

# **SOVEREIGN CREDIT RATINGS AND MACROECONOMIC VARIABLES: AN APPLICATION OF BOUNDS TESTING APPROACH TO MALAYSIA**

Mansur Masih, King Fahd University of Petroleum & Minerals, Saudi Arabia

Abd Halim Ahmad, Northern University of Malaysia

Siti Nurazira Mohd Daud, University of Southampton and Islamic Science University of Malaysia

Ainulashikin Marzuki, Islamic Science University of Malaysia

## **ABSTRACT**

*This paper aims to investigate the short- and long- run macroeconomic determinants of sovereign credit ratings in developing countries. Malaysia is used as a case study. This study employed quarterly data from 1991 to 2004. We apply a recently developed time series technique called 'Auto-Regressive Distributed Lag' (ARDL) [Pesaran, Shin, and Smith, Journal of Applied Econometrics, 2001] which has taken care of a major limitation of the conventional cointegrating tests in that they suffer from the pre-test biases. Based on the above rigorous methodology, our evidence tends to suggest that both in the short- and long- run, Debt ratios such as (Debt to GDP, Debt Service to Reserve) and US Treasury Bill rate (3-months) appear to have had a significant impact on Malaysia's sovereign credit ratings. The findings of the study tend to indicate that Malaysia's short- and long-term ability to pay its debt contain information for the prediction of her credit ratings. These findings are plausible and have strong policy implications for developing countries like Malaysia.*

*Keywords: Malaysia, sovereign credit rating, macroeconomic variables, ARDL cointegration.*

*JEL classification codes: C22, E44*

## **1. INTRODUCTION: THE SIGNIFICANCE AND OBJECTIVE OF THE STUDY**

Forces of the globalization and liberalization in world market have almost become a cliché nowadays. Besides that, our economies have now become smaller with little gap or border. Malaysia as an open and free developing country does not deny the importance of capital inflow to generate development of the economy, and therefore, the basic principle of scarcity of resources has been proven. However, there is an alternative or option to resolve the scarcity problem. One of the alternatives is getting the fund from abroad to support the productive activities. Getting capital or resources by borrowing from international market may help a country reduce the problem of scarce resources. In this aspect, sovereign credit rating, rated by rating agencies is very important for bond issuer in order to get adequate fund from the international market. There are several factors that are taken into account by the rating agencies to determine the ratings.

