Faculty of Business and Law

SCHOOL OF ACCOUNTING, ECONOMICS AND FINANCE

School Working Paper - Accounting/Finance Series 2007

SWP 2007/10

FACTORS AFFECTING THE CREDIT SPREADS BEHAVIOUR OF USD MALAYSIAN BONDS

Chee Jin Yap and
Gerard Gannon

FACTORS AFFECTING THE CREDIT SPREADS BEHAVIOUR OF USD MALAYSIAN BONDS

Chee Jin Yap*
Gerard Gannon

School of Accounting Economics and Finance
Deakin University
221 Burwood Highway
Burwood
Victoria 3125
Australia
Telephone: (61) 3 9244 6537
Fax: (61) 3 9242 6283
Email: cheejin@deakin.edu.au
Telephone: (61) 3 9244 6243
Fax: (61) 3 9242 6283
Email: gerard@deakin.edu.au

Abstract

This paper addresses empirical analysis of Malaysian credit spreads in a number of directions. Firstly, the investigation of explanatory power of macroeconomic or market variables to the changes in the spreads. Secondly, use of daily data rather than data sampled to match typical macroeconomic data release. Third, a focused study on the market behaviour of bonds issued from a rapidly emerging market. Fourth, the inclusion of semi-parametric measures to better capture the behaviour of the credit spreads. This study finds that changes in credit spread of Malaysian bonds are only receptive to certain macroeconomic factors. Also changes in credit spreads are negatively correlated with the interest factor but this study could not find convincing evidence to support the argument of a negative relationship with the asset factor.

JEL Classification: G12, G14, G15

Keywords: Credit spreads, Emerging markets, Malaysia

Factors affecting the Credit spreads behaviour of USD Malaysian Bonds

1. INTRODUCTION

The presence of systematic risk in the all risky asset is readily accepted in the finance literature. Established studies in the literature as such Fama and French (1989) found evidence that systematic risk influences default premia of on corporate bonds. Collin-Dufresne, Goldstein and Martin (2001) found credit spread changes are driven by a common latent factor.

Altman (1990) found some evidence of the explanatory power of macroeconomic variables to predict business failures. He believes market expectation tends to lead the actual occurrence of a default. Collin-Dufresne et al (2001) found fundamental factors in the structural approach could not explain all the changes in credit spread. Hence, market variables can be used as factors to forecast defaults. An early study by Pedrosa and Roll (1998) provides the framework and evidence that credit spreads are affected by common economic factors. Recent studies of He, Hu and Lang (2000) and Alam (2003) have come to similar conclusions, that market sentiment plays an influential factor to explain the changes in credit spreads.

The classical studies in international finance such as Eichengreen and Mody (1998) and Cantor and Packer (1996) established the foundation of employing macroeconomic data as explanatory variables in the study of sovereign borrowings. Both studies found macroeconomic variables could explain the majority of the spread changes. The study of Hui and Lo (2002) also found similar evidence which support the argument. Sy (2001) further found, for the case of emerging market issues (EMs), published factor such as credit rating, which relies heavily on economic fundamentals differ significantly from what is observed in the market (sentiments) in times of fast-changing fundamentals, such as during a crisis.

Alam (2003) shows specific local market variables are able to capture more market sentiment than the more general local macroeconomic variables. Different studies have attempted to employ various indices as a better proxy to capture economic and market sentiments. Equity indices (S&P 500, FTSE and Nasdaq) are frequently employed in addition to variables such as the slope of the US yield curve, the price of crude oil, credit spreads of corporate bonds below the rating of BBB, the implied volatility on US Treasuries and VIX.[1]

This paper address empirical analysis of credit spreads in a number of directions. Firstly, the investigation of explanatory power of macroeconomic or market variables to the changes in the spreads. Secondly, use of daily data rather than data sampled to match the calendar of release of macroeconomic data. Third, a focused study on the market behaviour of bonds issued from a rapidly emerging market, Malaysia. Fourth, the inclusion of semi-parametric measures to better capture the behaviour of the credit spreads.

The remainder of this paper is as follows. In section two the statistical properties of Malaysian credit spreads and various market variables is discussed. We also discuss the relationships between credit spreads and market variables. The model specifications and sets of results are presented and discussed in section three. Some key results are highlighted and concluding comments provided in section four.

[1] The ticker for the Chicago Board Option Exchange Volatility Index constructed from the implied volatilities of a range of S&P 500 Index options. It is widely accepted as the market's expectation of the market volatility.

2. PROPERTIES OF MALAYSIAN CREDIT SPREADS AND RELATIONSHIP WITH MARKET VARIABLES

The study by Litterman and Iben (1991) as well as Longstaff and Schwartz (1995) recognised the two different specifications of credit spreads variable: absolute or relative. Relative spreads are adjusted for the differences in spreads attributed by differences in levels of interest rates over time. An absolute spread is the yield difference between the risky bond and the Treasury securities. Credit spread models using relative credit spreads tend to show higher statistical significance over actual credit spread. Batten, Hogan and Jacoby (2005) empirically proved the results of using relative spreads may be spurious due to the way relative spreads are constructed.

Bernstein (2005), on the other hand argued that spreads should be seen as a relative measure of the perception of risk. Extracting absolute spread from Treasury paper relies on the assumption that Treasury paper is riskless. In strict sense, Treasury issues are not entirely risk-free, they still carry risks such as the possibility of reduction of real yield at times of higher inflation or when the government suffers deficits in its fiscal position. The presence of such an environment may provide the narrowing of spreads between risky issues and Treasury issues in equilibrium since the investors may forsake Treasury issues and instead demand corporate issues for higher returns.

If credit spread is measured by absolute spread, the compression of spreads between Treasury-Risky bonds (such as in the situation highlighted above) could be due to the improvement in credit quality of the issuer or due to the risk of perception as a result from the reduction in real return in the risk-free Treasury paper. Some studies argued spread is an idiosyncratic factor to the risk of American corporate bonds (Garcia-Herrero and Ortiz 2005).

Following the evidence put forth by Batten , Hogan and Jacoby (2005), spreads are calculated based on the difference of the sample USD Malaysian bond with a US Treasury bond closest to the maturity of the sample[2].

