

Deposit Determinants of Commercial Banks in Malaysia

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Abstract

This study investigates the structural determinants of deposits level of commercial banks in Malaysia, using cointegration techniques. The results suggest that determinants such as rates of profit of Islamic bank, rates of interest on deposits, Base Lending Rate, Kuala Lumpur Composite Index, Consumer Price Index, Money Supply and Gross Domestic Product have significant impact on deposits. We also find that in most cases, customers of conventional system behave in conformity with the savings behaviour theories. The process of financial liberalisation has intensified competition between financial institutions, thus forcing commercial banks to compete for deposits in various forms. A wide range of savings issues have been investigated but the studies on saving determinants have attracted the maximum attention. This study does not differentiate the behavioural pattern of different classes of depositors.

1. Introduction

ALTHOUGH BANKERS ARE now focusing more efforts into off-balance-sheet activities, the traditional banking business of supplying funds to the economy is still of importance. For example, most business organizations especially in developing countries are highly dependent on bank loans as a source of capital and the ability of banks in giving loan are depend much on their ability to attract deposits. Prior to the period of substantial deregulation in the 1980s, banking was among the most heavily regulated industry. Now monetary authority no longer strictly imposed

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policies such as the maximum interest rates could be paid on deposits, minimum capital-to-asset ratios, statutory reserve requirements, lending direction, range of products and services offered. The process of financial liberalization has intensified competition between financial institutions, thus forcing commercial banks to compete for deposits in various forms. First, banks are unconstrained in terms of deposit facilities they can offer. Thus, the range of products is much broader than what was previously available. Therefore, customers are free to negotiate any minimum denomination, rates of return and maturity period prior to placing their deposit with a particular financial institution. Second, deposit facilities are now also available at other financial institutions. To remain ahead of its competitors, commercial banks have to be more sensitive on pricing, products offering, and the quality of service they offer to their customers.

Since the role of commercial banks as the most important financial intermediary will persevere, studies in savings management will continue to become a topic of interest for many researchers. In the current literature, a wide range of savings issues have been investigated but studies on saving determinants have attracted the most attention. The objective of this study is to examine the effect of selected economic and financial variables on deposits placed at the commercial banks in Malaysia. Both long-run and short-run relationships between these variables are measured using cointegration techniques. This paper is divided into six sections: section two elaborates the theoretical considerations on customers' saving behavior; section three reviews the selected literature on saving determinants; section four explains the methodology used in analyzing the relationship between variables selected in this study; section five presents the findings; and section six concludes this study.

II. Theoretical Considerations

Commercial banks are dependent on depositor's money as a source of funds. According to the Keynesian theory of demand for money, there are three main motives why people hold money: transactions, precautionary and investment motives. In order to cater for these motives, commercial banks offer three categories of deposit facilities that are demand, savings and time deposits. Demand deposit facility is most commonly referred to as current account and is designed for those who need money for transaction purposes. This motive can be looked at from the point of view of consumers who want income to meet their household expenditure and from the viewpoint of businessmen who require money and want to hold it in order to carry out their business activities. Hence, the purpose of deposit facility is for convenience or for making daily commitments. The second category of deposit is the savings account, which caters the need of those who wishes to save money but at the same time want to earn an income. Depositors of savings account hold money because of precautionary motives while are simultaneously induced by their investment motives. Precautionary motive for holding money refers to the desire of people to hold cash balances for

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However, from the depositor's perspective there are three main theories relating to savings behaviour: the traditional models of the life-cycle hypothesis (Modigliani and Brumberg, 1954) and the permanent-income hypothesis (Friedman, (19570); and the more recent buffer-stock theory of savings behaviour (Deaton, 1991 and Carroll, 1992). The life-cycle model of savings behaviour predicts that consumption in a particular period depends on the expectations about lifetime income which implies that people save in order to smooth consumption over time. Therefore, since income tends to fluctuate systematically over the course of a person's life, saving behaviour is determined by one's stage in the life-cycle. Individuals smooth consumption over their lifetimes and are consequently, net savers during their working years and dissavers during retirement. Hence the cornerstone of the life-cycle hypothesis is age-related consumer heterogeneity and the prediction that savings follow a hump-shaped pattern, which is high at middle age and low at young and old ages.

The permanent-income hypothesis predicts that higher future income reduces current saving. In contrast to the life-cycle hypothesis, which predicts that consumption function depend upon consumer's lifetime income, the permanent-income hypothesis focuses attention on the income of consumer earned in recent past as well as expected future earnings. It also makes a distinction between permanent and temporary income. Temporary income changes are met by consumption smoothing whereby part of today's income windfall is saved to sustain higher spending tomorrow. Permanent income changes, on the other hand, do not justify current saving since more can be consumed now and in the future.

According to the buffer-stock theory of saving, consumers hold assets mainly so that they can shield their consumption against unpredictable fluctuations in income. The buffer-stock behaviour arises because when consumers face important income uncertainty, they are both impatient and prudence. Impatience means that if income were certain, consumers would like to borrow against future income to finance current consumption and prudence in the sense that they have precautionary motive. Carroll (1992) showed that under plausible circumstances this tension would imply the existence of a target wealth stock. Whenever wealth is below the target, fear or prudence will dominate impatience and consumers will try to save. Meanwhile, if wealth is above the target, impatience will have a stronger role and consumers will plan to dissave.

III. Literature Review

Despite extensive literature on savings behaviour, studies on factors that determine the level of deposits at commercial banks have not been

given its due attention. In the past, efforts were made by the researchers to determine private saving behaviour not only for a particular country but also for cross-country comparisons. Lambert and Hoselitz (1963) were among the first researchers who compiled works of others pertaining to savings behaviour. They edited the works of researchers who studied the savings behaviour of households in Ceylon (now Sri Lanka), Hong Kong, Malaya (now Malaysia), Pakistan, India, Philippines and Vietnam. Snyder (1974) did a similar study but reviewed the works of others that involved econometric studies. Browning and Lusardi (1996) also presented an excellent review on micro theories and facts on households saving. A comprehensive list of papers and publications on the savings determinants of a particular country was compiled by Loayza *et al.* (2000b). The works by Loayza *et al.* (2000b) has sparked a renewed interest in this area including studies by Cardanes and Escobar (1998), Rosenzweig (2001), Kiiza and Pederson (2001), Athukorala and Sen (2003), Dadzie, *et al.* (2003), Ozcan, *et al.* (2003), Athukorala and Tsai (2003), Qin (2003) and Hondroyannis (2004).