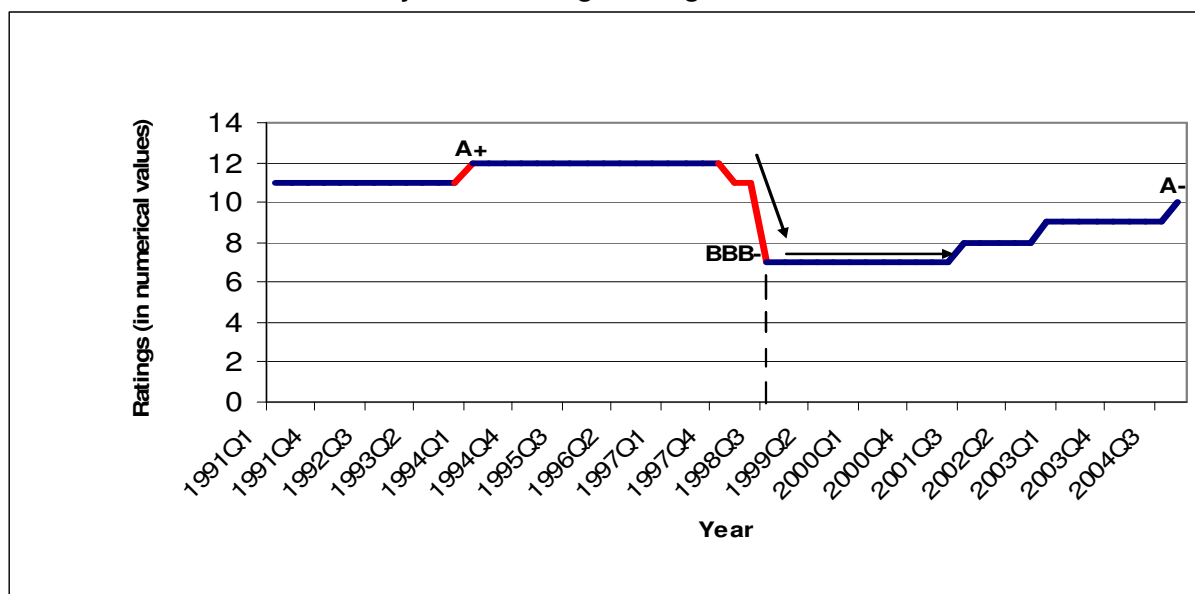
Malaysia has experienced and been rated for several levels of rating based on its economic performance as well as political stability. Between 1994 and 1997, Malaysia has been rated highly on its sovereign bonds supported by bullish economy during the period (Figure 1). However, due to 1997 financial crisis contagion effect from Thailand and Indonesia, a downturn in the Malaysian economy had affected the sovereign ratings as Malaysia was rated BBB- in Q3 1998 which was the worst and lowest rate in the country's history. Recovery policies implemented by the government later were successful and resulted in the upgrading of the ratings to A-. Malaysia's strong and improving economic fundamentals had led to several sovereign-rating upgrades in 2004. During the year, Malaysia's sovereign ratings were further upgraded by several credit rating agencies. In January 2004, Rating and Investment Information Inc. upgraded Malaysia's long-term foreign currency rating to A- from BBB+. Later, in May 2004, Standard & Poor's reaffirmed Malaysia's long-term foreign currency sovereign credit rating at A-. Fitch International assigned a positive outlook to Malaysia's rating to A-, from BBB+ with a stable outlook on 8 November 2004. After assigning the outlook for Malaysia's sovereign ratings to positive from a stable outlook in Feb 2004, Moody's Investor Service upgraded the rating further to A3, from Baa1 in Dec 2004 (Central Bank of Malaysia Annual Report, 2004).

Credit rating is a published ranking of one's financial history, specifically as it refers to one's ability to meet debt obligations. The highest rating is usually AAA, and the lowest is D. Normally the lender uses this information to decide whether or not to approve a loan. Specifically, credit ratings provide an evaluation of credit risk. Ratings are based on information supplied by 'issuer' or agent and information from reliable resources. Ratings are designed exclusively for the purpose of grading bonds according to their credit risk. It does not take into consideration factors such as the direction of future market price or the risk parameter of the investor.

Normally, two types of rating are produced by credit ratings agency. They are issuer ratings or sovereign ratings, and debt ratings. Issuer or sovereign ratings indicate the capacity of the government to fulfill its debt obligation in full and on time. On the other hand, debt rating indicates the specific credit standing of individual debt instruments.

In this study, we will focus on the sovereign ratings for Malaysia. The sovereign debt rating business continues to be dominated by three credit rating agencies worldwide; Standard & Poor, Moody's and Fitch Inc. The agencies will be given a contract by national authorities that wish to float bond issues internationally and sometimes it could be a pre-requisite for issuing sovereign bond.

**FIGURE 1: Performance of Malaysia's Sovereign Ratings**



This paper tries to investigate the long- and short-run determinants of sovereign credit ratings in Malaysia. We employ quarterly data over the period 1991-2004 by using a robust and recently developed Autoregressive Distributed Lag (ARDL) cointegration method which is applicable regardless whether the variables are I(1) or I(0). This paper is organized as follows. Section 2 reviews on the relevant empirical literature. The theoretical specification, data and the ARDL cointegration methodology are explained in section 3. The empirical results and discussions are presented in section 4. The last section ends with the concluding remarks and policy implications of the paper.

## 2. LITERATURE REVIEW

Most of the studies in the past examined the determinants of spread for sovereign debt whereas only a few are focused on the determinants of credit ratings. Since changes in sovereign credit ratings have effects on bond yield spreads and variations in bond yield spreads also have effects on sovereign credit ratings, one could expect the determinants of the ratings to be similar to the determinants of the spread

(see International Monetary Fund, 1999; Larrain, Reisen and Maltzan, 1997; Reisen and Maltzan, 1999; Mora, 2001). Both are also commonly used as measures of country risk or default risk.

