delta \text{ OPR}_t = \Phi \text{ D}_t + \Pi \text{ OPR}_{t-1} + \sum_{i=1} \Gamma t \Delta \text{ OPR}_{t-1} + \varepsilon_{t.} \qquad \text{............ (3)}$$

Where $\Delta$ is the first difference .OPR $_t$ is a vector of endogenous variables. $D_t$ is deterministic vector (Constant and trend). $\Phi$ is a matrix parameter $D_t$. The matrix

$\Pi$ contains information about the long run relationship between $OPR_t$ variables in the vector. VECM restricts the long run behaviour of endogenous variables to converge to their co integrating relationship while allowing for short run adjustment. The existence of cointegration and the number of stochastic trends for the k series in $Y_t$ depends on the rank of the matrix $\Pi$ . We consider again three cases namely , rank ($\Pi$) = k , rank ($\Pi$) = 0 and rank ($\Pi$ ) = r with $1 \leq r \leq k-1$ .

To determine the number of co integrating rank, we use the likelihood ratio (LR) trace test statistic:

$$\lambda_{TRACE}(r) = -T \sum \ln(I - \lambda_t) \quad , \textit{Maximum-Eigen Value}$$

$$\lambda_{\max}(r, r+1) = -T \sum \ln(1 - \lambda_{I-I})$$

Where: $\lambda_I$ = characteristic roots estimates value found from matrix $\Pi$ (Eigen values) , r = Cointegration factor and T = observation .

According to Charter (2008), we have three steps to test the number of cointegration relations .

a)Step 1: Test $H_0$ against $H_1 : r \geq 1$. First, test the null hypothesis that there is no cointegration and there are k stochastic trends. This corresponds to the hypothesis that $\lambda_1 = \ldots = \lambda_k = 0$ and the relevant test statistic is (3 ) with r = 0.If $H_0$ is not rejected ,then there is no cointegration. If $H_0$ is rejected , continue with step 2.

a)Step 2: Test $H_0$ against $H_1$ : $r \geq 2$. First, test the null hypothesis that there is no cointegration and there are k stochastic trends. This corresponds to the hypothesis that $\lambda_1 = \ldots = \lambda_k = 0$ and the relevant test statistic is (9) with r = 1.If $H_0$ is not rejected ,then there is a single cointegration relation and there (k-1) common trends . If $H_0$ is rejected, continue with the next step.

For easier understanding, if both test statistic (Trace and Max Eigen Value) > critical values (1 or 5% significant level) it will reject $H_0$ which means there has cointegrated at least with one factor (exist long-run relationship) .

**3.5 Granger Causality test**

The Granger Causality Test is based on the fact that the future cannot affect the past. A test is made to show whether lagged values of $BLR_t$ significantly explain $OPR_t$. If both variables are integrated at level stage or I(0), the granger causality test should have been used. This test is valid only in the short-term determination. The requirements to proceed to the Granger causality test are:

a) The variables must be stationary at I(0), If the variables are not stationary at I(O) but are stationary at I(1) (after first difference), it can also proceed to Granger or I(n).
b) There must be one cointegration factor in the cointegration test.
c) Residual is uncorrelated (no autocorrelation) with zero means and exist constant variance (homoscedastic).

## 4. FINDINGS AND DISCUSSION

### 4.1 Unit root test result

The first step is to check the stationary properties of the series. For this purpose, the approach developed by Fuller (1979) and the approach developed by Perron (1988) test was used .Table 1a) and 1b) shows all the involved series are non-stationary or integrated of order one, I (1) at 1 % significant level. We used the cointegration methodology by Johansen and Juselius (1990) which is based on maximum-likelihood estimation procedure and then allow for testing of feedback effect among a set of variable. Table 2 reports the result of Johansen cointegration test that indicates two co integrating relation for OPR at 5 % significant level. We select the lag length for Johansen specification based on justification of economy that is, starting with a day (1) lag length and observing that the results did not alter appreciable as lag length increased.

**Table 1(a): Unit Root Tests for OPR, SACONVEN, SAISLAM, BLR**

| **Variable** | **ADF(Without trend)** | | **ADF(with trend)** | |
|---|---|---|---|---|
| | Level | First difference | Level | First difference |
| OPR | -1.9022 | -13.3625* | -1.9810 | -13.287* |
| SACONVEN | -1.7765 | -4.2639* | -1.9872 | -4.3478* |
| SAISLAM | -2.0878 | -10.312* | -2.9048 | -22.362* |
| BLR | -2.2414 | -3.8026* | -2.2342 | -3.9832* |

**Table 1(b): Unit Root Tests for OPR, SACONVEN, SAISLAM, BLR**

| **Variable** | **Philips-Perron(Without trend)** | | **Philips-Perron(With trend)** | |
|---|---|---|---|---|
| | Level | First difference | Level | First difference |
| OPR | -2.3579 | -13.4725* | -2.4493 | -13.3961* |
| SACONVEN | -1.7573 | --6.7981* | -1.411 | -6.90462* |
| SAISLAM | -2,9048 | -22.3628 | -5.5237* | -25.6379* |
| BLR | -1.6679 | -6.4768* | -1.6661 | -6.4430* |

