THE MACROECONOMIC DETERMINANTS OF BANK CREDIT IN MALAYSIA AN ANALYSIS VIA THE ERROR CORRECTION MODEL (ECM)

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Abstract:

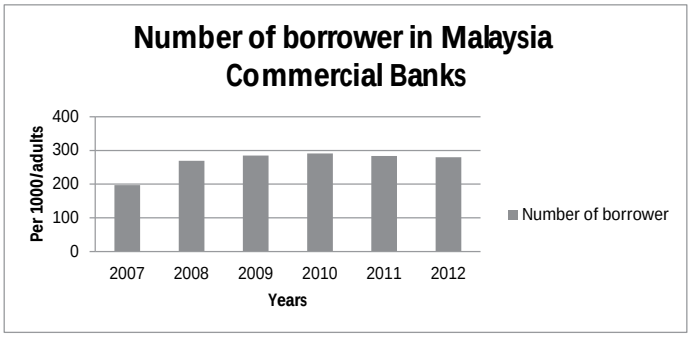
The financial landscape in the Malaysian banking sector has undergone major structural changes in this era of globalization with various liberalization measures introduced during the last decade. These include government reforms to improve the bank infrastructure, existing ownership structures, lending practices and capital requirements; deregulation to allow for increased competition and greater focus on consolidation and mergers and acquisitions (Abdul Rahman et al, 2006). As part of the reform to develop large and high-performing banks to support growth at home and abroad, the government encouraged the banking sector to move towards a more private market- driven industry sector; to implement Basel Accord II and to adopt similar risk management standards as well as to improve bank services such as lending and borrowing activities and performance in the home country (Aziz, 2006). In this context, our study aims to discuss the impact of macroeconomic variables on bank credit in Malaysia between 1991 and 2011.Using quarterly data for January 1991 to December 2011, unit root test, cointegration test and the vector error correction model were applied to uncover the dynamic long run relationship between macroeconomic variables and bank credit. Overall, it can be clearly seen that all these three macroeconomic variables have contributed positively towards bank credit in the Malaysia. It is also statistically proven that they also have positive long run relationship with the bank credit.

Keywords: *Bank Credit, Unit Root Test, Cointegration Test, Vector Error Correction Model, Malaysia.*

Introduction

A bank is an institution that provides financial services which mainly involve financial intermediation that channels funds from the surplus unit to the deficit unit of the economy thus transforming bank deposits into credits. Bank Negara Malaysia stated that the financial institutions in Malaysia consist of 25 commercial banks of which 9 are domestically-owned while 16 are foreign-owned, 16 Islamic banks, 5 international Islamic banks, 15 investment banks and 2 other financial institutions (Guisse, 2012). There are a few types of borrowers in Malaysia namely personal, sole proprietor, partnership, companies, co-operative societies, societies and clubs, government corporations and agencies. The chart below shows the number of borrowers from commercial banks (per 1,000 adults) for the period 2007 – 2012.

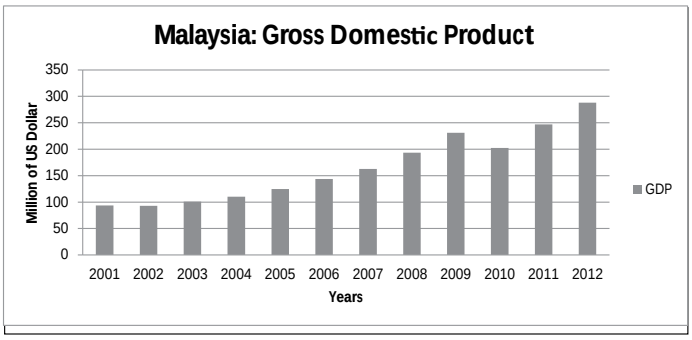
Figure 1: Number of borrowers from commercial banks (per 1,000 adults)



Source: The World Bank Report, 2013

The determinants of the bank credit in Malaysia are Gross Domestic Product (GDP), Consumer Price Index (CPI) and Lending Rate. GDP is the total market value of all final goods and services produced within the country in a given period of time (Mankiw, 2007). CPI measures the changes in the average prices of a "market basket" of consumer goods and services (Wahab et al., 2010). Lending Rate is the bank rate that is normally differentiated according to credit worthiness of borrowers and objectives of financing, which then meets the short-term and medium-term financing needs of the private sector (The World Bank, 2013). The Figures 2 and 3 respectively show the data for GDP and CPI in Malaysia from 2000 to 2012. The lending rates in Malaysia from 2003 to 2012 are also shown in Figure 3.