Previous studies have provided support for the basic premise that ratings are significantly linked with selected economic fundamentals. However, most of the studies are cross-country analyses and only a few are dedicated to a particular country.

Cantor and Parker (1996) suggested the first quantitative assessment of the determinants of sovereign ratings. They used a linear transformation on the ratings of 35 developed and developing countries for a single year and results were derived with OLS estimations. They concluded that income per capita, GDP growth, inflation rate, external debt relative to exports, economic development and default history explained roughly 90% of sample variation. In addition, a study by Afonso (2002) who also used linear and logistic transformation on the ratings of 81 developed and developing countries leads to the similar findings. It is also highlighted that external debt is basically relevant to developing countries.

Ferri, Liu and Stiglitz (1999) and Chambers (1999) suggested that short-term debt to reserves is a significant variable apart from variables specified in the study of Cantor and Parker (1996) as they found that their results are not robust over time and especially not for the ratings changes during the East Asian crisis.

Edwards (1983, 1985) used random effects components estimation and suggested that the spread was determined by the reserves-to-GNP, debt-to-GDP and debt-service ratios. Min (1998) analyzed the economic determinants of yield spreads of US dollar denominated, fixed income securities of emerging markets issued between 1991 and 1995. The researcher suggested that cross country differences in bonds spreads are determined by the debt-to-GDP, reserves-to-GDP and debt-service-to-exports ratios, as well as by the import-export growth rates, the inflation rate, the net foreign assets, the terms of trade and the real exchange rate. Min (1998) concluded that the developing economies seeking greater access to international bond markets, should aim to improve their macroeconomic fundamentals.

Eichengreen and Moody (1998) analyzed data of almost 1000 developing country bonds issued between 1991 and 1996 while paying special attention to selection bias. They found that the launch spreads depend on the issue size, the credit rating of the issuer, and on the debt-to-GDP and debt-service-to-exports ratios. Their main conclusion is that changes in market sentiment, not obviously related to fundamentals, have moved the market by large amounts over short periods.

Ades, Frederico, Paulo, Masih and Daniel (2000) modeled emerging markets sovereign's fair value spreads as a function of economic variables, analyzing monthly data from 15 emerging market economies from January 1996 until May 2000 using a panel data technique. The data was pooled for all countries in the sample and the authors found a number of variables to have a significant impact on the sovereign spread, such as the GDP growth rate, total external amortizations as a ratio of foreign reserves, the external-debt-to-GDP ratio, the fiscal balance, the exports-to-GDP ratio, the real exchange rate misalignment, international interest rates and the default history of the country.

Rowland and Toress (2004) investigated the determinants of the spreads of 16 emerging market sovereign issuers, using a panel data technique. They concluded that for both the spread and the creditworthiness, significant explanatory variables include the economic growth rate, the debt-to-GDP ratio, the reserves-to-GDP ratio and the debt-to-exports ratio. In addition, the spread is also determined by the exports-to-GDP ratio, and debt service to GDP, while the creditworthiness is influenced by the inflation rate and a default dummy variable.

Among studies done on single-country analysis are Budina and Mantchev (2000), Nogues and Grandes (2001) and Rojas and Jaque (2003). Budina and Mantchev (2000) used a cointegration framework and concluded that, in the long run, gross foreign reserves and exports had a positive effect on bond price, and the real exchange rate and Mexico's nominal exchange rate depreciation had a negative effect. Nogues and Grandes (2001) who used an estimation technique developed by Pesaran, Shin and Smith (2001) concluded that the Mexican crisis, the debt-service-to-export ratio, the GDP growth rate, the fiscal

balance and the 30-year US Treasury yield had significant impact on the spread. Furthermore, using OLS estimation, Rojas and Jaque (2003) found significant impact on the spread of the debt-to-reserves ratio, exports, economic activity and US interest rates. However, there are critics on the validity of the results, as they did not take into account the econometric problems involved in the non-stationarity of the variables used in the study.