Cardenas and Escobar (1998) studied the savings behaviour in Colombia and found that higher government expenditure led to the decreasing national savings and saving and investment were perfectly correlated and savings caused growth. This study also indicated that higher taxation; urbanization and age dependency had negative effect on savings. Loayza and Shankar (2000) used cointegration approach in measuring the relationship between savings in India and factors such as real interest rate, per capita income, the dependency ratio, financial development, the government saving rate and the share of agriculture in gross domestic product (GDP). They found that real interest rate, per capita income and the share of agriculture in GDP had a positive relationship with savings, whereas, inverse relationship were found for variables such as financial development, inflation and dependency ratio. Another study which used India as a case study was conducted by Athukorala and Sen (2003) and they found that with the exception of the changes in the external trade, factors such as rate of growth, real interest rate on bank deposits, spread of banking facilities and inflation had significant positive relationship with savings.

Rosenzweig (2001) studied the savings behaviour of household in Thailand and found that the inefficient savings facility had influence the level of saving among farmers and the life-cycle model was not applicable to this group. Kiiza and Pederson (2001) presented evidence to show that factors such as the availability of information, the accessibility of the saving facilities, level of education of the head of the household and the density of financial institution could influence customers to start savings with the financial institution in Uganda. On the other hand, factors including the availability of credit facilities, lower transaction costs and higher permanent income were positively related to savings level. Another study involving a country in Africa was conducted by Dadzie *et al.* (2003). From their studies, Dadzie *et al.* proved empirically that level of income, customer satisfaction,

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service quality and demographic factors such as number of dependents and location were positively correlated with the level of savings. Nonetheless, age and formal education variables were found to be insignificant in explaining the level of personal savings.

The determinant of private savings behaviour in Turkey was investigated by Ozcan et al. (2003) and found that with the exception of government savings; income level, financial depth and measures, inflation all had positive impact on savings. Athukorala and Tsai (2003) used the standard life cycle framework in estimating the impact of population dynamics, growth of disposable income, social security contribution and credit availability and financial reforms on savings. From their findings, they establish that income growth, aging of the population, changes in social security contributions and the availability of credit were significant determinants of saving performance. While interest rate had a significant positive impact, inflation seems to move in an opposite direction. Investigating the savings behaviour of Mainland Chinese, Qin (2003) found that the expected savings potential was the chief determinant of bank deposits. Similarly to their Taiwanese counterparts, interest rate seems to be an important consideration to Mainland Chinese in making deposits. He concluded that precautionary was one of the essential factors that motivated them to save. The most recent literature on savings behavior was a study by Hondroyiannis (2004), who used cointegration approach in estimating the behaviour of Greece households. He provided empirical evidence that in the long run savings function is sensitive to fertility changes, old dependency ratio, real interest rate, liquidity and public finance.

Several studies involving cross-country comparison have also been taken up in years. The works of Doshi (1994), Masson et al. (1998), Loayza et al. (2000a), Agrawal (2001), Anoruo (2001), Sarantis and Stewart (2001), Cohn and Kolluri (2003), Ruza and Montero (2003) are worth reviewing. Based on the life-cycle framework, Doshi (1994) examined the effect of population growth (measured by the age structure and life expectancy period) and productivity growth (measured by the Gross National Product (GDP) level and GDP (growth)) on savings in 129 countries. He clustered these countries into two groups, low-income and high-income countries and further divided the low-income countries into five sub-groups, Asia, Latin America and Caribbean, Sub-Saharan Africa, Middle East and North Europe and North Africa. This study found that life expectancy had positive effect on savings in less-developed countries, whereas inverse relationship was recorded for the high-income countries. While demographic variables have an important effect on the savings ratio in Asia, per capita income in Africa and income growth in Latin America was found to be important.

Masson et al. (1998) examined the determinants of private savings behaviour of industrial and developing countries and found that demographic factors were important in determining the saving rates. Factors such as GDP growth, real interest rate, and changes in the term of trades

were found to be positively related to savings in both groups of countries. However, the magnitude of the relationship was slightly different. In contrast, the level of foreign savings was found to have an inverse relationship with savings in the developing countries.

Loayza et al. (2000a) examined the effects of policy and non-policy variables on savings and reported several interesting findings: (1) private saving rates are highly serially correlated; (2) positive saving rates with the level and growth rate of real per capita income and the influence of income is larger in developing than in developed countries; (3) life cycle hypothesis is supported by the negative relationship between dependency ratio and saving rate; (4) inflation was found to have a positive impact on saving thus supporting the precautionary motive for saving; (5) fiscal policy is a moderately effective tool to raise national saving; and (6) financial liberalization is detrimental to private saving rates because greater credit availability reduces saving rate and similarly larger financial debt and higher real interest rate do not increase saving.

Agrawal (2001) studied the relationship between saving and growth in seven Asian countries (South Korea, Taiwan, Singapore, Malaysia, Thailand, Indonesia and India) and found mixed results. Both high rate of growth of income per capita, and the rapidly declining age dependency ratio contributed to the high rate of saving in these countries. As for the interest rate, a significant positive relationship was found for Malaysia and Thailand and negative for Indonesia. Anoruo (2001) also used ASEAN countries in his saving-investment connection study and established the long run relationship between savings and investment for all countries under consideration.