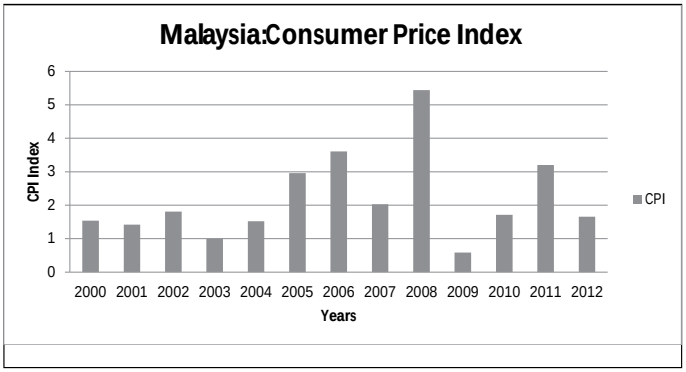
Figure 2: GDP between 2000 and 2012



Source: The Wold Bank Report, 2013

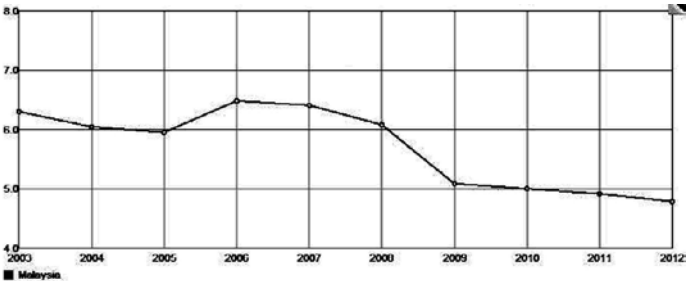
The GDP increased all the way from 2000 till 2009 (See Figure 3). It then increased again and suffered a setback in 2010 due to the global financial crisis which occurred in 2008 (Guisse, 2012).

Figure 3: CPI between 2000 to 2012



The CPI increased all the way from the year 2000 to 2012. Rising food and energy prices which boosted inflation in emerging markets around the world could be one of the reasons for this. Many commodity prices, including crude oil, have posted significant increases throughout these years.

Figure 4: The graph of Lending Rate between 2003 to 2012



There was a decrease in the lending rate between 2003 and 2005 due to the role of the Bank Negara in reducing the lending rate to stimulate the economy. The lending rate suffered a drastic decrease between 2008 and 2009 which are the post-crisis years of the 2008 global financial crisis.

There are many reasons why people involve themselves in bank credit activities. The bank offers various kinds of loans to satisfy different needs of borrowers. As a consumer, due to the budget constraints, they may choose to spend using credit cards to increase their utilities now and forego the consumption in the future. Again, due to limited buying power, consumers cannot afford to buy those luxurious goods such as cars, houses and lands. Hence, after getting the loans from bank, they can repay through instalment including principal plus interest. This consumption contributes largely to the total gross domestic output. Beside this, business people will apply for loans from banks for investing in financial securities, mutual fund and derivatives. This accounts for the investment components in gross domestic product.

Furthermore, the Malaysian banking sector has undergone significant structural change in this phase of globalization with various liberalization measures being introduced over the last decade. These include government reforms to improve the bank infrastructure, the existing ownership structures, lending practices and capital requirements; deregulation to allow for increased competition, and heavy focus on consolidation and mergers and acquisitions (Abdul Rahman et al, 2006). As part of the reform to develop large, high-performing banks to support growth at home and abroad, the government encouraged banks to move towards a more private market-driven industry sector; to implement Basel Accord II or to adopt similar risk management standards; and to improve bank structure and performance in the home country (Aziz, 2006). Therefore, we believe that these factors may have an implication on the bank credit activity in Malaysia. This paper therefore aims to discuss the impact and relationship of macroeconomic variables towards bank credit in Malaysia for the decades covering 1991 - 2011.

2.0. Literature Review

There are quite a number of researches conducted in the area of banks credit both for developed and emerging economies. In this study, the literature review can be divided into three categories that will discuss Lending Rate (LR), Consumer Price Index (CPI) and Gross Domestic Product (GDP) which we consider to be the main determinants of bank credit.

It is postulated that there is a positive relationship between lending rate and bank credit. The lending rate is highly related to monetary policy implemented by the Central Bank. If the economy is in recession, the central bank will buy in the government bonds to stimulate expenditures and it will increase the supply of money in the market (McConnell et al., 2012). Hence, the lending rate will fall due to excess supply of money. Consequently, this will benefit two parties in the market, namely consumers and producers. For consumers, they are encouraged to forego future consumption and consume more now in the goods and services market. For producers, the low interest rates act as an incentive to borrow money to invest by purchasing more raw materials, equipments and buildings. If this situation is uncontrolled, the money supply continues to expand and prices will continuously rise when the growth of output reaches the capacity limits (Schwartz, 2008). Comparatively, Topi and Vilmunen (2001) have attempted to investigate the effects of monetary policy on bank lending for Finland. They find that bank lending responds positively to changes in real income and inflation, but negatively to monetary policy shocks.