### 3. THEORETICAL SPECIFICATION, DATA, AND METHODOLOGY

In general, there are several factors that may influence and have been taken into account by the rating agency to rate a country's sovereign creditworthiness. In their rating criteria, the main rating agencies list numerous economic, political and social factors that underlie their sovereign credit ratings. Based on previous studies, a number of variables as potential determinants have been divided into three major categories namely, solvency, liquidity and external shocks variables. The solvency variables refer to the country's long-term ability to pay its debt. While the ability to pay country's short-term debt deals with the liquidity variables. In this context, countries that can service its long-term debt might also have the possibility to default in its short-term debt. In this study, variables that represent external shocks to the economy are also examined. As an open economy, Malaysia has strong and wide linkages with the rest of the world and therefore it increases its contagion risk. Therefore, international condition might have a significant impact on the Malaysia economy and its credit ratings.

In this empirical study, a linear function model is estimated employing explanatory variables to determine the long-run dynamic linkages.

$$\text{Sovereign ratings} = f(\text{Solvency variables, Liquidity variables, external shocks}) \quad (1)$$

This study employs seven independent variables in order to investigate the relationship with sovereign ratings. External debt to GDP ratio, external debt to export ratio and current account balance as a percentage of GDP represent the solvency variable. Meanwhile, for liquidity variables, short-term debt to reserve ratio, debt service to exports ratio, debt service to reserve ratio has been chosen to determine the potential linkages with sovereign ratings. US Treasury bill rate (3-month) will represent the external shocks 'imported' from the rest of the world.

$$\text{Ratings} = f(\text{Debt / GDP}, \text{Debt / Exports}, \text{CAB / GDP}, \text{STD / Re sv}, \text{UST 3}, \text{Debtserv / Re sv}, \text{Debtserv / Exports}) \quad (2)$$

$$\begin{aligned} \text{LogRatings} = & \alpha_0 + \log(\text{Debt / GDP})_t + \log(\text{Debt / Exports})_t + (\text{CAB / GDP})_t + \\ & \log(\text{STD / Re sv})_t + \log(\text{UST3})_t + \log(\text{Debtserv / Re sv})_t + \\ & \log(\text{Debtserv / Exports})_t + e_t \end{aligned} \quad (3)$$

Data for all the independent variables are taken from various issues of Quarterly Bulletin, produced by Central Bank of Malaysia from 1991Q2 until 2004Q4. Since the observations are on quarterly basis, for maximum order of the lags in the ARDL model, lag order of 4 is chosen. In addition, ratings given by the Standard & Poor and Moody's are transformed into numerical values, which is linear transposition of rating scales. The linear transformation of the ratings is adopted from the study by Cantor and Parker (1996) and Afonso (2002).

#### Methodology:

The methodology adopted in most of the previous studies in order to investigate the relationship between ratings and selected economic fundamentals is cross-sectional. The cross-sectional approach has major shortcomings in testing any relationship. Firstly, they are not appropriate in capturing the dynamics of the variables involved. Secondly, a major assumption of the cross-sectional studies is that the slope parameters are homogeneous or equal across units/countries (Perman and Stern, 2003). This

assumption is not realistic in the context of developing countries with different institutions, structures, and stages of development. Finally, it is difficult to draw any policy conclusions on a particular country on the basis of results of a group of countries. Moreover, in the case of pooled cross section-time series, the data in the time-series dimension are likely to be non-stationary and require estimation methods which will take care of the non-stationary nature of the variables.

In regard to the time-series studies, the regression analysis that has been applied for many decades to estimate the long-run relationship among economic and social variables is now considered to have either estimated a spurious relationship (if the original 'level' form of the variables was non-stationary) or estimated a short-run relationship (if the variables were 'differenced' to make the original variables stationary). The damaging limitation of the traditional regression analysis (i.e., either spurious or not testing theory) has been addressed by the recent and ongoing cointegration time series techniques. The significant contributions made by the time series cointegration techniques starting with the publication of the seminal paper by Engle and Granger (1987) has been recognized through the recent award of the Nobel Prize in Economic Science to Engle and Granger in 2003.

Although the conventional cointegrating procedure has made an important advance on regression analysis by focusing on the point that any regression analysis should start off, not mechanically, but by testing the stationarity and cointegration properties of the time series involved, the cointegrating estimates also are subject to a number of limitations. The estimates derived from the cointegrating tests (such as the Johansen test) and the unit root tests (such as, the augmented Dickey-Fuller and Phillips-Peron, etc. which precede the cointegrating tests), are found to be biased. The tests lack power and are biased in favour of accepting the null hypothesis. The cointegration tests require the variables to be  $I(1)$  but the order of integration of a variable, whether  $I(1)$  or  $I(0)$ , may depend on the number of lags included or whether the intercept and/or the trend are included or excluded in the unit root tests. Moreover, the Johansen cointegrating tests have small sample bias and simultaneity bias among the regressors.