The savings behaviour in OECD countries was investigated by Sarantis and Stewart (2001). Demographic factors and credit constraints were significant and had the anticipated sign in the overwhelming majority of OECD countries. Greater financial liberalization and integration minimized the liquidity constraints, thus leading to lower savings. One of the interesting findings presented by the authors is that government deficit does not increase savings, which is in contrast to the Ricardian Equivalence. Cohn and Kolluri (2003) also used developed nations in their study. They examined the long run relationship between per capita households saving and the real rate of interest, government savings and social security contributions. Their results indicated that savings reacted positively to interest rate, but negatively to government savings and social security contributions.

IV. Methodology

The vast empirical literature on saving behaviour has listed plenty of variables that determine the level of private saving. Loayza et al. (2000) for example, divided determinant variables of private saving into nine categories and each of these categories has at least of two specific variables. Ozcan et al. (2003) outlined six groups of potential saving determinants,

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namely government policy variables, financial variables, income and growth variables, demographic variables, uncertainty variables and external variables. This study classified variable into two, namely financial and economic variables. Financial variables consist of interest rates on savings account (RScv) and fixed deposit accounts (ARFDcv), rates of profit for Islamic savings account (RS_{IS}), and Islamic investment accounts (ARI_{IS}) (fixed deposit accounts are normally known as investment account at Islamic banks). Whereas, based lending rate (BLR), composite index of Malaysian Bourse (KLCI), consumer price index (CPI), money supply (M3), and gross domestic product (GDP) are economic variables.

Interest rates on savings and fixed deposit facilities of conventional banks and rates of profit for savings and investment account facilities of Islamic banks are considered financial variables in the literature and have always been featured as one of the important considerations in explaining the saving behaviour of individuals. Savings, according to classical economists, is a function of the rate of interest. The higher the rate of interest, the more money will be saved, since at higher interest rates people will be more willing to forgo present consumption. Based on utility maximization, the rate of interest is also at the centre of modern theories of consumer behaviour, given the present value of lifetime resources. However, the results of a change in the rate of return, is theoretically ambiguous because of potential offsetting substitution and income effects. For a net saver an increase in the rate of interest will have an overall effect composed of two partial effects: an income effect leading to an increase in current consumption and a substitution effect leading to a reduction in current consumption. Since net lender (net saver) receives more in investment income than he has to pay to service his debt, high interest rates increases net investment income, thus encouraging present consumption and lessening the need to save in order to finance future consumption. However, if the substitution effect is strong, an increase in rate of return tends to encourage consumers to postpone consumption and increase savings in the present period in order to achieve higher consumption levels later. This variable is used to validate the existence of smoothing consumption theory and life-cycle model where individual will keep their monies during working years for usage during their retirement period. We decided to include rates of profit given by Islamic bank to their depositors because there is no restriction to customers to move their funds from one system to another. Therefore, it is interesting to know whether customers of conventional bank are sensitive to rewards given by Islamic bank.

Base Lending Rate (BLR) is yet to be used by other researchers in saving determinants studies. BLR represents the lowest interest rate charged for bank loans. Changes in the rate will have a direct relationship with the credit availability to customers. Increase in the rate means higher cost of borrowing to customers and also serves as an indicator whether they can easily obtain financing for their needs as well as their capacity to payback

the loans. When people are refrained from extensive borrowings due to high BLR, they are induced to save in anticipation of future consumption needs that cannot be financed through credit. Therefore, BLR is expected to have a positive relationship with savings. This variable also can be used as a proxy for financial liberalization. In most cases, central bank is responsible in determining the BLR of banks in the country. One of the indicators for liberalization is banks are free to choose their rates. Changes in lending rates will reflect this, thus encouraging people to save more.

Composite Index of the Malaysian Bourse or Kuala Lumpur Composite Index (KLCI) is another new variable introduced in this study. This variable represents the future growth in the economy and the confidence level of people toward the economic of the country. Instead of putting their money in the bank accounts, they will buy stocks hoping that they will benefit from higher dividend rates and capital gain. Therefore it is expected that this variables will have an inverse relationship with deposits.

Consumer Price Index (CPI) is used as a proxy for inflation. Inflation may influence saving through several reasons. Theory postulates that greater uncertainty should raise saving since risk-averse consumers set resources aside as a precaution against possible adverse changes in income and other factor. Hence, when inflation raises uncertainty regarding future income growth, risk-adverse consumers may increase their precautionary saving (Sandmo, 1970). Secondly, savings may rise in inflationary environment if consumers mistake an increase in the general price level for an increase in some relative prices and refrain from buying (Deaton, 1977). Inflation could also influence saving through its impact on real wealth. If consumers attempt to maintain target level of wealth or liquid assets relative to income, saving will rise with inflation.

Money supply (M3) is one of the tools used by the government in the conduct of its monetary policy. Hence, any changes in money supply can have a major impact on economic conditions. An increase in money supply makes loanable funds cheaper, thus reducing cost of borrowing for corporate and individual customers. In this case, it is expected that people will increase consumption and reduce savings. Therefore, money supply will have an inverse relationship with deposits.

The growth in the economy is represented by GDP. Most empirical literature have shown that an ambiguous relationship between savings and growth. Similarly, the direction of causality between these variables is still under much debate. The simple permanent — income theory postulates that higher growth reduces current saving because higher anticipated future income. Therefore people are urged to dissave against future earnings. But in the life-cycle model growth has an ambiguous effect on saving, depending on which age cohorts benefit the most from the growth, how steep their earning profile are, and the extent to which borrowing constraints apply.