There is also a positive relationship between deposit interest rate and bank activity. Bank loans are raised significantly and immediately when there is an increase in the interest rate (Ibrahim, 2006). Interest rate has long been recognized by classical, neo-classical and contemporary economists as one of the factors that determine the level of savings in the economy. The higher the rate of interest, the more willing people will be to forego present consumption; more money will be saved (Haron & Ahmad, et.al. 2006). Masson et al. (1998) found that demographic factor such as real interest rate is positively related to savings in industrial and developing countries (Haron & Wan Azmi, 2006). Using the Adaptive Expectation Model, it is confirmed that there is a negative relationship between the interest rate of conventional banks and the amount deposited in interest-free deposit facilities due to the existence of the utility maximization theory (Haron & Ahmad, et.al. 2006).

The positive relationship between CPI and bank credit also appears to be a positive one. Using the two-tailed Spearman test, quarterly repayment data from Bank Negara Malaysia (BNM) for eight major types of loans were tested for correlation against the CPI. The result shows that there is a significant positive correlation between CPI and repayment of loans for purchase of transport vehicles, purchase of property, personal consumption, credit cards, working capital, total loan repayments (Kechik, 2008). CPI is used as an indicator for inflation. Risk-adverse consumers may increase their precautionary savings because inflation increases the uncertainty regarding future income growth (Haron & Wan Azmi, 2006). On the other hand, a study by Pazarbasioglu (1997) indicates that inflation had a strong negative effect on credit demand in Finland during the period 1981-1986 and 1987-1995. Pazarbasioglu estimated credit demand

for Finland to determine whether there was a credit crunch after the banking crisis. To analyse the effect of inflation on bank credit Pazarbasioglu used the maximum log likelihood approach. The explanatory variables were the bank lending rate, expected fixed investment, expected rate of inflation and industrial production. A similar result was found in Moore and Threshgold (1985) whereby they investigated the short-run dynamics of loans to the industrial and commercial companies in the United Kingdom. The explanatory variables in the model were components of the working capital of the firms and the data used covered the period 1978-1981. A single short-run disequilibrium equation was used to analysis the short-run dynamics of loans. This Moore and Threshgold study also provides evidence of a negative relationship between bank credit and inflation.

In general, many studies have been conducted in the past on the relationship between bank credit and economic growth. One, conducted by Ibrahim (2009) showed that there was a positive relationship between GDP and bank activity because an increase in GDP will raise both supply and demand for loans. As GDP increases, banks will have more funds to make loans due to the increase in the amount of deposits. Moreover, Agrawal (2001) found that both high rate of growth of income per capita and the rapidly declining age dependency ratio have contributed to the high rate of savings in the seven Asian countries (South Korea, Taiwan, Singapore, Malaysia, Thailand, Indonesia and India).(Haron & Wan Azmi, 2006). Deidda and Fattouh (2002) concluded that there is a positive correlation between bank-based financial development and growth of the economy in countries with higher income. When the income of the country grows, market-based financial structures will increase (Lakstutiene, 2008). However, the high credit growth acts as a signal for the occurrence of financial crises. In the empirical analysis, there is a significant relationship between the rapid credit growth and increasing defaults. Dell'Ariccia and Marques (2006) as cited in Kelly, McQuinn, Stuart (2013) have a prediction that the defaults cases will be increasing after the credit has been expanded rapidly. The rapid credit growth is more likely to occur in the upswing of a business cycle due to over-exuberant lending. Hence, the defaults rate is increasing in the upswing of the cycle. So, when the GDP is increasing rapidly and economy is at the peak of the business cycle, the bank credit system makes more mistakes and will finally contribute to the collapse of economy. (as cited in Kelly, Mc Quinn, Stuart, 2013). Inevitably, the growth of GDP is positively correlated to the rapid growth of bank credit activities.
Therefore, hypotheses put forth in this study are;

H1: Bank credit in Malaysia is determined by Lending Rate/ Interest Rate;
H2: Bank credit in Malaysia is determined by Consumer Price index;
H3: Bank credit in Malaysia is determined by Gross Domestic Product;

3.0. Methodology

3.1. Model

To identify the relationship between bank credit and macroeconomic determinants, we employ the following model;

$$LnBC = f\,(LnLR, LnCPI, LnGDP)$$

where:

LnBC = Natural Log of Bank Credit/Loans
LnLR = Natural Log of Lending Rate/Interest Rate
LnCPI = Natural Log of Consumer Price Index (Base Year: 1990: 100)
LnGDP = Natural Log of Gross Domestic Product

3.2. Unit Root (UR) and Cointegration Tests (CT)

The first step in this study is to determine stationarity of the variables of the models. Broadly speaking, classical regression techniques may be invalid if applied to variables that do not fulfil the stationarity property (Thomas, 1997). This study uses the most commonly used test, which is the Augmented Dickey Fuller (ADF) test. It is "augmenting" a random walk with drifts around a stochastic trend by adding the lagged values of the dependent variable ΔYt (Gujarati, 2009). The test of Unit Root is based on the following equation;

(UR) ---------- $\Delta Y_t = \beta_1 + \beta_{2t} + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} Y_{t-1} + \varepsilon_t$ (Equation 1)

where: β_1 and β_2 are parameters, t is the time or trend variable, δ indicates drift, ε_t is a pure white noise error term and $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$ $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$ etc. In case if the null hypothesis exists, i.e. $\delta = 0$; then there is a unit root. Hence, the time series is non – stationary. If the alternate hypothesis exists, i.e. δ is less than zero, then the time series is stationary.

The next step would be a test on cointegration. Gujarati (2009) illustrates that, although variables are individually not stationary, I (1), and they are stochastic trends, and the linear combination between those variables may be stationary. Therefore, all those variables are co-integrated. Variables will be cointegrated in the case where they have long term or equilibrium, relationship between them (Gujarati, 2009). In order to test the long run relationship, the Johansen and Julieus Cointegration (CT) test will be employed. The test will be run based on the following equation;

(CT) ---------- $\Delta Y_t = \beta_0 + \pi Y_{t-1} + \sum_{i=1}^{p} r_i \Delta Y_{t-1} + \varepsilon_t$ Equation (2)

Cointegration exists if the trace statistics is greater than critical values. After the identification of the number of Cointegration equations, then we can proceed to the Vector Error Correction Model analysis.

3.3. Vector Error Correction Model (VECM)

Vector Error Correction Model is a restricted VAR (Vector Autoregressive) model used for non - stationary variables to be cointegrated. VECM specification restricts the long run behaviour of endogenous variables to converge to their cointegration relationship (Abduh et all, 2011).

VECM shows the adjustment of instability relationship from short term to long term equilibrium. This method is used to incorporate a loss of long term information as long as the data are cointegrated. In the short run, there may be disequilibrium. The statistical significance of the Error

Correction Term (ECT) (-1) coefficient decides how quickly the equilibrium is restored (Abduh et all, 2011). To be more specific, the VECM Approach according to Masih and Masih (1997) as cited by in Gujarati (2009) allows us to differentiate between short term and long term dynamics within long run equilibrium. Broadly speaking, this method is based on the following equation;

VECM ---------- $\Delta Y_t = \sum_{i=1}^{k-1} r_i \Delta Y_{t-1} + \mu_0 + \mu_{i,t} + \alpha\beta Y_{t-1} + \varepsilon_t$ (Equation 3)

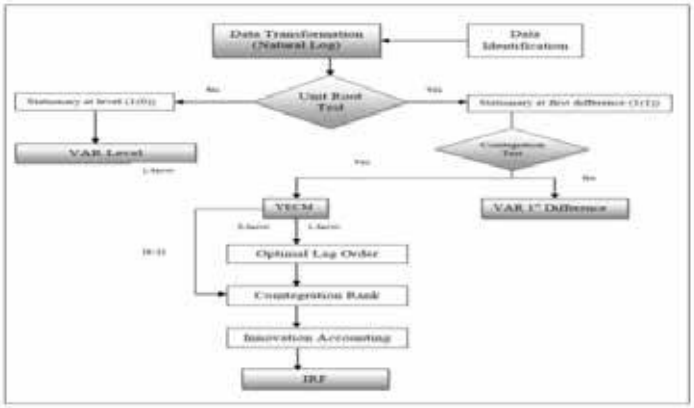
where:

ΔY_t = $Y_t - Y_{t-1}$
K-1 = Order of VECM from VAR
Γ_i = Regression coefficient matrix (b1... bi),
μ_0 = Intercept vector
μ_1 = Regression coefficient vector
T = Time trend
α = Loading matrix
β = Cointergration vector
Y = Variables used in the analysis