The Auto-Regressive Distributive Lag (ARDL) method (also known as the bounds testing approach) proposed by Pesaran-Shin-Smith (2001) that we have employed is free from the above limitations of the unit root and cointegration tests. The ARDL bounds testing approach does not require the restriction imposed by cointegration technique that the variables are  $I(1)$  or  $I(0)$ . Moreover, the bounds testing procedure employed in this study is robust for small sample size study (Pattichis, 1999; Mah, 2000; and Tang and Nair, 2002). Pattichis (1999) applied ARDL bounds test with 20 observations, whereas studies of Mah (2000) and Tang and Nair (2002) had observations of 18 and 28 respectively. Furthermore, the bounds testing approach is possible even when the explanatory variables are endogenous (Alam and Quazi, 2003).

The ARDL technique involves two stages. At the *first stage*, the existence of a long-run relationship among the variables is investigated. This is done by constructing an unrestricted error correction model (UECM) with each variable in turn as a dependent variable and then testing whether or not the 'lagged levels of the variables' in each of the error correction equations are statistically significant (i.e., whether the null of 'no long run relationship' is accepted or rejected).

Basically, the ARDL method is the Wald test (F-statistic version of the bounds testing approach) for the lagged level variables in the right-hand side of UECM. That is, we test the null hypothesis of non-cointegrating relation ( $H_0: \delta_1 = \delta_2 = \delta_3 = \dots = \delta_8 = 0$ ) by performing a joint significance test on the lagged level variables. The asymptotic distribution of the F- statistic is non-standard under the null hypothesis of no cointegrating relation between the examined variables, irrespective whether the explanatory variables are purely  $I(0)$  or  $I(1)$ .

The test consists of computing an F-statistic testing the joint significance of the 'lagged levels of the variables' in each of the above error-correction form of the equation. The computed F-statistic is then compared to two asymptotic critical values. If the test statistic is above an upper critical value, the null hypothesis of 'no long-run relationship' can be rejected regardless of whether the variables are  $I(0)$  or  $I(1)$ . Alternatively, when the test statistic falls below a lower critical value, the null hypothesis of 'no long-run

relationship' is accepted regardless of whether the variables are I(0) or (1). Finally, if the test statistic falls between these two bounds, the result is inconclusive. It is only in this case that the researcher may have to carry out unit root tests on the variables. As regards the implications of the F-statistics, if all the F-statistics in all equations happen to be insignificant, then that implies the acceptance of the null of 'no long run relationship' among the variables. However, if at least one of the F-statistics in the error-correction equations is significant, then the null of 'no long-run relationship' among the variables is rejected. In that case there is a long run relationship among the variables. When the F-statistic is significant, the corresponding dependent variable is endogenous and when the F-statistic is insignificant, the corresponding dependent variable is exogenous or called 'long-run forcing variable'.

Once the long run relationship has been demonstrated, the *second stage* of the analysis involves the estimation of the long run coefficients (after selecting the optimum order of the variables through AIC or SBC criteria) and then estimate the associated error correction model in order to estimate the adjustment coefficients of the error-correction term. Since the data are quarterly, we choose four for the maximum order of the lags in ARDL model. The error correction version of the ARDL (4, 4, 4, 4, 4, 4, 4, 4) that we have estimated is :