2.1 Data

Perhaps due to the scarcity of bonds issued by the EMs investors tend to hold these bonds until maturity. Studies in this area have used different databases. For the purpose of this study the Malaysian issued US dollar denominated bonds are selected from Reuters 3000 price services. This database was also used in the studies of Nickell, Perraudin *et al* (2001), Batten, Fetherson and Hoontrakul (2002) and Batten, Hogan and Pynnonen (2003). The sample period is from 28 May 2002 to 24 March 2003 (213 trading days). We overcome the issue of infrequently traded issues by downloading the daily bid yield from Reuters composite database. Bid yield is chosen over submitted ask to better reflect the market demand for the assets. Reuters constructs the yields based on the best submitted yield at close of trading by several panel members of market-makers. This database also captures other information about each issue such as cash flows, ratings, matching benchmark during issue as well as the clearing codes at various exchanges.

Several filter criteria is employed in the sample selection. The first filter consists of several criteria: (i) the bonds have to be a straight bond (no floating or variable rate issues), (ii) does not have puttable, callable, convertible or sinking fund features, (iii) coupon payments are paid semi-annually (iv) repayment of principle is at par on maturity, (v) no other credit enhancement features such as asset-backed or guaranteed by the parent company. The last criterion is to avoid the possibility of bonds having

2 relative spreads is also used and results are available from the authors on request

separate behaviour for those with enhancement and those without that claims. In theory, bonds backed by these enhancements are more secured during default compared to those without. Duffee (1998) cautioned against such inclusion. Recent studies such as Krishnan, Ritchken and Thomson (2005) have argued for the inclusion with the provision that some adjustment should be made to the callable/puttable feature for the credit spread to reflect only the creditworthiness of the issuer.

[INSERT TABLE 1 AROUND HERE]

The whole dataset consists of 6,603 daily observations from a total of 31 series (table 1) with 213 observations starting on 28 May 2002 until 24 March 2003. During this period, there was no rating change on the Malaysia sovereign or the other issuers in the sample. In additional to the sample of Malaysian USD issue, 52 US Treasuries are included bringing the total number of observation points in the sample to 17,679[3]. While these series can be extended in a future date, Duffee (1999) has established that in the modelling of credit spreads, the bonds sample should be at least one year remaining to maturity. Westphalen (2001) further noted, sovereign bonds would normally be held until redemption shortly before maturity. There are three series in the sample that would fall short of one year to maturity if the whole sample is to be extended in a later date[4]. The complete listing of issues are reported in Appendix 1.

[3] Gendreau and Heckman (2003) used yield data from Citigroup Global Markets' Emerging Market and Yankee bond desks, and S&P's Bond Guides. The authors however were indifferent between Eurobonds, Yankee bonds and global bonds. In addition, they do not differentiate between government and government-sponsored enterprises.

[4] There have not been a lot of international papers issued by Malaysian post early 1990s. Euroweek (1999) reported Malaysian sovereign have not accessed the international market for a period of 10 years until May 1999. Euromoney (2000) also reported Telekom Malaysia has not issue any bonds since its USD500mil issues in 1995.

2.2 Descriptive Statistics of Spreads

Table 2 shows the descriptive statistics of the spreads. Mean spread of the issues increase at a decreasing rate as maturity increases. Issues by issuers with more issues outstanding in the market (Malaysian sovereign and Petronas) have lower mean spreads compared to Tenaga and Telekom issues. This finding is consistent with the conclusion in the literature on spreads of emerging countries that within the same credit rating, there is an inverse but strong correlation between spreads and quantity of issues (Eichengreen and Mody 1998).

Overall, the standard deviations of spread increases with longer maturities. Within the issues by same issuer, standard deviations of issues with shorter term to maturity are generally larger than the issues with longer term to maturities. This is perhaps influenced by the more volatile nature in the shorter end of the term structure. The standard deviation seemed to be issuer specific, where those which have more issues on the market, their standard deviation of spreads are on average smaller (in the case of Malaysian Sovereign and Petronas) than issuers which have fewer issues in the market (Telekom and Tenaga).

[INSERT TABLE 2 AROUND HERE]

Pedrosa and Roll (1998) cautioned, ignoring excess kurtosis in credit spread will lead to the underestimation of the probable impact of large negative outcomes. Based on the reported figures, the degree of skewness varies by issuers. Sovereign and Petronas issues are on average, positively skewed, while Tenaga and Telekom issues are skewed on the opposite direction. All the spreads of the sample series have kurtosis larger then zero, in some case rather large.

Studies on country spreads such as Kamin and Kleist (1999) found spreads of emerging markets are non-stationary. Similar results were also found in the study by Pedrosa and Roll (1998) study on the spreads of corporate bonds. Pedrosa and Roll subsequently concluded that stationarity is an important topic but has largely been simplified by many leading credit derivative models as Das Tufano (1996) and Jarrow, Lando and Turnbull (1997). Results from econometric tests are spurious if the series are non-stationary.

[INSERT TABLE 3 AROUND HERE]

Table 3 provide a different perspective to the current literature, that not all credit spreads are non-stationary. For the purpose of this study we take a prudential approach by taking the first difference of credit spreads, this also inline with the recommendation of Pedrosa and Roll (1998) that the first difference of credit spreads can be used with confidence.

The credit spreads have different correlations with different parts of the yield curve (table 4). The spreads are positively correlated with the short term US term structure however the relationship is reversed with 30 day short term Malaysian rates. The correlation of the spreads of Malaysian USD bonds with longer term US Treasury securities is negative. Compared to the longer term the relationship is stronger at the middle section of the term structure.

[INSERT TABLE 4 AROUND HERE]

There is a consistent presence of a long term cointegration relationship between sample bonds of the same issuer or bonds by different issuers but with approximate maturities (table 5). The results also implies, the spreads, are not stationary. Economically, the non-stationarity of the bond spreads between the samples suggests the changes in spreads in the sample are each driven by separate dynamics. Over the longer term the changes between the sample bonds will converge.

[INSERT TABLE 5 AROUND HERE]

Irrespective of the issuer, the Malaysian government or the Government-Linked-Companies (GLCs), the credit spreads consistently have a positive correlation with the changes in the Malaysian equity market index. This suggests portfolio managers may switch their exposure from the bond market to the equity market when the Kuala Lumpur Stock Exchange is in a bull-run. This issue will be further investigated in a later section of this paper in the regression analysis.

Most of the spreads of sample bonds are found to be negatively correlated with macroeconomic factors. The degree of correlations of the issues with the three market variables varies. Changes in the NASDAQ market are found to have the most significant negative relationship with the spreads. The correlation with the changes of oil price in the international market is the only factor where the correlation relationship is consistent and the same across both the domestic and international Malaysian bonds.

2.3 Explanatory Variables

Benchmark Issues

The relationship discovered in the theoretical framework predicted a negative relationship between the risk-free rate and the credit spreads. An increase in the risk-free rate translates to an increase in firm's value, resulting in the reduction of probability of default. Therefore the credit spreads between the risky issue and benchmark narrows.