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Based on the above explanation, we formulated six different models as follows:

$$CR = f(ARIis, ARFDcv, BLR, KLCI, CPI, M3, GDP)$$

$$SA = f(RSis, RScv, BLR, KLCI, CPI, M3, GDP)$$

$$FD = f(ARIis, ARFDcv, BLR, KLCI, CPI, M3, GDP)$$

where, CR Balance in current account of commercial banks
SA Balance in savings account of commercial banks
FD Balance in fixed deposit of commercial banks

The data for this study are taken from the monthly statistical bulletin of Bank Negara Malaysia (www.bnm.gov.my). The study uses monthly data covering the period January 1990 to December 2003. In examining the determinants of conventional banks deposit, the paper employs recent advances in time series econometrics. These techniques are cointegration and error correction framework, which are conducted within the vector autoregression (VAR) framework. The first step of the analysis is to test for the presence of unit roots of the variables in the system using the Augmented Dickey-Fuller (ADF) test. Once the stationary condition is examined, the next step is to conduct a cointegration test. If cointegration is found, a vector error correction model (VECM) is constructed. Hence, impulse response will be performed based on this error correction models. However, 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. In a VAR model, each variable is explained by its own lagged values and the lagged values of all other variables in the system. A vector autoregressive process of order k or VAR(k) for a system of ' m ' variables can be written in the following matrix form:

$$Y_t = \delta + \sum_{j=1}^k A_j Y_{t-j} + u_t \quad (1)$$

The term autoregressive is due to the appearance of the lagged value of the dependent variable and the term vector is due to the fact that we are dealing with a vector of two or more variables. There are no exogenous variables in the models. In a VAR model, several endogenous variables are considered and each endogenous variable is explained by it as lagged and the lagged values of all other endogenous variables in the model. In general, a VAR model expresses current values of the endogenous variables solely as a function of lagged values of all endogenous variables in the system.

4.1 Unit Root Tests

The VAR model requires that all variables in the system to be stationary. Thus, it is necessary to test the stationary of each data series. Under the ADF test, the null hypothesis of a unit root, $H_0 : b_1=0$ (unit root), is tested using the following specification

$$\Delta X_t = b_0 + b_1 X_{t-1} + \sum_{j=1}^p \theta_j \Delta X_{t-j} + \varepsilon_t \quad (2)$$

The original level data and the first-differenced level data are both tested for unit roots. If the test statistics (t-ratio) is greater than the critical values given in Fuller (1976), the null hypothesis is rejected and the data is said to be stationary.

4.2 Cointegration Tests

The concept of cointegration was introduced by Granger (1983, 1986) and further developed by Engle and Granger (1987). Cointegration implies that the series do not drift too much apart and are tied together by some long run equilibrium relationship. When the series are cointegrated, there is no need to difference the variables. Contrary, other techniques require differencing the variables in order to achieve stationarity, which involves a loss of potential information about long-run relationships among the levels of variables. Hence, cointegration analysis is able to capture this relationship, which are otherwise lost when other techniques are used.

A multivariate test for cointegration developed by Johansen (1988) and Johansen and Juselius (1990) is used in this study. The Johansen-Juselius (JJ) procedure of cointegration test is based on the maximum likelihood estimation of the VAR model. The test is carried out through a VAR system such as follows:

$$D_t = \beta_1 D_{t-1} + \beta_2 D_{t-2} + \dots + \beta_k D_{t-k} + \alpha + v_t, \quad t=1, \dots, T \quad (3)$$

where, D_t is a $(n \times 1)$ vector of $I(1)$ variables; β_i are $(n \times n)$ matrices of parameters; α is a $(n \times 1)$ vector of constant; v_t is a vector of normal log distributed error with zero mean and constant variance; and k is the maximum number of lag length processing the white noise.

The trace and maximum eigenvalue statistics are calculated to test for the presence of r cointegrating vectors. The trace statistics (λ_{trace}) tests the null hypothesis that there are at most r cointegrating vectors against the alternative of r or more cointegrating vectors. The λ_{trace} for the null hypothesis of at most r cointegrating vectors is

$$\lambda_{\text{trace}}(r) = -T \sum_{j=r+1}^n \ln(1 - \hat{\lambda}_j) \quad (4)$$

The maximum eigenvalue statistic (λ_{max}) for the null hypothesis of r cointegrating vectors against the alternative of $r+1$ cointegrating vectors is

$$\lambda_{\text{max}}(r, r+1) = -T \ln(1 - \hat{\lambda}_{r+1}) \quad (5)$$

where, $\hat{\lambda}_j$ = the estimated values of the characteristics roots obtained from the π matrix
 T = the number of usable observations

4.3 The VECM

Engle and Granger (1987) showed that cointegration implies, and is implied by, the existence of an error correction term. This means that changes

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in the dependent variable are a function of the level of disequilibrium in the cointegrating relationship (captured by the error correction term) as well as changes in other explanatory variables. Once the variables are found to be cointegrated, a vector correction model (VECM) will be used to investigate the dynamic interactions among them in the system. The Granger representation states that for two cointegrated variables, an ECM can be found in the following form:

$$\Delta Y_t = \beta_0 + \beta_1 \Delta X_t + \beta_2 \varepsilon_{t-1} + v_t \quad (6)$$

where, ε_{t-1} represents the error correction term which captures the adjustment toward the long-run equilibrium and β_2 is the short-run adjustment coefficient.

A principal feature of cointegrated variables is that their time paths are influenced by the extent of any deviation from long-run equilibrium. Hendry and Richard (1983) argued that ECM captures the dynamics of the system whilst incorporating the equilibrium suggested by economic theory. The appeal of the ECM formulation is that it combines flexibility in dynamic specification with desirable long-run properties (Dolado et al., 1990).