$$\begin{aligned}
 DLRatings = & a_0 + \sum_{i=1}^4 b_i DLRatings_{t-i} + \sum_{i=1}^4 c_i DL(Debt / GDP)_{t-i} + \sum_{i=1}^4 d_i DL(Debt / Exports)_{t-i} + \\
 & \sum_{i=1}^4 e_i D(CAB / GDP)_{t-i} + \sum_{i=1}^4 f_i DL(STD / Re sv)_{t-i} + \sum_{i=1}^4 g_i DL(UST3)_{t-i} + \sum_{i=1}^4 h_i DL(Debt serv / Re sv)_{t-i} + \\
 & \sum_{i=1}^4 i_i DL(Debt serv / Exports)_{t-i} + \delta_1 LRating_{t-1} + \delta_2 L(Debt / GDP)_{t-1} + \delta_3 L(Debt / Exports)_{t-1} + \\
 & \delta_4 (CAB / GDP)_{t-1} + \delta_5 L(STD / Re sv)_{t-1} + \delta_6 L(UST3)_{t-1} + \delta_7 L(Debt serv / Re sv)_{t-1} + \\
 & \delta_8 L(Debt serv / Exports)_{t-1} + u_t
 \end{aligned}$$

The lagged error correction term ( $e_{t-1}$ ) derived from the ECM model is an important element in the dynamics of cointegrated system as it allows for adjustment back to the long-term equilibrium relationship given a deviation in the last quarter. The appropriate lag structure of the ECM is determined by three model selection criteria: Schwarz Bayesian Criteria (SBC), Akaike Information Criteria (AIC), and Adjusted LR Test.

#### 4. EMPIRICAL RESULTS AND DISCUSSIONS

Since the selection of the lag length is important in estimating the ARDL regression, the test runs over 4 lag length of 1, 2, 3 and 4 to determine the optimal lag length. However, lag length determined by SBC and AIC produced contradictory results. SBC suggests lag length of 1, while 4 lag lengths are suggested by AIC. Based on an Adjusted LR Test in **Table 1**, lag length of 1 has been determined. The log likelihood value is 170.99, (Probability = 0.86), thus we cannot reject the null hypothesis of no misspecification at lag length 1. Thus, lag length of 1 is selected to proceed to the next step in this study.

**TABLE 1: Test Statistics and Choice Criteria for Selecting the Order of the VAR Model**

Order	AIC	SBC	Adjusted LR Test
4	270.9389*	15.9379	-
3	228.6250	35.4425	75.0451[.163]
2	205.2775	73.9134	136.7021[.283]
1	220.6977	151.1520*	170.9938[.860]*
0	-64.7981	-72.5254	417.6967[.000]

AIC = Akaike Information Criterion    SBC = Schwarz Bayesian Criterion

**TABLE 2: F-Statistics for Testing the Existence of Long-Run Relationship**

Computed F-Statistic	4.4646*
Critical Values at 5 percent level	Lower; upper 2.365; 3.553

The critical values are taken from Pesaran et al. (2001), unrestricted intercept and no trend with seven regressors. \* denote rejecting the null at 5 percent level. The range of the critical value at 1 percent and 10 percent are 3.027-4.296 and 2.035-3.153 respectively.

**Table 2** shows the calculated F-statistics (4.4646) which is higher than the upper bound critical value 3.553 at the 5% significance level. This implies that the null hypothesis of no cointegrating long-run relationship can be rejected. These results reveal that a long-run relationship exists between the macroeconomic variables and sovereign credit ratings in Malaysia. This by itself is a significant finding in view of the fact that the long run relationship between the variables is demonstrated here avoiding the pre-test biases involved in the unit root tests and cointegration tests required in the standard cointegration procedure. The evidence of long run relationship rules out the possibility of any spurious relationship existing between the variables. In other words, there is a theoretical relationship existing between the variables.

**TABLE 3: Results of Estimated Long-Run Coefficients using the ARDL Approach**

<i>Independent Variable</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>P-Value</i>
DEBT / EXPORTS	0.014393	0.32256	0.965
DEBT / GDP	-0.60558	0.27981	0.036*
CAB / GDP	-0.0076987	0.0048310	0.118
STD / RESV	0.20956	0.10664	0.056
DEBTSERV / RESV	-0.35540	0.17327	0.046*
DEBTSERV / EXPORTS	0.16556	0.22329	0.462
UST3	-0.11695	0.056270	0.044*
Intercept	2.4441	0.55228	0.000*