Empirical studies within the framework of structural models found weak but positive links that an increase in the risk-free rate would lead to a small increase of the credit spread (Landschoot 2003). Both studies of Longstaff and Schwartz (1995, here after LS) and Duffee (1998) have found evidence of negative correlation between the changes in three month Treasury bill rate and changes in credit spread of investment-grade corporate bonds in the US.

From the perspective of Merton's (1974) firm value model, the increase in interest rates only has a partial negative effect on the credit spreads. Since the growth in value of the firm is set to equal the risk-free rate, an increase in the risk-free rate can also be translated as an increase in the value of firm. As a result the increase in firm value should minimise the probability of default or the price of a put option on the debt.

In the case of EMs, under normal circumstances, there should be a positive drift in the value of the country. Molano (2003) examined the spreads of the EMs and found they are sensitive to the monetary policy of the US. It is commonly believed the correlation between US Treasury and yield of EMs would be higher when the US interest rates are on the rise. EMs issuers generally have to raise their compensation to attract potential investors when Treasury rates are high or risk being replaced by Treasury issued instruments given the nature of their risk. In spite of this, when portfolio managers substitute US Treasury issues, more likely than not, they will need to move to longer maturity in order to maintain equivalent return. Empirically, Eichengreen and Mody (1998) and Kamin and Kleist (1999) both found the negative impact of increase of US interest rate on country spreads.

Cross sectional studies which pooled data by credit ratings have generally employed one benchmark issue as proxy to capture all the changes in levels of interest rates.

However the selection of such a benchmark issues is not consistent in the literature. Longstaff and Schwartz (1995) and Christiansen (2002) study on corporate bonds, have employed the 30-year Treasury Bill rate to capture the changes in the levels of the term structure. Whereas, in the Westphalen (2001) study of sovereign issues, the 10 year benchmark rate is used.

Preliminary tests of a cointegration relationship shows, Malaysian bonds are found to have varying degrees of cointegration with US risk-free rate of longer term to maturity[5]. The cointegration with US Treasury issues matching maturity is consistently present and significant. Hence the US Treasury securities closest to the maturity of the sample are used as proxy of levels.

Slope of the curve

Empirical studies found significant evidence that changes in level and the slope can explain 98% of the variations in the term structure, specifically the variations of coupon paying bonds This finding has received much support in other empirical studies (such as Litterman and Scheinkman 1991; Chen and Scott 1993; Ilmanen and Iwanowski 1997).

Duffee (1998) measures the slope as a function of the difference between the yield of 30 year-constant maturity minus the 3 month rate.[6] A positive slope implies an improvement in the activities in the economy (Estrella and Hardouvelis 1991). Antzoulatos (2000) found the 3-month US T-bill rate is a good proxy for the determinant of bond flows to Latin American countries during the 1990s. Das and

---

5 In order to be succinct, these results are not reported but available from authors by request.

6 Duffee's study did not specify the specific rate, the 3 month T-Bill is the commonly used proxy of the short term rate in finance studies (Johannes 2004). In addition these bills are very liquid, hence have narrower bid-ask spread and are free of idiosyncratic effects that could induce non normalities (Duffee 1996a; Fleming and Sarkar 1999).

Tufano (1996) is similar to that of Duffee (1996b), that both short term rates and slope of term structures have negative impact on the credit spreads of the bonds. Morris et al. (1999) finds a positive correlation between the slope and credit spreads changes over the long term horizon. The negative impact is also present in short term horizon where the correlation between credit spreads and changes in interest rates is negative (Duffee 1998).

The study of Athanassakos and Carayannopoulos (2001) on country spreads supports the findings from empirical studies in the corporate bond market, that slope is a good proxy for changes in market expectations in the modelling of rational credit spreads. Earlier studies of country risk by Calvo, Leiderman and Reinhart (1992) and Min et al.(2003) found the proxy is highly significant across countries from different regions.

We calculate the slope as the difference between the yield of current 30 year on-the-run issue minus the 30 day Treasury bill rate. This is to maintain consistency in this study that all US benchmarks selected are current issues being traded in the market.

Asset Factor

Structural models assume asset value of firms are traded and evolves continuously. In practice this is not easily observed. In empirical studies of structural models return of equity is usually used or alternatively the return of the equity index is used as the proxy. Equity analysts would model cost of equity or return of equity for issues from the emerging markets as the average return from the equity market plus an estimated equity risk premium (Godfrey and Espinosa 1996). Shane (1994) provides evidence that besides the returns of bonds of investment grades, the returns of high-yield bonds are also highly correlated with equity indices.

An earlier study of Kwan (1996) found negative correlation between the bond spreads and the stock index. In fact, the Collin-Dufresne et al. (2001) study specifically found credit spread changes are more sensitive to the changes of the equity index than to the firm's own equity return. As far as the relationship of sovereign yield spreads with equity markets, most researchers believe the explanatory power only works one way, that the equity index influences the changes of credit spreads. A number of researchers, (Longstaff and Schwartz 1995; Duffee 1996b; Barnhill, Joutz and Maxwell 2000) have found returns on the market indices are good proxy for the asset factor.

To approximate the asset value for a country value is not an easy task. Debt of a country will after all be definitely less than what the value of assets owned by the country and the nationals (Eaton, Gersovitz and Stiglitz 1986). Wiggers (2002) suggested the use of domestic stock index as a proxy for expected future gains of the economy. For this study, the Kuala Lumpur Stock Index (KLSE) is used. The return of KLSE is lagged one period or the equivalent of a day to allow for the difference in the opening time of the markets in Europe and United States. Similar adjustments to the return of the local equity index were also considered by Batten, Fetherson and Hoontrakul (2002) in their study on USD denominated Thai bonds.

Market Variables

In the case of EMs bonds macroeconomic variables are not merely simple proxies for local economic conditions, rather they also capture the anticipation and sentiment of global investors. Researchers have all modelled macroeconomic variables in differences (such as Altman 1990; McGuire and Schrijvers 2003). For the purpose of this study the following macroeconomic variables will used:

a. FOREX Variables

The ability of government accessing international financial markets allowed corporations of these countries to raise capital. A steep appreciation of the currency in which the debt is denominated (very often the USD) may directly affect the indebtness of the country immediately. In addition, a "double whammy" would be when the fall in the export revenues of the country, as a result of the depreciation of the domestic currency, will further reduce the country's ability to service its debt. Carrard and Folkerts-Landau (1997) listed some of the reasons developing countries issue foreign debt, such as to accumulate foreign exchange reserves, develop benchmark instruments to enable domestic entities to borrow and diversify exposure across various asset markets.