3.4. Impulse Response Function (IRF)

Impulse Response Function (IRF) is a method which is used to determine the response of an endogenous variable on a certain shock, because this shock may be transmitted to the other dependent variables through a dynamic structure or lag structure in the VAR model. IRF essentially maps out the dynamic response path of a variable due to a one – period standard deviation shock to another variable. The summary of the flowchart methodology framework to be applied in this study is as follows;

Figure 1: The Process of Vector Autoregressive (VAR)



3.5. Data Collection

The data collected comprises of quarterly data for the period 1/1991 to 2/2011, and this paper employs the Johansson and Juselius Cointergration Test and Vector Error Correction Model (VECM). For Lending rate and Bank Credit, the data was gathered from Bank Negara Statistics (published by Bank Negara Malaysia). For Consumer Price Index (CPI) and Gross Domestic Product (GDP), the data was gathered and complied from the Statistical Bulletin and other publications of the Department of Statistics, Malaysia.

4.0. Empirical Evidences and Analyses.

In this part, analysis will be divided into 7 parts, namely; (i) Descriptive Statistics, (ii) Unit Root Tests and Stationarity, (iii) Lag Optimum Test, (iv) Cointegration Test, (v) Vector Error Correction Model, (vi) Error Correction Model and (vii) Impulse Response Function.

4.1. Descriptive Statistics

Table 1: Descriptive Statistics

Details	LNCREDIT	LNLENDR	LNCPI	LNGDP
Mean	12.90941	2.018187	4.510374	11.39201
Median	13.05389	1.987851	4.531524	11.39263
Maximum	13.75254	2.603430	4.764735	12.25198
Minimum	11.36718	1.585145	4.197202	10.35930
Std. Dev.	0.583893	0.260708	0.157098	0.536954
Skewness	-0.931968	0.140201	-0.246942	-0.150151
Kurtosis	3.116586	1.955582	2.067043	1.973647
Jarque-Bera	11.91681	3.995568	3.807290	3.907237
Probability	0.002584	0.135636	0.149024	0.141760
Sum	1058.572	165.4913	369.8507	934.1447
Sum Sq. Dev.	27.61544	5.505478	1.999066	23.35390

Table 1 explain descriptive statistics whereby all series for said variables are transformed into log form. Basically all the variables have stable scores in mean, median and kurtosis. In addition, all series transformation into log directly gives elasticities and solves the problem of Heteroscedasticity. Moreover, by looking at Jarque Bera value, it's clearly indicates that there is no autocorrelation problem and the model is fit in this study.

4.2. Unit Root and Stationary test

Test of stationary are employed to indicate unit root in the variable (Gujarati, 2009). The investigation using Augmented Dickey Fuller (ADF) summarized in Table 2 shows that there are no variables having unit root; However when the first difference condition of all variables are conducted using the same ADF test by comparing the level and the McKinnon value using 1%, 5% and 10% alpha, those variables fulfil the requirement of stationarity since the absolute number in level (ADF) are greater than McKinnon Value (Table 3)

Table 2: Unit Root Test (At Level)

Variable	ADF Test Statistic	McKinnon Value			Description
		1%	5%	10%	
LnBC	-1.089280	-4.081666	-3.469235	-3.161518	Not Stationary
LnLR	-2.987647	-4.076860	-3.466966	-3.466966	Not Stationary
LnCPI	-2.415819	-4.075340	-3.466248	-3.466248	Not Stationary
LnGDP	-2.606459	-4.083355	-3.470032	-3.470032	Not Stationary

Source: Authors' own

Table 3: Unit Root Test (First Difference)

Variable	ADF Test Statistic	McKinnon Value			Description
		1%	5%	10%	
LnBC	-8.503649	-4.076860	-3.466966	-3.160198	Stationary
LnLR	-4.895871	-4.076860	-3.466966	-3.160198	Stationary
LnCPI	-7.455612	-4.076860	-3.466966	-3.160198	Stationary
LnGDP	-5.745809	-4.083355	-3.470032	-3.161982	Stationary

Source: Authors' own

4.3. Lag Optimum Test

This test will explain if the lag used is too small in the unit root rest, then the residual from the regression process will not perform the white noise process and as a result the model will be unable to predict the actual error precisely. Therefore,

standard error will not be estimated properly. But if there is too much lag, it will reduce the willingness to reject null hypothesis (Ho) due to more parameters being included; it will reduce the degree of freedom. This is a very important process since in simultaneous equations a variable is affected by the lag of its variable and by lag of other variables (Abduh et all, 2011). Referring to the Table 4, the authors refer to AIC where the number of optimum lag is 3.