4.4 Impulse Response Analyses

For each variable in the system, innovation accounting techniques can be used to ascertain how each variable respond over time to a shock in itself and in another variable. This can be done through impulse response analyses. An impulse response function essentially maps out the dynamic response path of a variable to a change in one of the variable's innovations. This function shows the degree of international transmission among variables as well as the speed and length of time of the interaction between them; and it is obtained from the moving average representation of the original VAR model. Consider the following VAR model

$$X_t = A_0 + \sum_{p=1}^m A_p X_{t-p} + \varepsilon_t \quad (7)$$

In order to examine the interactions between the variables in the system, equation 7 is transformed to a vector moving average representation as equation 8 below,

$$X_t = \mu + \sum_{i=0}^{\infty} C_i \varepsilon_{t-i} \quad (8)$$

The coefficients of C_i can be used to generate the effects of each ε_t shocks on the entire time paths of all variables under investigation. These shocks can take the form of one standard error of each variable. The structure of response of each variable to such a unit shock in another variable can be determined by constructing a moving average representation with disturbance process that is orthogonal contemporaneously. This is done by making the following transformation. Let $\varepsilon_t = F u_t$, where F is a lower

triangular matrix and v_t is an orthogonalised innovations such that $E[\varepsilon_t \varepsilon_t'] = F \Sigma F'$. Then equation 8 becomes:

$$\begin{aligned} X_t &= \mu + \sum_{i=0}^{\infty} C_i F u_{t-i} \\ &= \mu + \sum_{i=0}^{\infty} D_i u_{t-i} \end{aligned} \quad (9)$$

where, $D_i = C_i F$. This represents the Choleski decomposition of the u_t vector. Note that each component in D_i represents the response of a variable to a one standard error shock in another variable in the system after the orthogonalising process, while u_{t-i} contains orthogonalised residuals. Equation 9 above is used to derive the impulse response functions.

V. Findings

This section applies the techniques of cointegration, VECM and impulse response analyses to investigate which factors determine the deposit level of both Islamic and conventional bank as well as the strength and speed of transmission between them.

5.1 Unit Root Tests Results

The VAR model requires that all variables in the system to be stationary. Thus, it is necessary to test the stationarity of each data series. Results of the Augmented Dickey-Fuller unit root tests for all variables are shown in Table I. Overall, the results indicate that the null hypothesis of unit root cannot be rejected for series levels at the 5% significance level. Thus, suggesting that all variables are non-stationary in their level form. However, the first-difference of the series rejects the hypothesis of a unit root which implies that each data series are integrated in the first order, i.e. $I(1)$.

Table I
Results of the ADF Unit Root Tests

Variable	Level	First Difference
<i>lnCR</i>	-1.3526	-4.7911*
<i>lnS</i>	-2.8910	-3.0746*
<i>lnFD</i>	-2.5320	-3.4203*
<i>RSis</i>	-2.5417	-3.4101*
<i>RScv</i>	-2.8387	-3.6637*
<i>ARlis</i>	-2.3396	-4.1340*
<i>ARFDcv</i>	-2.7436	-4.6431*
<i>BLR</i>	-2.7734	-3.1086*
<i>lnKLCI</i>	-2.3694	-3.1614
<i>lnCPI</i>	-0.5429	-4.8654*
<i>lnM3</i>	0.5941	-4.6197*
<i>lnGDP</i>	-1.5439	-4.1373*

Note : * Significant at 5% level.

5.2 Cointegration Test Results

In order to test for cointegration, we use Johansen maximum likelihood approach employing both maximum eigenvalue and trace statistics. Table

II presents the results of the maximum eigenvalue test for current deposits and conventional bank deposits cointegrating vector. The results are identified. Whilst the conventional bank deposits are not cointegrated, the relationship between the two implies that all of the long-run, even if so.

Hypothesis	5%
Null Alternative	
Test Statistics: Max I	
$R=0$	$r=1$
≤ 1	$r=2$
≤ 2	$r=3$
≤ 3	$r=4$
Test Statistics: Trace	
$R=0$	$r \geq 1$
≤ 1	$r \geq 2$
≤ 2	$r \geq 3$
≤ 3	$r \geq 4$

Note: * Rejection of

The present study in practice, a single cointegrating vector is identified. Lai (1993) was used to correct the scale where T is the sample size and n is the lag length in VAR. The critical values are

Hypothesis	
Null Alternative	C
Test Statistics: Max I	
$r=0$	$r=1$
≤ 1	$r=2$
≤ 2	$r=3$
Test Statistics: Trace	
$r=0$	$r \geq 1$
≤ 1	$r \geq 2$

Note : * Rejection of

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ests

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-4.7911*
-3.0746*
-3.4203*
-3.4101*
-3.6637*
-4.1340*
-4.6431*
-3.1086*
-3.1614
-4.8654*
-4.6197*
-4.1373*

n maximum likelihood
nd trace statistics. Table

II presents the results of the cointegration test. Based on the results from the maximum eigenvalue and trace statistics tests, three cointegration vectors for current deposit of conventional bank were identified. Whilst two cointegrating vectors for current deposits of conventional bank were identified. Whilst two cointegrating vectors for savings deposits of conventional bank and fixed deposits of conventional bank were documented. The results suggest the presence of a strong long-run relationship between the dependent variables and their determinants. This implies that all of the series in the deposit functions move together in the long-run, even if some move at different speed than others in the short-run.

Table II
Results of the Cointegration Test

Hypothesis	5% Critical Value	Dependent Variable		
Alternative		<i>ln</i> CR	<i>ln</i> S	<i>ln</i> FD
Statistics: Max Eigenvalue				
r=1	54.1700	107.2477*	76.8568*	108.2992*
r=2	48.5700	85.9851*	69.6849*	88.3268*
r=3	42.6700	53.2425*	38.9418	37.4704
r=4	37.0700	28.5615	23.5043	34.5373
Statistics: Trace				
r≥1	174.8800	329.3439*	255.1026*	312.3808*
r≥2	140.0200	222.0963*	178.2459*	204.0816*
r≥3	109.1800	136.1112*	108.5609	115.7548
r>4	82.2300	82.8687	69.6191	78.2844

Note: * Rejection of the null at 5% significance level

The present study finds multiple cointegrating vectors. In common practice, a single cointegrating equation is preferred from a case of multiple cointegrating vectors. Hence a scaling factor as proposed by Cheung and Lai (1993) was used to adjust the critical values to make finite-sample corrections. The scaling factor used to adjust the critical values is $T/(T-nk)$, where T is the sample size, n is the number of variables in the model and k is the lag length in VAR. The results of the cointegration test with the adjusted critical values are reported in Table III.