Foreign exchange (FX) risk is the most important factor in the investment decision of foreign currency bonds. An appreciation in the home currency could potentially reduce the forecasted profit. In the case of unhedged bond returns, the predictability is much influenced by the changes in FX rate since the return will be more driven by the exchange rates than the interest rate of the bond behaviour (Ilmanen 1995). It is also due to the comparatively more volatile nature of the FX market than the bond markets. In the case of Malaysia, during the period of this study, the Malaysian Ringgit was pegged to the US Dollar. The only difference in a prudential investment strategy is a foreign exchange swap but with the maximum credit spread as the trigger for an embedded option for the swap. This is also a rare opportunity to investigate the impact of foreign exchange on credit spreads.

Give the strong trade relationship with Japan and the United States, the daily rate of return of the Japanese Yen (YEN/USD) and Great British Pound (USD/GBP) are used as proxy of FX rates.

b. EMBI

Industry widely accepts the definition of JP Morgan's EMBI index as the benchmark for the emerging markets. In the study of Sy (2001) EMBI+ was used for an uncontrolled sample (instead of control for floating coupon, features, collateral) of 17 countries[7]. The study concluded that EMBI is a good proxy to measure the market's appetite for risky bonds from emerging countries. When EMBI was first launched it only considered Brady bonds or other restructured bonds from sovereigns which have defaulted in their obligations[8].

EMBI+ index is launched at a later date and it considers both sovereign and quasi sovereign issues. EMBI covered 11 countries whilst EMBI+ includes bonds from 27 countries. Like all other derivatives of EMBI indices, only bonds with a minimum issue size of USD500 million and a minimum of 2.5 years term to maturity are included to ensure sufficient trading and liquidity. The definition of EMBI+ is comparatively more flexible, an issue by a country may be considered as long as a it is being considered as low or middle income by the World Bank, instead of the minimum credit rating requirement of BBB-/Baa3 by both Standard & Poor's and Moodys as required in EMBI+.

---

[7] instead of control for floating coupon, features or having collateral attached to the bonds

[8] Brady bond was initiated by J. P. Morgan in 1988 but named after the US Treasury Secretary, Nicolas Brady, which helped restructuring of Maxico's sovereign loan default by using long term zero Treasury bonds to guarantee principle and rolling of interest payments. While there has been investments in other part of the world besides Latin America before the Brady bond program, Howell (1998) recognised the program actually reopened international foreign capital to emerging markets.

Eventhough EMBI+ is dominated with 61% weight by issues from Latin America, it is still a good reflection of the proportion of lending to the EM. Asian countries. These countries carry about 10.9% weight in EMBI+. In order to better reflect the market sentiment of the demand of investment opportunities in emerging markets this study will use EMBI+Malaysia.

c. Crude Oil

The production of the Malaysian economy has traditionally heavily relied on the manufacturing industries. An increase in the price of crude oil would lead to higher production costs. Petrol prices are also subsidised by the government as a way to control inflation. Hence an increase in international oil prices would directly impact the country's economy. Current literature in the empirical studies of country risk has conflicting conclusions on the influence of changes in the prices of crude oil. van Deventer and Imai (2003 p.84) found 4 macro economics factors (U.S Treasury, KLSE, US dollar price for oil and FX) are enough to explain about 90% of the credit spread changes of Petronas over a long term equilibrium.

3 MODEL SPECIFICATION

Previous studies have employed low-frequency data, and monthly observations (such as Barnhill, Joutz and Maxwell 2000) This allows the inclusion of country-specific economic variables as regressors but precludes analysis of high-frequency spread movements. The approach of using daily data should lead to more timely and accurate proxies for conditional bond risk. However, in many cases the lack of sufficient data prevented in depth research such as in the case of Ilmanen (1995).

The model of this study builds on the valuation framework of the Longstaff and Schwartz (LS) (1995) model that credit spreads, (ΔCS_t) are driven by two factors: an asset(ΔKLSE) and interest rate factor ($\Delta USshort_t$). In addition, variables identified in the literature of modelling of the term structure of interest rates, where ΔUS_t is employed to capture the change in levels of the yield of US treasury paper with matching maturity and $(\Delta US_t)^2$ is included to capture the curvature of the yield curve. (ΔUSDYEN) and (ΔUSDGBP) are the variables for market sentiments, as both Japan and United Kingdom are the major trading partners of Malaysia. (ΔKLSEvol) is used to capture the changes in trading volume in the KLSE. The extended model is specified in the following testable equation:

$$\Delta CS_t = \alpha_0 + \alpha_1 \Delta US_t + \alpha_2 \Delta (US_t)^2 + \alpha_3 \Delta(slope) + \alpha_4 \Delta USshort_t$$
$$+ \alpha_5 \Delta USDYEN + \alpha_6 \Delta USDGBP$$
$$+ \alpha_7 \Delta KLSE + \alpha_8 \Delta(KLSEvol) + \varepsilon_t \qquad (1)$$

Results for the base equation specified above are available from the authors on request. Further investigation on the credit spreads of the series and residuals from equation (1) reveals some of the series exhibits autocorrelation. This can be interpreted as spreads of the series are constantly influenced by the spreads observed from the previous days. This can also be caused by relatively thin trading in some offers. The ARMA model specifies the dependent variable as a function of past values of the dependent variable in an extended model of equation specified in equation (1):

$$\Delta CS_t = \alpha_0 + \alpha_1 \Delta US_t + \alpha_2 \Delta (US_t)^2 + \alpha_3 \Delta(slope) + \alpha_4 \Delta USshort_t$$
$$+ \alpha_5 \Delta USDYEN + \alpha_6 \Delta USDGBP + \alpha_7 \Delta KLSE$$
$$+ \alpha_8 \Delta(KLSEvol) + \sum_{i=1}^{p} \phi_i \Delta CS_{t-i} + \sum_{j=0}^{q} \lambda_i \varepsilon_{t-j} + \varepsilon_t \qquad (2)$$

Where $ø_i$ are the coefficients of Autoregressive terms (AR) with lag length of p with λ_{t-i} are the coefficients of Moving Average (MA) terms with the lag of q in the error term. The error term ε_t, is assumed to be normally distributed, however, the coefficients of the MA terms are not. Two autoregressive terms, AR(1) and AR(2), are added into the regression in addition to one MA(1) term.