Note: \* denotes significant at 5 percent level

Next, the ECM's representation for the ARDL model is selected using the Schwarz Bayesian Criterion. **Table 3** provides the estimates of the ARDL long-run coefficient for the model. The estimated long run coefficients of the long run relationship above show that Debt to GDP, Debt Service to Reserve and US Treasury Bill rates (3-months) have significant effects on the credit ratings performance in Malaysia. It appears that Debt to GDP is the strongest mechanism affecting changes in credit ratings performance. The coefficient of Debt to GDP implies that a 1% increase in Debt to GDP ratio downgrades the ratings by 0.61 percent on average, all things being equal. It is followed by the impact of Debt Service to Reserve ratio and US Treasury Bill rates (3-months), which may downgrade the rating by 0.36 percent and 0.12 percent respectively. This finding is in line with the study by Rowland and Tores (2004) which concluded that US Treasury Bill rate is a good indicator to predict sovereign credit rating movement in the emerging countries.

The impact of Debt to GDP (solvency variable), Debt Service to Reserve (liquidity variable) and US Treasury Bill rate (external shocks) is negative and statistically significant to sovereign ratings performance in the long run. The Debt to GDP, which represents the solvency variable, shows that higher debt may increase the risk of default and as a result this may downgrade the sovereign rating. In addition, the liquidity variable, which is represented by Debt Service to Reserve ratio, is found to have a negative impact on Malaysia's sovereign ratings. Moreover, higher ratio of the variable may indicate low liquidity hence it may result in the downgrade of the sovereign rating. US Treasury Bill rate (3-months) which represents the external shock from the rest of the world, resulted in a negative impact to the rating. This shows that any changes to the US Treasury Bill rate may affect the interest rate spread significantly. Consequently, it would have an impact on the level of capital inflows to Malaysia and to a lesser extent, Malaysian economic growth. Indirectly, it may influence the assessment of sovereign rating given by the credit rating agency.

**TABLE 4: Results of Error Correction Models**

<i>Independent Variable</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>P-Value</i>
$\Delta$ DEBT / EXPORTS	0.44190	0.12830	0.001*
$\Delta$ DEBT / GDP	-0.18061	0.10772	0.100
$\Delta$ CAB / GDP	-0.0022960	0.0014863	0.129
$\Delta$ STD / RESV	0.062500	0.045079	0.172
$\Delta$ DEBTSERV / RESV	0.15391	0.072166	0.038*
$\Delta$ DEBTSERV / EXPORTS	-0.17474	0.078446	0.031*
$\Delta$ UST3	-0.034878	0.015616	0.030*
$\Delta$ Intercept	0.72892	0.33917	0.037*
Ecm(-1)	-0.29824	0.094653	0.003*

Note: \* denotes significant at 5 percent level

As stated earlier, cointegration tells us that there is a long run relationship between the variables. However, there could be a short-run deviation from the long-run equilibrium. Cointegration does not unfold the process of short-run adjustment to bring about the long-run equilibrium. For understanding that adjustment process we need to go to the error-correction model (**Table 4**). The 't' ratio or the 'p' value of the error-correction coefficient indicates whether the deviation from equilibrium (represented by the error-correction term) has a significant feedback effect or not on the dependent variable (i.e. credit ratings). In other words, whether the dependent variable is endogenous or exogenous. The error-correction coefficient being significant confirms our earlier findings of a significant long-run cointegrating relationship between the variables. Moreover, the size of the coefficient of the error-correction term indicates the speed of short-run adjustment of the dependent variable to bring about the long-run equilibrium. The size of the coefficient of the error-correction term is also indicative of the intensity of the arbitrage activity to bring about the long-run equilibrium.

The error correction coefficient estimated at -0.2982 (0.003) is highly significant, has the correct sign and implies a moderate speed of adjustment to equilibrium after a shock. Approximately 29.8% of disequilibria from the previous quarter's shock adjusts to the long run equilibrium in the current quarter. Finally, the 't' or 'p' value of the coefficients of the  $\Delta$ (i.e., differenced) variables indicate whether the effects of these variables on the dependent variable (i.e., credit ratings) are significant or not in the short-run. We find that the Debt to Exports, Debt Service to Reserves, Debt Service to Exports and US Treasury Bill rate have significant effects on the sovereign credit ratings performance in the short run. These results are broadly consistent with our earlier long-run results regarding the major role played by the debt ratios as well as the US treasury bill rate in affecting the sovereign credit ratings in the context of the developing countries like Malaysia.