Table 4: Optimum Lag Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	252.3225	NA	1.56e-08	-6.621933	-6.498334	-6.572581
1	736.1774	903.1959	5.97e-14	-19.09807	-18.48007*	-18.85131
2	765.5152	51.63439	4.20e-14	-19.45374	-18.34134	-19.00957
3	794.6136	48.10942	2.99e-14*	-19.80303*	-18.19624	-19.16146*
4	803.5855	13.87651	3.67e-14	-19.61561	-17.51442	-18.77663
5	824.3063	29.83797*	3.34e-14	-19.74150	-17.14591	-18.70511
6	837.0404	16.97882	3.80e-14	-19.65441	-16.56443	-18.42061
7	854.3455	21.22762	3.92e-14	-19.68921	-16.10483	-18.25801

* indicates lag order selected by the criterion
AIC: Akaike information criterion
SC: Schwarz information criterion

4.4. Cointegration Test

A set of variables will be cointegrated if a linear combination among the variables is stationary even though the variables are not stationary individually. If there exists cointegration, then there will be long run equilibrium among the variables. In this study, by employing the Johansen and Juselius Cointegration test, we compare the value of the trace statistic with the 5% critical value and it was found that there is exist only one cointegration in the long run (Table 5).

Table 5: Johansen – Juselius Cointergration Tests

Hypothesized	Trace	Max-Eigen	Critical Values (5%)	
No. of CE(s)	Statistic	Statistic	Trace	Max-Eigen
r = 0	58.74036**	38.10319**	47.85613	27.58434
r ≤ 1	20.63717	11.37630	29.79707	21.13162
r ≤ 2	9.260868	8.116477	15.49471	14.26460
r ≤ 3	1.144392	1.144392	3.841466	3.841466

Note: **denotes significant at 5% significance levels
Lag Interval: 1 to 3 (Based on Optimal Lag Test)
Source: Authors' Own

4.5. Vector Error Correction Model (VECM)

VECM estimation provides information about the velocity of adjustment on the instability relationship from short term to long term equilibrium. Variables that are not stationary at level will be analysed by testing the unit root at the first difference level. This application of first difference data can eliminate the long term information in the study. For this reason, VECM will be used in order to anticipate a loss of long term information as long as the data are cointegrated. The Vector Error Correction Model for this can be written as follows:

LnBC = f (LnLR, LnCPI, LnGDP) ---------- Equation (4)

where:
LnBC = Natural Log of Bank Credit,
LnLR = Natural Log of Lending Rate (Malaysia Base Lendi
LnCPI = Natural Log of Consumer Price Index
LnGDP = Natural Log of Gross Domestic Product.

From equation (4), the VECM equation model can be written as:

$$\Delta LnBC_{1t} = \mu_1\phi_1(LnBC - \gamma_0 - \gamma_1 LnLR - \gamma_2 LnCPI - \gamma_3 LnGDP)_{t-1} + \sum_{i=1}^{j}\beta_{1,i}\Delta LnBC_{1t-i} + \sum_{i=1}^{j}\beta_{2,i}\Delta LnLR_{1t-i} + \sum_{i=1}^{j}\beta_{3,i}\Delta LnCPI_{1t-i} + \sum_{i=1}^{j}\Delta LnGDP_{1t-i} + \varepsilon_{1t} \quad (5)$$

$$\Delta LnLR_{2t} = \mu_2\phi_2(LnBC - \gamma_0 - \gamma_1 LnLR - \gamma_2 LnCPI - \gamma_3 LnGDP)_{t-1} + \sum_{i=1}^{j}\Delta LnBC_{2t-i} + \sum_{i=1}^{j}\Delta LnLR_{2t-i} + \sum_{i=1}^{j}\Delta LnCPI_{2t-i} + \sum_{i=1}^{j}\Delta LnGDP_{2t-i} + \varepsilon_{2t} \quad (6)$$

$$\Delta LnCPI_{3t} = \mu_3\phi_3(LnBC - \gamma_0 - \gamma_1 LnLR - \gamma_2 LnCPI - \gamma_3 LnGDP)_{t-1} + \sum_{i=1}^{j}\Delta LnBC_{3t-i} + \sum_{i=1}^{j}\Delta LnLR_{3t-i} + \sum_{i=1}^{j}\Delta LnCPI_{3t-i} + \sum_{i=1}^{j}\Delta LnGDP_{3t-i} + \varepsilon_{3t} \quad (7)$$

$$\Delta LnGDP_{4t} = \mu_4\phi_4(LnBC - \gamma_0 - \gamma_1 LnLR - \gamma_2 LnCPI - \gamma_3 LnGDP)_{t-1} + \sum_{i=1}^{j}\Delta LnBC_{4t-i} + \sum_{i=1}^{j}\Delta LnLR_{4t-i} + \sum_{i=1}^{j}\Delta LnCPI_{4t-i} + \sum_{i=1}^{j}\Delta LnGDP_{4t-i} + \varepsilon_{4t} \quad (8)$$