### 4.2 Cointegration test result

We test the number of cointegration relations by applying the Johansen trace test and assumed that the drift terms and the trend in the cointegration relation can be omitted. The intercept term is omitted because it has no economic meaning (Charter, 2008). Therefore we present the results without trend in table 2(a) and 2(b). The test gives Eigen values $\lambda_1 = 0.3074$, $\lambda_2 = 0.2331$ , $\lambda_3 = 0.1696$ and $\lambda_4 = 0.0358$. The first three Eigen values differs significantly from zero (at 5 % significance), but the fourth one does not. This means that the matrix $\Pi$ in the Vector error correction model for these three series has rank r = 3. So there are three cointegration relations between the variables and there is one common stochastic trend that drives all four rates.

Since the three variables are noted to be I (1), there exists the possibility that they are sharing a long run equilibrium relationship. Table 2(a) and 2(b) *reports* the results of Johansen cointegration procedure (*trace* test) that indicate two co integrating relation which are significant at 5 % level.

**Table 2(a): Results of Johansen cointegration procedure (*trace* test). Unrestricted cointegration rank test (trace)**

| Hypothesized No of CE(s) | Eigen value (λ) | Trace statistics | 0.05 Critical value | Prob ** |
|---|---|---|---|---|
| None ( r = 0) | 0.3074($\lambda_1$) | 76.9791* | 47.8561 | 0000* |
| At most 1 r ≤ 1 | 0.2331($\lambda_2$) | 43.9184* | 29.7970 | 0.0006* |
| At most 2(r≤ 2) | 0.1696($\lambda_3$) | 20.0231 | 15.4947 | 0.0097* |
| At most 3(r≤ 3) | 0.0358($\lambda_4$) | 3.2869 | 3.2869 | 0.0698 |

Trace test indicates 3 co integrating equations at the 0.005 level..
*denotes rejection of the hypothesis at the 5 % level.
**MacKinnon-Haug-Michlis (1999) p-values.
Note: The asterisks * and ** denotes statistically significant at 5 %.

**Table 2(b): Results of Johansen cointegration procedure (*trace* test). Unrestricted cointegration rank test (Maximum eigenvalue)**

| Hypothesized No of CE(s) | Eigen value (λ) | Max-Eigen statistics | 0.05 Critical value | Prob |
|---|---|---|---|---|
| None ( r = 0) | 0.3074($\lambda_1$) | 33.0608* | 27.5854 | 0000 |
| At most 1 r ≤ 1 | 0.2331($\lambda_2$) | 23.8952* | 21.1316 | 0000 |
| At most 2(r≤ 2) | 0.1696($\lambda_3$) | 16.7362* | 14.2646 | 0.0199 |
| At most 3(r≤ 3) | 0.0358($\lambda_4$) | 3.2869 | 3.8414 | 0.0698 |

Note: The asterisks *denotes statistically significant at 5 %.
Trace test indicates 3 co integrating equations at the 0.005 level.
*denotes rejection of the hypothesis at the 5 % level.
**MacKinnon-Haug-Michlis (1999) p-values.
Note: The asterisks * and ** denotes statistically significant at 5 %.

**Table 3(a): Results of normalized co-integrating vectors based on Equation 1.**

| OPR | BLR | SACONVEN | SAISLAM |
|---|---|---|---|
| 1.0000 | -0.9695 | -1.1847 | 0.5088 |
| Standard Error | (0.0952) | (0.2906) | (0.2343) |
| (t-ratio's) | (-10.1759)* | (-4.0757) | (2.1714) |

Table 3(a) shows the results of normalized co integrating vectors based on the equation. Co-efficient on OPR, BLR, SACONVEN and SAISLAM which are interpreted as a long run relationship. The expression $v_t^{\,y} = y_t - \beta_{10} - \beta_{11} y_{t-1} - \beta_{12} x_{t-1}$ is the co-integrating vector which has normalized coefficient [ 1, - $\beta_{10}$ - 0.3466 - (-1.3329) ]

**4.3 Causality test result**

We carry out Granger Causality test on series OPR, BLR, SACONVEN and SAISLAM. The results are shown in table 4. A variable X granger –cause Y if Y can be better predicted using the histories of both X and Y then it can use the history of Y alone. Conceptually the idea has several components

a) Temporality: Only past values of X can cause Y.

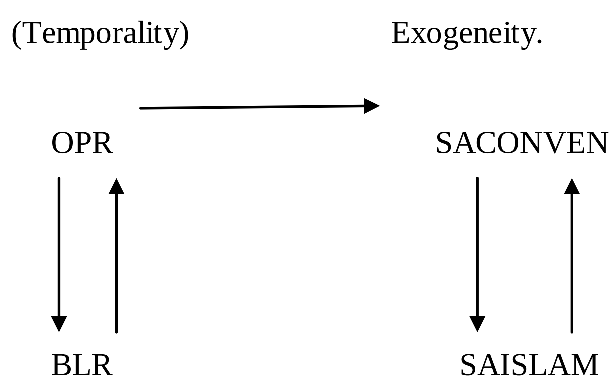
b) Exogeneity: points out that a necessary condition for X to be exogenous of Y is that X fails to Granger cause Y.

c) Independence: Similarly, variables X and Y are only independent if both fail to Granger cause another.