Results from the Mean Regression

In the literature of credit spreads of corporate bonds various authors have used different ends from the US Treasury yield curve as benchmarks. We applied different US Treasuries with approximate maturity dates to the sample bonds. It is found the explanatory power of any US Treasury paper is similar within the approximate maturity. We have also checked the influence from either ends of the term structure on the changes of credit spreads of Malaysia but there was no direct preference. There are 9 cases which support the significance of the long term rates while there 8 cases of significance of the short term rates. When there is the case of significant influence, the long term rate would have positive impact on the changes of the credit spreads, while the short term in the US market is found to have a negative impact on the changes of spreads. These results are available from the authors on request.

[INSERT TABLE 6 AROUND HERE]

Table 6 reports the best fitting specification as developed in equation (2). Test statistics for the fully specified model are also reported. The predictability of this model as measured by adjusted R2 ranges from as low as 2% to about 85%, suggesting a diverse degree of accuracy from the regression model. However this result is comparable to the study of Landschoot (2004) involving European corporate data. While their average adjusted R2 is 22% the overall R2 is still dispersed over a wide range. The study of Collin-Dufresne et al. (2001) on the US corporate bonds also produced a diverse set of results.

The adjusted R^2 reported in table 6 seems to be weaker as the bonds get closer to maturity. The model is best suited to explain the changes of credit spread for issues with around 10 years to maturity. For bonds with longer term to maturity (such as 20 years) the result of the model is weaker. In regards to same bonds but traded at different exchanges, the model is better in explaining changes of credit spreads for bonds traded in the US than for the same bonds but traded in Europe.

The coefficient of asset or the return from equity index (KLSE) is negative as expected however not significant as found in Martell (2003). The inclusion of a volume factor also does not improve the explanatory power of the model. Based on the results, it seems the results show some support for the Calvo's (2003) argument that domestic factors are almost irrelevant in explaining sovereign spreads.

Interest Factor

In accordance with Longstaff and Schwartz (1995), Duffee (1998), and Collin-Dufresne, Goldstein and Martin (2001) changes in levels (Δlog(US)) is consistently negative and significant in explaining the changes in credit spreads. However when the two components that are being used as a measure of slope are included, result suggest significance of slope is directly related to the significance of the short rate.

In the case of the slope factor, in contrast to most studies (such as Duffee 1998; Athanassakos and Carayannopoulos 2001), all the results show a consistent and positive relationship with spreads. The average coefficient is 0.59 which translates for every increase of 1% in US benchmark issue the credit spread would be expected to increase by 60 basis points or translates to increase of 40bp to the expected yield of Malaysian bonds. These positive relationships are not significant and in addition the value of the coefficients is spread across a wide range, from a negative value (-0.5) to as high as 3.6.

The LS model (1995) predicted credit spreads of bonds with short term to maturity are insensitive to interest rates. In contrast the Madan and Unal (2000) theoretical framework supports the Duffee (1998) argument that there is a negative relationship between the interest rates and credit spreads of bonds with short maturity. The results in table 6 show support for the argument of Longstaff and Schwartz (1995a) that credit spreads for bonds with shorter terms to maturity are insensitive to changes in interest rate (such as TEN150604US and PET10703US).

In a fully specified model (in equation 2), dynamics in the short term end of the yield curve seems to have higher explanatory power. The result is consistent with the findings of Calvo et al (1992) that changes in short term US rate has positive effect on the changes of spread of the emerging markets. Coefficients of the 30 day US Treasury bill rates are always positive when the variable is significant. This study perhaps extended the conclusions in studies employing data at lower frequency (such as Calvo et. al.1992) that the effect is true even in the case of daily observations.

Shape of the spread curve

Consistent with the findings of Jones, Mason and Rosenfeld (1984), Sarig and Warga (1989), Fons (1994) and Jarrow, Lando and Turnbull (1997), the term structure of credit spreads is upward sloping. However the results obtained from this study seems to suggest the upward slope only goes up to medium term of around 10 years from maturity. Credit spreads gradually decrease for bonds at the longer terms to maturity.

Longstaff and Schwartz (1995) found a humped-shape spread curve peaked at the third year. From the study on the sample of Malaysian bonds, the term structure of credit spreads followed a similar result. The spread is found to be upward sloping which peaked at around the tenure of 10 year to maturity and after which the increase of spreads start to decrease.

Autoregressive Terms

There is substantial evidence (as measured by p-values) of persistence and significant positive estimates of AR terms and negative estimates of the MA terms. In the regression of changes of credit spreads 9 cases out of 28 Malaysian bonds require AR(1) adjustment. However, the most important in ARMA adjustments is in the MA(1) term with 16 cases followed by AR(2) adjustment (12 cases). In almost all the cases when these terms are significant, the AR(1) terms are found to be positive, the MA(1) are regularly found to be negative, however, the result with AR(2) term is mixed.

The significance shown in coefficients of AR and MA terms imply that the credit spread changes has a semi-parametric behaviour. Using strong linear time series regression approach such as specifying with only an AR(1) term will fail to capture or forecast the dynamics of the credit spreads. The results reported in the table suggest the changes of the credit spread tend to be followed by changes in the same direction the following day. However, the market corrections generally occur on the third day, perhaps when the portfolio managers adjust their original books to original allocation. The coefficients of AR(2) are always found to be lower than the coefficient of AR(1) which implies the effective changes at subsequent days will be less than the initial shock.

These adjustments point to the trading of these securities in the market suggest the violation of market efficiency (similar results are also found in the studies such as Batten 2001; Monzoni 2002). Wagner, Hogan and Batten (2005) acknowledge it is normal in daily or weekly data from bond markets. They further offer an explanation that such occurrences could be a result of low liquidity in bond markets. Such dependence may be spuriously impounded by asynchronous trading due to the illiquidity in the market.

Robustness Check: Modelling with GARCH Specifications

Based on the results of regressions of mean equations, and graphs shown in the sections above, there is some evidence to suggest there is evidence of the series possessing residual serial correlation at long lags. Residuals from the estimated mean equation (from equation 2) as measured with Ljung-Box test statistics on lag 5 and lag 10 still show significant and high level of correlation of the residuals with past values. In this case, the models are mildly mis-specified. In order to overcome this issue, recent studies in this field have introduced Generalised Autoregressive Conditional Heteroscedasticity (GARCH) type modelling (such as Christiansen (2002) with GARCH specification and Monzoni (2002) multivariate EGARCH framework). The inclusion of a GARCH specification for the conditional variance equation into the modelling should sharpen the results and importance of variables tested in the mean regressions. The GARCH specification still requires a correctly specified mean equation. Most series show strong evidence of skewness and leptokurtosis or fat tailed distributions which is evidence of ARCH effects.