Table III
Results of the Cointegration Test with Adjusted Critical Value

Hypothesis	Adjusted	Dependent Variable		
Null Alternative	Critical Value	LnCR	lnS	lnFD
Statistics: Max Eigenvalue				
r=1	97.5060	107.2477*	76.8568	108.2992*
r=2	87.4260	85.9851	69.6849	88.3268*
r=3	76.8060	53.2425	38.9418	37.4704
Statistics: Trace				
r≥1	314.7840	329.3439*	255.1026*	312.3808*
r≥2	252.036	222.0963	178.2459	204.0816

Note: * Rejection of the null at 5% significance level

From Table III, conflicting results were given by the maximum eigenvalue and trace statistics. Johansen (1991) argued that trace test tends to have more power than the maximum eigenvalue test since it takes into account of all N-r of the smallest eigenvalues. Thus, in conflicting cases, the decision is made based on trace statistics, which established the presence of a single cointegration vector. Having verified the existence of a long run relationship in all six equations, we investigated whether each variable entered statistically significant in the cointegrating vector by way of imposing restrictions and likelihood ratio tests which are asymptotically distributed as a chi-squared distribution with one degree of freedom. The cointegrating vector is normalized on the dependent variables. The LR test statistics, given in parentheses, are used to test the null hypothesis that each coefficient is statistically zero. The results are shown in Table IV.

Table IV
Johansen Cointegration Results

Variable	<i>lnCR</i>	<i>LnS</i>	<i>lnFD</i>
RSis		-0.2624 (0.6752)	
RScv		0.62198* (4.7983)	
ARlis	-0.21028* (9.7600)		0.31117* (30.0112)
ARFDcv	0.55309* (26.617)		-0.56804* (30.3262)
BLR	-0.44814* (37.5817)	0.03149* (11.3047)	0.43378* (21.7800)
<i>lnKLCI</i>	0.018957* (40.1054)	0.24642* (11.6024)	-0.073738* (39.8269)
<i>lnCPI</i>	5.7798* (28.4163)	-4.5342* (8.8715)	-7.1662* (40.4664)
<i>lnM3</i>	0.084248* (26.6959)	3.0690* (11.7284)	-2.9184* (68.8687)
<i>lnGDP</i>	-0.27154* (28.9291)	-0.61120* (8.6201)	-0.089082* (68.7046)

Note: The figure in parentheses represents the LR test statistics

* Significant at the 5% level

Table IV measures the long run relationship between explanatory variables and various deposit facilities. With the exception of profit rates of Islamic saving account, other explanatory variables have significant relationship with all the deposit facilities. We expect that current account not to have any significant relationship with both financial and economic variables since depositors maintain this account for transaction purposes. Contrary to this belief, we found significant relationship for all variables, but not all findings are found to be in the line with the saving theories. For example, rates on fixed deposit, composite index and money supply are expected to have an inverse relationship with current account, but this study finds otherwise. A probable explanation for this is that during

economic boom, however, higher proportion of customers, economy cash is needed for e-

In the case of savings account, we expect that higher rates of interest, surprisingly, variables do not have the expected positive impact on savings. This stems from the depositors' behavior of keeping their money in the bank. Contrary to economic theory, savings account is not operational of a good. Provident Fund (EPF) during inflationary periods, the fund. It is also possible to maintain their current bearing in mind that back in the form of EL cost of borrowing, consumption. However, increased use of consumer credit. In more consumption. one of the countries behavioral pattern of borrowing is low.

With regard to the given by Islamic banking, other variables are expected, fixed deposit with the rates of return movement in the interest rate of conventional behaviour is caused banking system and finding is the inverse amount deposited by a direct effect on the effect. One possible upward trend in fixed. During this period opportunities especially

the maximum eigenvalue trace test tends to have it takes into account of cases, the decision is the presence of a single long run relationship each variable entered by way of imposing asymptotically distributed. The cointegrating LR test statistics, given that each coefficient is

	lnFD
	0.31117*
	(30.0112)
	-0.56804*
	(30.3262)
	0.43378*
	(21.7800)
	-0.07373*
	(39.8269)
	-7.1662*
	(40.4664)
	-2.9184*
	(68.8687)
	-0.089082*
	(68.7046)

between explanatory option of profit rates of tables have significant ct that current account financial and economic transaction purposes. nship for all variables, he saving theories. For and money supply are rent account, but this or this is that during

economic boom, households have high spending power and thus, require a higher proportion of income to be kept for transaction purposes. For business customers, economy growth means more opportunities and therefore, more cash is needed for expansion and new business ventures.

In the case of savings account, customers tend to behave as rational economic agent. We found evidence that higher savings is positively related to rates of interest, thus supporting the substitution effects hypothesis. Surprisingly, variables such as composite index, inflation and money supply do not have the expected sign. The composite index was found to have a positive impact on savings account. One possible reason for this result stems from the depositors behaviour of disposing their shares and keeping their money in the savings account when stock prices are at an upturn. Contrary to economic theory, inflation has a negative relationship with savings account. Such finding is most likely to be attributable to the operational of a good saving mechanism in Malaysia, i.e. the Employees Provident Fund (EPF) Scheme. Consumers are not motivated to save more in inflationary period since part of their income or wealth have been saved in the fund. It is also possible that consumers forgo their savings in an attempt to maintain their current standard of living during high inflationary times bearing in mind that they already have a certain amount of savings to fall back in the form of EPF. Theoretically, increase in money supply reduces the cost of borrowing, thus leads people to borrow more and increase consumption. However, improved access to credit markets such as the increased use of personal credit cards has enhanced accessibility to consumer credit. In light of this, excess money supply does not generate more consumption. Furthermore, Malaysia has always been regarded as one of the countries with high saving rates, thus this finding confirms the behavioural pattern of Malaysians who prefer to save even when cost of borrowing is low.