**Table 4: Result of Granger Causality Test**

| Num Lag | Null hypothesis | F-Statistics | Prob | Decision |
|---|---|---|---|---|
| 3 | BLR does not Granger cause OPR | 6.2427 | 0.0007 | Reject $H_0$ |
| | OPR does not Granger cause BLR | 6.3672 | 0.0006 | Reject $H_0$ |
| | | | | |
| | SACONVEN does not Granger cause OPR | 2.5535 | 0.0610 | Accept $H_0$ |
| | OPR does not Granger cause SACONVEN | 6.2477 | 0.0007 | Reject Ho |
| | | | | |
| | SAISLAM does not Granger Cause OPR | 0.1080 | 0.9952 | |
| | OPR does not Granger cause SAISLAM | 0.6604 | 0.5790 | Reject $H_0$ |
| | | | | |
| | SACONVEN does not Granger cause BLR | 1.1313 | 0.3412 | Accept $H_0$ |
| | BLR does not Granger cause SACONVEN | 6.76304 | 0.0007 | Reject Ho |
| | | | | |
| | SAISLAM does not Granger Cause BLR | 0.2806 | 0.8392 | |
| | BLR does not Granger cause SAISLAM | 0.8150 | 0.4891 | Reject $H_0$ |
| | | | | |
| | SAISLAM does not Granger Cause SACONVEN | 0.8057 | 0.4932 | |
| | SACONVEN does not granger cause SAISLAMIC | 1.72804 | 0.1676 | Reject $H_0$ |
| | | | | |

**Figure 3**




- When undertaking the testing procedure outlined in figure 2 there are four possible outcomes from the test for causality.
- i)OPR Granger cause BLR.
- ii) BLR Granger causes OPR.

- iii) OPR granger cause BLR and BLR Granger cause OPR.
- iv) No Granger causality exists between BLR and SAISLAM.
-

## 5. CONCLUSIONS AND IMPLICATIONS

We conclude that the three series of interest/profit rate are co-integrated. Co-integration of OPR, BLR, SACONVEN and SAISLAMIC suggests that there is a long run relationship or equilibrium among them and their trend will cancel each other out. This result implies that any changes in the BLR and SACONVEN are linked to changes in the OPR which is under control of BNM.

Overall it can be concluded that, because all the variables are co-integrated Bank Negara Malaysia can easily conduct its monetary policy by influencing the level of interest rates. When the economy is overheating and the threat of inflation is high, monetary policy will be tightened by withdrawing funds from the banking system and raising interest rates

## References

Bank Negara Malaysia (1997-2009), Monthly Statistical Bulletin, Bank Negara Malaysia, Kuala Lumpur, January 1997- Dec 2009, various issues.

Bank Negara Malaysia (2004-2009), Annual Report, Bank Negara Malaysia, Kuala Lumpur. Various issues.

Bernanke, B.S., Mark G. (1995),"Inside the black box:the credit channel of monetary policy transmission", Journal of Economic Perspectives, Vol 9.No 4,pp27-48.

Charter.H, , Griffiths.W.R, Lim.G.C ,(2008).Principles of Econometrics. John Wiley and Sons, Inc 2007.

.

Furfine, Craig. 2002. Interbank Markets in a Crisis. European Economic Review. 46(4-5): 809-820.

Gujarati ,D.N (2003) .Basic Econometrics.Fourth Edition. McGraw.Hill Companies

Dickey DA, Fuller WA 1979. Distribution of the Estimators for Autoregressive Time Series With a Unit Root, Journal of the American Statistical Association, 74: 427-431.

Engle, R., F & Granger, C. W. J. 1987 Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica (1986-1998)*, 55**,** 251.

Johansen, S.(1988) Statistical analysis of cointegration vectors. J.Economic Dynamics and Control, 12: 231-254.

Johansen, S. and K. Juselius, 1990. Maximum likelihood estimation and inference cointegration-with application to the demand for money, Oxford Bulletin of Economic and Statistics, 52, 169-210.

Koop.G(2008), Introduction to EconometricsJohn Wiley & Sons,Ltd.

Mohamad Haji Alias and Tang, T.C (2005). Supply Response of Malaysian Palm Oil Producers: Impact of Interest Rate Variations.Oil Palm Industries Journal.Vol 5 (2) 2005.11-22.

Kassim, S.H .(2008), “The role of bank lending in the monetary transmission process of a developing economy: evidence from Malaysia”, Asian Economic Journal,Vol .19 No.1,pp.83-102.

Kassim,S.H ., Abdul Majid,M.S.,Mohd Yusof,R.(2009), “Impact of Monetary transmission process of a developing economy:evidence from Malaysia”,Saving and Development, Vol,33 No 4.

Philip and Perron (1988). Testing for a unit root in time series regression. Biometrika, 75(2): 335-346.

Merican Cheong, L (2005): Globalisation and the operation of Monetary policy in Malayisa.BIS Working Papers No 23. Switzerland.page 209-215.