Studies which investigated the relationship between the mean equation and the ARCH conditional variance equation (such as Nelson 1990a; Nelson 1990b; Gannon 1996) have shown misspecification of low order of AR effects have no real impact on the ARCH models estimates. After allowing for GARCH effects the parameters and the standard errors of the residuals in the re-estimated equation (1) are expected to be more efficient.

If a model has been properly specified GARCH effects are correctly allowed for in the residuals from the regression models and should exhibit a normal distribution with no serial correlations. The Ljung-Box Q statistics test is again applied on lag 5 and lag 10 to assess if the residuals are still serially correlated or exhibit non-normality. The autocorrelations and partial autocorrelations should not be significantly greater than zero at all lags and the Q-statistics should not be significant.

Results in Appendix A show that when the model was re-estimated with a GARCH (1,1) specification, it is found to add explanatory value to the model. The drop in the significance of the variables as reported in table 6 did not change the conclusion.

The relationship of the explanatory variables with the changes of credit spreads which were found to be significant in table 6 have consistently maintained significance except the lagged return of the asset factor (KLSE (-1)) increases in significance from 7 cases to 10 cases. In the re-estimated specification it is found the number of significant of AR(1) terms has increased to 12 cases. A similar result is also seen in AR(2) and MA(1) terms which have been increased to 13 and 17 cases respectively.

The estimates of the variance equation provide evidence of changing conditional volatility of credit spread changes. The ARCH (1) term is consistently significant across most of the samples (22 out of 28 cases). Such significance in the term implies a time varying risk premium is attached to the Malaysian USD bonds in addition to the ones as factored in the literature. Exactly half of the sample displays a significant GARCH (1) term and most of the coefficients of that term are higher than 0.5 suggesting there is high persistence of variance in the residuals. The high significance of the GARCH coefficients also suggests there is an observable clustering of time varying volatility in pattern of spreads. There are six cases (Appendix A, Alpha+Beta) where the GARCH terms show an explosive conditional variance (Alpha+Beta>1). One likely reason for that to occur is perhaps be due to the small sample size.

The high value in the sum of GARCH estimates suggests presence of persistence of volatility as such the expected future volatility will take longer to decay to the unconditional variance. This implies any shock in the market will have a ripple type effect in the credit spread of the Malaysian bonds. The effect will be present for sometime before the spreads gradually return to equilibrium.

[INSERT TABLE 7 AROUND HERE]

Based on the investigations in this paper, there are two separate cases of comparison. The first is the ARMA specification in equation (2), as the unrestricted model, while the model as specified in equation (1) is the restricted model. Second, when comparing the explanatory power of the GARCH(1,1) model, the unrestricted model would be the GARCH specifications and the model as specified by equation (1) the restricted model. Results of standard error ratios of unrestricted divided by restricted model standard errors are reported in Table 7. The results show that in nearly all cases the standard errors generated by equation (2) and the GARCH model are smaller than the restricted OLS specification. As well, there is no clear dominance of equation (2) against the GARCH model. It follows that inference from these competing unrestricted remains valid. Apart from a small increase in the number of significant terms in the GARCH model over model specified in equation (2) the results are very closely related.

4. CONCLUSIONS

This paper extends the empirical research on the behaviour of credit spreads on the USD denominated Malaysian bonds based on the classical study as established by Longstaff and Schwartz (1995). The results from the model provide evidence that agree with the theoretical framework that the changes in credit spreads are negatively correlated with the interest factor. However, this study could not find convincing evidence to support the argument of a negative relationship with the asset factor as found in other empirical studies in this area (Batten, Hogan and Pynnonen 2003). The possible explanation may due to the restriction on the free trading of the Malaysian Ringgit outside the Malaysian market and the restrictions on the free flow of capital into the Malaysian market which occurred during this period. The restriction on the free flows of capital has prevented the dynamic interactions between the asset factor and the US interest rate benchmark.

As suggested by the study of Collin-Dufresne et al (2001), influence of various macroeconomic factors are included in the empirical tests. This study found the changes in credit spread of Malaysian bonds are only receptive to certain macroeconomic factors. In the case of international Malaysian bonds denominated in USD, changes in Japanese Yen are definitely more influential then the changes in Great Britian Pound.

References

Alam, Tahsin I. (2003). Determinants of Emerging Market Bond Spreads: A Review, Sloan School of Management, Massachusetts Institute of Technology.

Altman, Edward (1990). Corporate Finance Distress. New York, Wiley.

Antzoulatos, Angelos (2000). "On the Determinants and Resilience of Bond Flows to Ldcs, 1990-1995." Journal of International Money and Finance 19(3): 399-418.

Athanassakos, George and Peter Carayannopoulos (2001). "An Empirical Analysis of the Relationship of Bond Yield Spreads and Macro Economic Factors " Applied Financial Economics 11(2): 197-207.

Barnhill, Theodore M., Frederick L. Joutz and William F. Maxwell (2000). "Factors Affecting the Yields on Noninvestment Grade Bond Indices: A Cointergration Analysis." Journal of Empirical Finance **7**: 57-86.

Batten, Jonathan (2001). Expending Long-Term Financing through Bond Market Development: A Post-Crisis Policy Task in Government Bond Market Development in Asia. Yun-Hwan Kim (eds.), Asia Development Bank.

Batten, Jonathan, Thomas Fetherson and Pongsak Hoontrakul (2002). "Modelling the Credit Spreads and Long-Term Relationships of Thai Yankee Bond Issues." Asian Economic Journal **16**(4): 379-397.

Batten, Jonathan, Warren Hogan and Gady Jacoby (2005). "Measuring Credit Spreads: Evidence from Australian Eurobonds." Applied Financial Economics 15: 651-666.

Batten, Jonathan, Warren Hogan and Seppo Pynnonen (2003). "The Time-Varying Behaviour of Credit Spreads on Yen Eurobonds." International Financial Review 4: 383-408.

Bernstein, Peter (2005). "How Well Do We Understand Ratios and Spreads?" Journal of Portfolio Management 31(2): 1.

Calvo, Guillermo (2003). Explaining Suddent Stop, Growth Collapse, and Bop Crisis: The Case of Distortionary Output Taxes. Vol. 50, Special Issue, IMF Staff Papers.

Calvo, Guillermo, Leonardo Leiderman and Carmen Reinhart (1992). Capital Inflows and Real Exchange Rate Appreciation in Latin America. Vol 40, No. 1, IMF Staff Papers.

Cantor, Richard and Frank Packer (1996). "Determinants and Impact of Sovereign Cedit Ratings." FRBNY Economic Policy Review October.

Carrard, Marcel and David Folkerts-Landau (1997). "Sovereign Debt: Managing the Risks." Finance & Development, IMF December.