With regard to the fixed deposit facilities, with the exception of returns given by Islamic bank, interest rate paid on fixed deposit, and inflation other variables are in conformity with the normal saving theories. As expected, fixed deposit of conventional bank has a positive relationship with the rates of return of Islamic bank investment deposits. This is because movement in the rates of return of Islamic bank tends to lag behind that of interest rate of conventional bank. Therefore, we strongly believe that such behaviour is caused by the method of rewarding the depositors in Islamic banking system and not by the rate of returns itself. Another interesting finding is the inverse relationship between fixed deposit rates and the amount deposited by customers. The result suggests that income effect has a direct effect on the level of deposits, and is stronger than the substitution effect. One possible explanation for this occurrence is that in most cases upward trend in fixed deposit rates are made during the booming period. During this period customers are exposed with more investment opportunities especially in various unit trust schemes introduced by the

government that gives out higher reward compared to fixed deposit. As for Muslim customers, for the last five years there have been significant increase in funds deposited with the Pilgrims Fund Board (an institution established by Malaysian Government to assist Muslim in doing their pilgrimage). Finally, fixed deposit is found to have a negative relationship with inflation. Since 70 per cent of fixed deposit account holders are individual customers, the reason for this relationship is similar to those of savings account holders.

5.3 Results of the Error Correction Models

Since all deposit structure of conventional banks and their corresponding explanatory variables exhibit cointegrating (long-run) relationships, VECMs were estimated to model short run dynamics of the system. The size and the statistical significant of the error correction term (ECT) measures the extent to which each dependent variable has the tendency to return to its long-run equilibrium. Results from the VECMs test are shown in Table III. The results reveal that the ECTs are negative and statistically significant for all deposit functions of conventional banks. This implies that all dependent variables have the tendency to adjust to any deviations in the long-run equilibrium.

Table V
Estimation of Error Correction Models

Variable	Current Account ($\Delta \ln CR$)	Savings Account ($\Delta \ln S$)	Fixed Deposit ($\Delta \ln FD$)
$\Delta RS_{is(t-1)}$	—	-0.0087 (-0.5124)	—
$\Delta RS_{cv(t-1)}$	—	-0.0251 (0.7338)	—
$\Delta ARI_{is(t-1)}$	0.01511 (0.48332)	—	-0.04002 (-3.6191)*
$\Delta ARFD_{cv(t-1)}$	0.0266 (0.09505)	—	-0.0201 (-1.9695)***
$\Delta BLR_{(t-1)}$	-0.00434 (-0.1526)	0.0984 (1.300)	0.01704 (1.6554)
$\Delta \ln KLCI_{(t-1)}$	-0.00969 (-0.1980)	0.00866 (0.0342)	0.00145 (0.07797)
$\Delta \ln CPI_{(t-1)}$	2.5867 (1.4409)	0.93344 (1.1114)	-0.31939 (-0.050554)
$\Delta \ln M3_{(t-1)}$	-0.2896 (-0.4763)	0.2779 (0.9613)	-0.32543 (-1.4996)
$\Delta \ln GDP_{(t-1)}$	0.1987 (1.0720)	-0.0748 (-0.8424)	-0.08437 (-1.2486)
ECT _(t-1)	-0.14619 (-4.0435)*	-0.10311 (4.6859)*	-0.02986 (-2.6511)*

Note: * Significant at 1% level.

** Significant at 5% level.

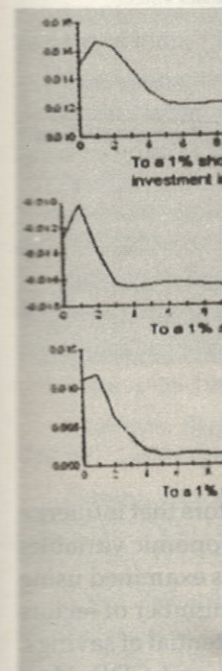
*** Significant at 10% level.

The estimated coefficients of the ECT indicate that the speed of adjustment among the variables is toward long run equilibrium within a year. Current account, savings account and fixed deposit of conventional

banks correct 14.6% per year, respectively. The variable capture statistics reveal that in the short run, the deposit function between the explanatory variables and conventional bank variables react to a 1% shock in the conventional bank variables mainly determined by the response in Islamic bank and bank.

5.4 Impulse Response

Figure 1 and Figure 2 show the response of conventional bank variables to shock in Islamic bank variables. The response of conventional bank variables to shock in Islamic bank variables is standard deviation in week 4. Except for the other variables, the response is negative and negatively to



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banks correct 14.6%, 10.3% and 3% of the system disequilibrium in a single year, respectively. The estimated coefficients of the lagged first different variable capture short run effects (Engle and Granger, 1987). The results reveal that in the short-run, all of the determinants show different effects on the deposit functions. Although we could not find any short-run relationship between the explanatory variables with the current and saving account of conventional bank, they are related in the long-run in that both dependent variables react to any disturbances to the relationships. For fixed deposit of the conventional bank, short-run variations in the dependent variable are mainly determined by the variations in the averages return on investment in Islamic bank and the average return on fixed deposit in the conventional bank.

5.4 Impulse Response Analyses Results

Figure 1 and Figure 3 presents the generalized responses of dependent variables to shocks on their independent variables. As shown in Figure 1, the response of current account of conventional bank to a 1% shock in the standard deviation of its' explanatory variables is small and dampens out in week 4. Except for KLCI, the current account responded immediately to the other variables. It responded positively to ARI_t , KLCI, CPI, M3 and GDP and negatively to $ARFD_{cv}$ and BLR. All responses die out after week 6.