## 5. CONCLUDING REMARKS AND POLICY IMPLICATIONS

Sovereign credit rating which refers to one's ability to meet debt obligations has been used by the investors to decide on buying a bond or approve a loan. Countries with high ratings have easier access to funds for investment activities that can boost the economics growth. This paper investigates the short and long run macroeconomic determinants of sovereign credit ratings. Malaysia is used as a case study. The findings based on ARDL cointegration tend to suggest that the Debt ratios such as (Debt to GDP, Debt Service to Reserve) and US Treasury Bill rate (3-months) have significant effects on the sovereign credit ratings in the long run. The short-run results as evidenced in the error-correction model are also broadly consistent with the long-run cointegration results regarding the major role played by the debt ratios as well as the US treasury bill rate in affecting the sovereign credit ratings in the context of the developing countries like Malaysia.

These findings are based on a recently developed time series technique called 'Auto-Regressive Distributed Lag' (ARDL) [Pesaran, Shin, and Smith, *Journal of Applied Econometrics*, 2001] which has taken care of a major limitation of the conventional cointegrating tests in that they suffer from the pre-test biases involved in the unit roots and cointegration.



From the above findings, two policy implications can be derived. **First**, since the debt ratios appear to be the important indicators on the basis of which the credit rating agencies make their judgments, the policy makers should, therefore, try to get an extensive information regarding the structure of the debt rather than giving importance merely to an overall number of outstanding debts. Higher outstanding debt sometimes does not indicate “unhealthy” condition of the economy; it is sometimes supported by profitable investment activities that the country might gain in the future. Therefore, it is suggested that the information on the structure of the debt should be analyzed in detail, for example by maturity of the debt (i.e. long term or short term debt), by sector (i.e. public, banks, and private) and by instruments (i.e. trade credits, and bonds). This is necessary in order to avoid any possible misinterpretation by the credit rating agency.

**Secondly**, interest rate spread between Malaysia and US should be considered as one of the important elements. A wide spread may affect the country’s savings level as investors may be attracted by the spread. It has been noted in the Keynesian economics theory that in equilibrium savings are equal to investment. Any decline in savings rate may lower the level of investment as well as its contribution to GDP. Therefore, any movement in the US Treasury Bill rate should be cautiously responded to by the central bank of a country such as Malaysia.

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APPENDIX: DATA: *Variable definitions*: DEBT / GDP: External debt to GDP;  
DEBT / EXPORTS: External debt to exports; CAB / GDP: Current account balance as a percentage of GDP; STD / RESV: Short-term debt to reserve; DEBTSERV / EXPORTS: Debt service to exports;  
DEBTSERV / RESV: Debt service to reserve; and UST3: US Treasury bill rate (3-month).

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## AUTHOR PROFILES

**Dr Mansur Masih** got his Ph.D. from Leeds University, UK in 1974. Currently he is the Saudi Aramco Chair Professor of Energy Economics, King Fahd University, Dhahran, Saudi Arabia. He was also the Tun Ismail Ali Distinguished Chair Professor of Finance & Investment, National University of Malaysia in 2004 (June- August) and the Bumiputra Commerce Bank Chair Professor of Finance & Banking, Northern University of Malaysia, 2005-2007 (June –August). So far he has had seventy-three articles in international refereed journals.

**Mr. Abd Halim Ahmad** earned his Master of Science (Finance) from the Northern University of Malaysia in 2003. Currently he is a lecturer in finance at his alma mater, the Northern University of Malaysia. He has some publications in international refereed journals and also received the excellence service award from the Northern University of Malaysia in 2006.

**Mrs. Siti Nurazira Mohd Daud** earned her Master of Economics from the Northern University of Malaysia in 2004. Currently she is pursuing her graduate studies at the University of Southampton, UK in International Economics under sponsorship from the Malaysia Government and Islamic Science University of Malaysia. She published some articles in international refereed journals.

**Mrs. Ainulashikin Marzuki** earned her Master of Business Administration from Universiti Teknologi Mara, Malaysia in 2005. Currently she is a lecturer in finance at Islamic Science University of Malaysia. She published several articles in national and international refereed journals and also actively presented her research in national level conferences.