Chen, Ren-Raw and Louis Scott (1993). "Maximum Likelihood Estimation for a Multifactor Equilibrium Model of the Term Structure of Interest Rates." Journal of Fixed Income 3: 14-31.

Christiansen, Charlotte (2002). "Credit Spreads and the Term Structure of Interest." International Review of Financial Analyst, special issue on credit derivatives 11(3): 279-295.

Collin-Dufresne, Pierre, Robert S. Goldstein and Spencer Martin (2001). "The Determinants of Credit Spread Changes." Journal of Finance 56(6): 2177-2207.

Das, Sanjiv and Peter Tufano (1996). "Pricing Credit Sensitive Debt with Interest Rates, Credit Ratings and Credit Spreads Are Stochastic." Journal of Financial Engineering 5(2): 161-198.

Duffee, Gregory R. (1996a). "Idiosyncratic Variation of Treasury Bill Yields." Journal of Finance 51(2): 527-551.

Duffee, Gregory R. (1996b). Treasury Yields and Corporate Bond Yield Spreads : An Empirical Analysis, Federal Reserve Board. working paper.

Duffee, Gregory R. (1998). "The Relationship between Treasury Yields and Corporate Bond Yield Spreads." Journal of Finance 53(6): 2225-2241.
Eaton, Jonathan, Mark Gersovitz and Joseph Stiglitz (1986). "The Pure Theory of Country Risk." European Economic Review 30(4): 481-513.
Eichengreen, Barry and Ashoka Mody (1998). What Explains Changing Spreads on Emerging-Market Debt: Fundamentals or Market Sentiment?, NBER. Working paper 6408.
Estrella, Arturo and Gikas A. Hardouvelis (1991). "The Term Structure as Predictor of Real Economic Activity." Journal of Finance 46(2): 555-576.
Fama, Eugene and Kenneth French (1989). "Business Conditional and Expected Returns on Stocks and Bonds." Journal of Financial Economics 25(1): 23-49.
Fleming, Michael and Ansar Sarkar (1999). Liquidity in U.S. Treasury Spot and Futures Markets. Working paper, Federal Reserve Bank of New York.
Fons, Jerome S. (1994). "Using Default Rates to Model the Term Structure of Credit Risk." Financial Analyst Journal 50(5): 25-32.
Gannon, Gerard (1996). Unconditional First and Conditional Second Moment Effects: Index Portfolios and Index Futures in Research in Finance: Supplement 2. A. H. Chen and K. C. Chan (eds.), JAI Press, Greenwood: 143-157.
Garcia-Herrero, Alicia and Alvaro Ortiz (2005). The Role of Global Risk Aversion in Explaining Latin American Sovereign Spreads. Documentos de Trabajo No:0505, Banco De Espana.
Godfrey, Stephen and Ramon Espinosa (1996). "A Practical Approach to Calculating Costs of Equity for Investments in Emerging Markets." Journal of Applied Corporate Finance Fall: 80-89.
He, Jia, Wenwui Hu and Larry Lang (2000). Credit Spread Curves and Credit Ratings, Chinese University of Hong Kong.
Howell, Michael J. (1998). Emerging Markets I, in Risk Management and Analysis. Volume 2: New Markets and Products. Carol Alexander (eds.), John Wiley and Sons.
Hui, C. H. and C. F. Lo (2002). "Valuation Model of Defaultable Bond Values." Asia-Pacific Financial Markets 9(1): 45-60.
Ilmanen, Annti and Ray Iwanowski (1997). "Dynamics of the Shape of the Yield Curve." Journal of Fixed Income(September): 47-60.
Ilmanen, Antti (1995). "Time-Varying Expected Returns in International Bond Markets." Journal of Finance 50(2): 481-506.
Jarrow, Robert A., David Lando and Stuart M. Turnbull (1997). "A Markov Model for the Term Structure of Credit Spreads." Review of Financial Studies 10 (2): 481-523.
Johannes, Michael (2004). "The Statistical and Economic Role of Jumps in Continuous-Times Interest Rate Models." Journal of Finance 59(1): 227-259.
Jones, Philip, Scott Mason and Eric Rosenfeld (1984). "Contingent Claims Analysis of Corporate Capital Structures: An Empirical Investigation." Journal of Finance 39(3): 611-625.
Kamin, Steven B. and Karsten von Kleist (1999). "The Evolution and Determinants of Emerging Market Credit Spreads in the 1990s." BIS Working papers 68.
Kwan, Simon (1996). "Firm-Specific Information and the Correlation between Individual Stocks and Bonds." Journal of Financial Economics 40: 63-80.
Landschoot, Astrid Van (2003). The Term Structure of Credit Spreads on Euro Corporate Bonds. Discussion paper 2003-46, Tilburg University.
Landschoot, Astrid Van (2004). Determinants of Euro Term Structure of Credit Spreads. Workking Paper Series No. 397, European Central Bank.
Litterman, Robert and Thomas Iben (1991). "Corporate Bond Valuation and the Term Structure of Credit Spreads." Journal of Portfolio Management 17(3): 52-64.