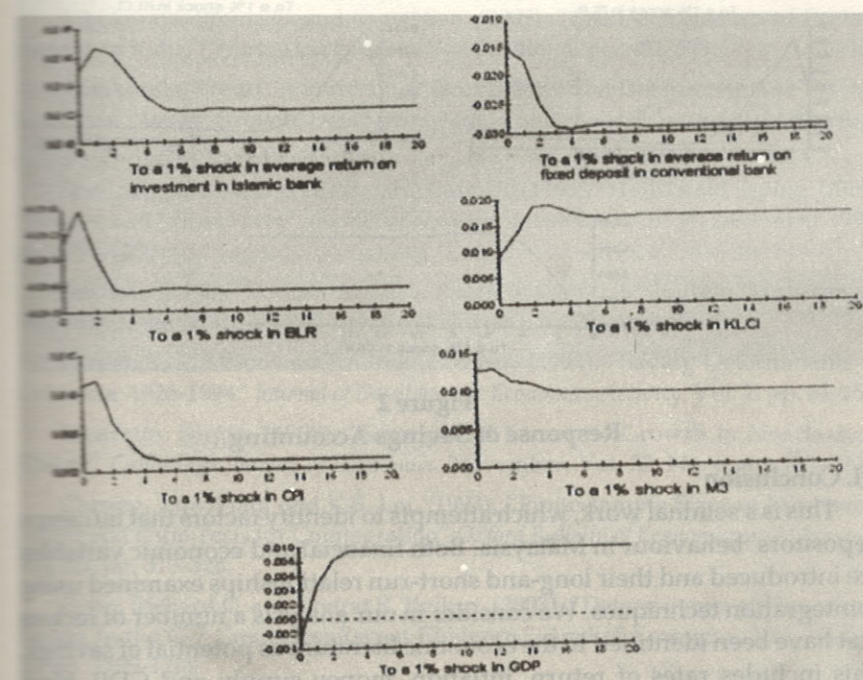


Figure 1
Response of Current Account

Fixed Deposit
($\Delta \ln FD$)

-0.04002
(-3.6191)*
-0.0201
(-1.9695)**
0.01704
(1.6554)
0.00145
(0.07797)
-0.31939
(-0.050554)
-0.32543
(-1.4996)
-0.08437
(-1.2486)
-0.02986
(-2.6511)*

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of conventional

The response of savings account in conventional bank responded positively and immediately to a shock in RS_{is} , KLCI, M3 and CPI. However, when GDP was shocked, it did not respond until after week 1. Savings account in conventional bank responded negatively to a 1% shock in the standard deviation in GDP (refer to Figure 2). The response of savings account in conventional bank dampens in week 4 and dies out in week 6 and 7. In the case of fixed deposit account in conventional bank (Figure 3), it responded positively to BLR, CPI and GDP. However, with respect to $ARPF_{cv}$ it responded positively in week 1 and 2 before turning to a negative respond thereafter. Similarly, the response dies out after week 6. Overall, the results of the impulse response show a small but quick response of each deposits account to shocks.

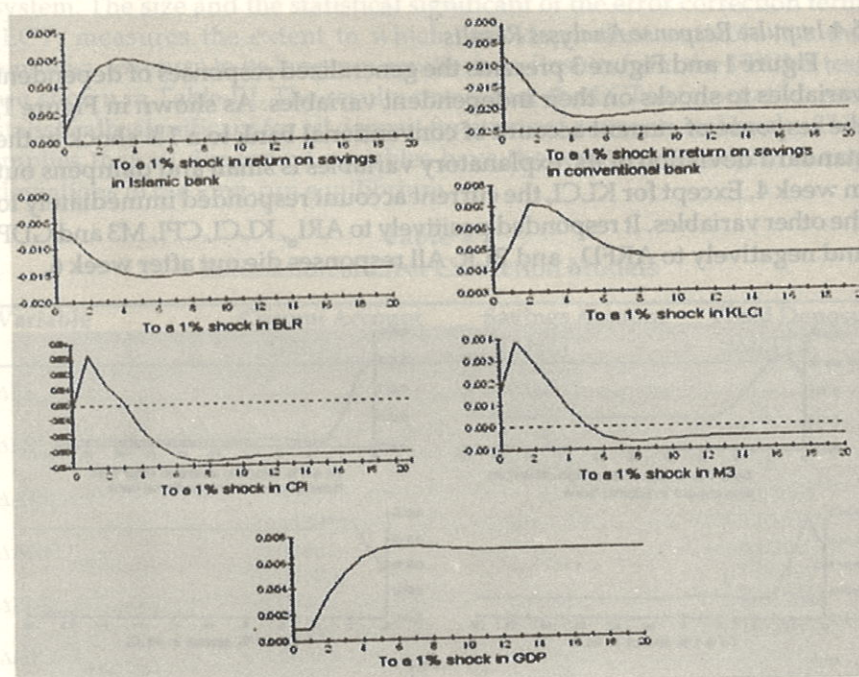
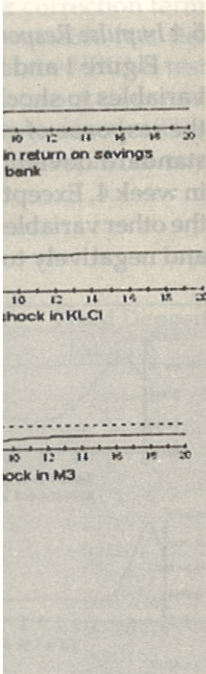


Figure 2
Response of Savings Accounting

VI. Conclusion

This is a seminal work, which attempts to identify factors that influence depositors' behaviour in Malaysia. Both financial and economic variables are introduced and their long-and short-run relationships examined using cointegration techniques. We consider in our analysis a number of factors that have been identified in the economic literature as potential of savings. This includes rates of return, inflation, money supply and GDP. New variables, namely base lending rate and composite index were introduced as a factor believed to have an influence on the level of deposits in Malaysia. In most cases, the behavioural patterns of Malaysian depositors are in

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conformity with the existing saving theories. However, there are also deviations from these theories. For example, both inflation and returns on deposit are supposed to have a positive relationship but this study found otherwise. Similarly, instead of an inverse relationship, both composite index and money supply have positive sign with savings account. For each of the deviation found, an explanation has been put forward. Finally, this study does not differentiate the behavioural pattern of different classes of depositors. It is interesting to examine whether different types of depositors have the same long-run influencing factors. In view of this, we will focus this subject matter in our future research agenda.

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