Table 6: Vector Error Correction Model

Variable	Coefficient	T-Statistics
LnLR	-0.736246	-5.92929
LnCPI	-2.987877	-2.49216
LnGDP	-0.313821	-0.89744
C	5.612797	-

(t-table for alpha 5% = 1.67 where the number of observation is 84
Source: Authors' Own

Thus, the final long run VECM equation derived is as follows;
ECT=LnBC-0.736246LnLR-2.987877LnCPI-0.313821LnGDP+5.612797

The equation above shows the sign of all variables in the long run. The negative sign in the Lending Rate (or Interest Rate) shows that any increase in lending rate will cause an increase in bank credit. The interest rate on loans depends positively on real GDP and inflation. If the economy is performing better, it will improve the number of projects becoming more profitable in terms of expected net present value (E – NPV) and, therefore, increase credit demand (Kashyap, Stein and Wilcox, 1993). As mentioned by Melitz and Pardue (1973) only increases in permanent income have a positive influence on loan demand, while the effect due to the transitory part could also be associated with a self – financing effect that reduces the proportion of bank debt (Friedman and Kuttner, 1993). On the other hand, an increase in money market rate raises the opportunity cost of other forms of financing such as bond, notes payable etc, making lending more attractive. This mechanism also boosts loan demand and increases the interest rate on loans (Gambacorta.L, 2004). Therefore, null hypothesis (H1) is accepted in this case as bank credit in Malaysia is determined by lending rate/ interest rate.

Our estimation result shows that Consumer Price Index (CPI) is positively significant to the bank credit. Generally speaking, when the general price level of goods and services increases, people will demand more money because of the decrease in the purchasing power. This will increase the credit activity by the banks. Economists have usually taken the view that an expected rise in price level promotes an increase in expenditure and people will substitute goods for money and spend more thus they will save less (Juster and Watchel, 1972). The findings from this study is consistent with Thiagarajan, Auuapan et al. (2011) who examined the relationship between current inflation and one year lag inflation with bank credit and found a positive relationship between current inflation and bank credit in the long run. We can conclude that null hypothesis (H2) is accepted in this case

as bank credit in Malaysia is determined by consumer price index (CPI).

The positive sign in Gross Domestic Product (GDP) indicates that when the GDP increases, the bank credit will also increase. This is consistent with Koch and McDonald (2003) who suggest that under favourable economic conditions both borrowers and lender are confident about investments and their ability to repay their loans. This encourages banks to relax credit standards and accept more risk. This is consistent with Neely and Wheelock (1997) who used per capita income and suggest that this variable has a strong positive effect on bank credit. Pasiouras and Kosmidou (2007) also found a positive relationship between real GDP and the bank profitability and credit. The findings of Demirguc Kunt and Huizinga (2000) and Bikker and Hu (2002) also suggest that there is a correlation between banks credit and business cycle. In this case the null is (H3) accepted since the bank credit is influence by Gross Domestic Product (GDP).

4.6. Error Correction Model (ECM)

The presence of cointegration indicates that at least one of the variables tests reacted to deviations from the long run relationship. Therefore, we are investigating whether bank credit corrects for disequilibrium. Our dynamic causal link between dependent and independent variables can be formulated as follows:

$$\Delta(LnBC)_t = \eta_0 + \eta_{1i}\sum_{i=0}^{1}\Delta LnLR_{t-i} + \eta_{2i}\sum_{i=0}^{1}\Delta LnCPI_{t-i} + \eta_{3i}\sum_{i=0}^{1}\Delta LnGDP_{t-i} + \eta_{4i}EC_{t-1} + E_t$$

where EC_{t-1} is the bank credit error correction term (lagged residual of statistics regression) and "Δ" stands for first difference.

If the error term is significant, the lagged dependent variables are important in predicting current movement of the bank credit and it also would mean that bank credit adjusts to the previous equilibrium error and that past independent variables have significant explanatory power for current bank credit (Asmy et all, 2010)

Based on Table 6, the estimated coefficient for ECT is 3.26% which is significant at 1% significance level, suggesting that the last period (quarter) disequilibrium in bank credit is corrected in the next quarter by 3.26%. This value implies that any shock that forces bank credit from their long run value will take a long time for bank credit to return to its equilibrium unless there are other shocks that counter the initial one.

Table 6

Error Correction Model of Bank Credit

Error Correction	Parameter Estimate	Standard Error	t-statistics
ECT	-0.155953	0.04244	-3.67503*

Notes: *,**,*** indicates significance at 1%, 5% and 10%.

4.7. Impulse Response Function (IRF)

Impulse Response Function (IRF) portrays how a dependent variable reacts to the shocks that attack other variables. In this section, we will discuss about Bank Credit response against the shocks of Lending rate (Lendr), Consumer Price Index (CPI) and Gross Domestic Product (GDP). From Figure 1 below, we can see that bank credit responds positively to shocks in lending rate. The same result was found to have a significant and positive relationship between real interest rate measured by nominal interest rate on three year treasury notes minus the inflation rate and bank credit. Richard (1999). In addition, a similar result was found by Fofack (2005) for Sub-Sarahan Africa and he also found a positive relationship between real interest rate and bank credit. This suggests that the rising interest rate to the extent that it increases of the cost of deposits to the commercial banks may have contributed to a decrease in the bank profit. On the other hand, Jiménez and Saurina (2006) used interbank interest rate to measure the impact of interest rate on problem loans. They found a significant and positive relationship between loans and interest rate.

The response of bank credit to consumer price index (CPI) is negative whereby its residue responds over time indicating that the relation between CPI and bank credit is negative in the short run and becomes positive in the long run. Generally speaking, we expect that an increase in the general price level will cause the public to borrow money from the banks in order to maintain their living standards. This will encourage the public to involve themselves in more borrowing activities. Since inflation reduces the future value of money, it pays people (both potential borrowers and lenders) to try to forecast inflation over the relevant time period. This forecast is called anticipated inflation (Kessel and Alchian 1962). When banks accurately forecast inflation, the management of the bank can appropriately adjust the interest rate in order to increase their revenues faster than the cost which mitigates the negative impact of inflation. Thiagarajan, Auuapan et al. (2011) examined the relationship between current inflation and one year lag inflation with bank credit and found positive relationship between current inflation and bank credit in the long run. However, some other studies by Aver (2008), Bofondi and Ropele (2011) and (Castro 2012) for the cases of Slovenian, Italian, and GIPSI banking system respectively, did not find any influence of inflation to credit risk.

Figure 1: Impulse Response Function

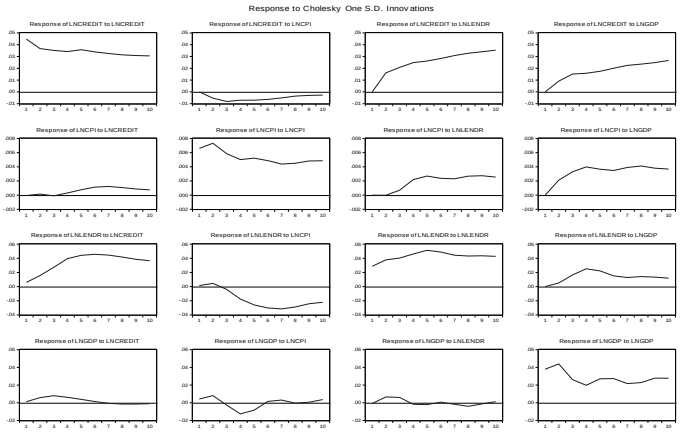


Figure 1 also shows that when there is a shock on Gross Domestic Product, the bank credit in Malaysia will react positively. We can see that bank credit responds positively to shocks in the lending rate. This indicates that the higher the

GDP level, the higher the standard of living and the higher the income level and the ability to repay the loan is higher. This is consistent with the study by Koch and McDonald (2003) which suggest that under good economic conditions both borrowers and lenders are confident about investments and their ability to repay their loans. This encourages banks to relax credit standards and accept more risk.

5.0. Conclusion

The main objective of this paper is to evaluate the macroeconomic determinants of bank credit in Malaysia. Three independent variables have been employed in this study which are Lending Rate, Consumer Price Index and Gross Domestic Product. The analysis was conducted using Vector Error Correction Model (VECM) to analyse the long - run relationship between bank credit and macroeconomic variables. Overall, it can be clearly seen that all these three macroeconomic variables contribute positively towards bank credit activity in Malaysia between 1991 and 2011. It was statistically proven that they have positive long - run relationship with the bank credit. Future research is nevertheless still required in this broad area of bank credit activity in Malaysia by employing more variables to analyze further on this area as it is a vital issue for bankers when it comes to bank lending or borrowing activities. Perhaps, researchers may consider using more sophisticated statistical tools to generate more comprehensive results and analysis.

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