Litterman, Robert and Jose Scheinkman (1991). "Common Factors Affecting Bond Returns." Journal of Fixed Income 1: 54-61.
Longstaff, Francis A. and Eduardo S. Schwartz (1995). "A Simple Approach to Valuing Risky Fixed and Floating Rate Debt." Journal of Finance 50(3): 789-819.
Madan, Dilip and Haluk Unal (2000). "A Two-Factor Hazard Rate Model for Pricing Risky Debt and the Term Structure of Credit Spreads." Journal of Financial and Quantitative Analysis 35(1): 43-65.
Martell, Rodolfo. (2003). "Understanding Common Factors in Domestic and International Bond Spreads." AFA 2005 Philadelphia Meetings Paper Accessed on 10 July 2005, from http://ssrn.com/abstract=645642.
McGuire, Patrick and Martijn A Schrijvers (2003). "Common Factors in Emerging Market Spreads." BIS Quarterly Review December: 65-78.
Merton, Robert C. (1974). "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates." Journal of Finance 29: 449-470.
Min, Hong-Ghi, Duk-Hee Lee, Changi Nam, Myeong-Cheol Park and Sang-Ho Nam (2003). "Determinants of Emerging Market Bond Spread : Cross-Country Evidence." Global Finance Journal 14(3): 271-286.
Molano, Walter. (2003, October 21, 2003). "The Latin American Adviser." BCP Securities, LLC Accessed on 2 October 2004, from http://www.emta.org/keyper/10-21-03.pdf
Monzoni, Katiuscia (2002). "Model Credit Spreads: An Application to the Sterling Eurobond Market." International Reviw of Financial Analyst 11(2): 183-218.
Morris, Charles, Robert Neal and Doug Rolph (1999). Credit Spreads and Interest Rates, Federal Reserve Bank of Kansas City.
Nelson, Daniel (1990a). "Arch Models as Diffusion Approximations." Journal of Econometrics 45: 7-38.
Nelson, Daniel (1990b). "Conditional Heteroscedasticity in Asset Returns: A New Approach." Econometrica 59(347-370).
Pedrosa, Monica and Richard Roll (1998). "Systematic Risk in Corporate Bond Credit Spreads." Journal of Fixed Income(December): 7-26.
Sarig, Oded and Arthur Warga (1989). "Some Empirical Estimates of the Risk Structure of Interest Rates." Journal of Finance 44(5): 1351-1360.
Shane, Hilary (1994). "Comovement of Low-Grade Debt and Equity Returns of Highly Levered Firms." Journal of Fixed Income 3: 79-89.
Sy, Amadou N. R. (2001). Emerging Market Bond Spreads and Sovereign Credit Ratings: Reconciling Market Views with Economic Fundamentals, IMF Working paper. WP/01/165.
van Deventer, Donald and Kenji Imai (2003). Credit Risk Models and the Basel Accords. Singapore, John Wiley & Sons.
Wagner, Niklas, Warren Hogan and Jonathan Batten (2005). "Interest Rates, Stock Returns and Credit Spreads: Evidence from German Eurobonds." Economic Notes by Banca Monte dei Paschi di Seina SpA 34(1): 35-50.
Westphalen, Michael (2001). The Determinants of Sovereign Bond Credit Spreads Changes. unpublished paper, Universite de Lausanne.
Wiggers, Andreas (2002). Default-Risky Sovereign Debt. Bonn Econ Discussion Paper 36/2002. University of Bonn.

Table 1 - Filter criteria for samples before derive to initial sample size

Filter criteria	Number of bonds
Preliminary search *(with USD as value of issuance, and Malaysia as domiciliates of issuers)*	56
With callable/puttable	12
One issues	3
Not priced	6
Issued less than a year to maturity	3
Total initial sample	31

Table 2– Descriptive Statistics for Spreads between Malaysian Yankee bonds and US Benchmark Bonds

	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	p-value
Malaysia Sovereign								
MAL0609EU	1.452	1.784	1.101	0.150	-0.176	2.340	4.968	(0.083)
MAL0609IS	1.401	1.747	1.055	0.158	-0.357	2.390	7.816	(0.020)
MAL0609US	1.444	1.829	1.129	0.150	0.037	2.685	0.930	(0.628)
MAL0711EU	1.782	2.113	1.520	0.110	0.307	3.121	3.479	(0.176)
MAL0711IS	1.803	2.136	1.520	0.111	0.409	2.952	5.956	(0.051)
MAL0711US	1.774	2.139	1.324	0.111	0.314	4.493	23.274	(0.000)
Petronas Bhd.								
PET10703US	1.003	1.767	0.520	0.267	0.819	3.168	24.038	(0.000)
PET10804EU	0.684	1.881	-0.926	0.833	-0.790	1.990	31.209	(0.000)
PET0805US	1.187	1.657	0.517	0.142	-0.431	5.707	71.620	(0.000)
PET1006US	1.241	1.503	1.033	0.083	0.153	2.784	1.245	(0.537)
PET1006EU	1.237	2.003	0.970	0.125	1.469	9.519	453.800	(0.000)
PET1006IS	1.288	1.789	1.019	0.144	0.635	2.824	14.611	(0.001)
PET0512EU	2.156	2.502	1.895	0.105	0.364	3.597	7.870	(0.020)
PET0512US	2.123	2.478	1.679	0.131	-0.630	5.993	93.566	(0.000)
PET0815EU	1.874	2.214	1.612	0.120	0.505	2.977	9.043	(0.011)
PET1026EU	2.366	3.050	2.107	0.132	1.161	7.059	194.070	(0.000)
PET1026US	2.297	2.652	1.868	0.148	-0.768	4.415	38.703	(0.000)
PCAP0522EU	2.276	2.653	1.126	0.158	-2.103	17.722	2080.652	(0.000)
PCAP0522US	2.249	2.615	1.834	0.144	-0.232	3.650	5.657	(0.059)
Telekom Malaysia								
TEL0805US	1.582	2.019	1.183	0.120	-0.236	4.461	20.927	(0.000)
TEL0825US	2.731	3.085	2.129	0.214	-0.794	4.367	38.951	(0.000)
TM1210EU	1.844	2.305	1.483	0.145	1.021	3.513	39.370	(0.000)
Tenaga National Bhd.								
TEN150604EU	2.187	3.026	1.125	0.442	-0.480	2.509	10.329	(0.006)
TEN150604US	1.610	2.280	0.986	0.227	-0.015	2.448	2.712	(0.258)
TEN0407US	1.926	2.557	1.419	0.242	-0.063	2.510	2.270	(0.321)
TEN0407EU	1.905	2.380	1.428	0.208	-0.662	2.615	16.875	(0.000)
TNB0407US	1.921	2.557	1.513	0.245	-0.079	2.534	2.144	(0.342)
Malaysian Ringgit Treasury								
MAL1206MY	-0.060	0.564	-0.829	0.340	-0.671	2.651	17.045	(0.000)
MAL0307aMY	0.043	0.697	-0.859	0.387	-0.909	2.921	29.384	(0.000)
MAL0307MY	0.073	0.672	-0.858	0.400	-0.976	2.911	33.857	(0.000)
MAL0707MY	0.161	0.805	-0.813	0.424	-0.964	2.802	33.313	(0.000)
MAL1007MY	0.199	0.946	-0.792	0.439	-0.878	2.762	27.876	(0.000)
MAL1207MY	0.211	0.918	-0.750	0.431	-0.845	2.667	26.360	(0.000)

Note: This table present the descriptive statistics of credit spreads of the sample. The spread is estimated by subtracting the USD Malaysian issue with a US Treasury of equivalent maturity.

Table 3 – Augmented Dickey-Fuller and Phillip-Perron tests for Unit Roots of Credit Spreads for Malaysian USD bonds and US Benchmark Bonds

	Levels		First Difference	
	ADF	PP	ADF	PP
Malaysia Sovereign				
MAL0609EU	-1.797	-3.127	-11.951	-26.332
MAL0609IS	-1.380	-2.431	-23.001	-24.949
MAL0609US	-1.795	-2.883	-11.672	-23.369
MAL0711EU	-2.636	-5.606	-15.432	-30.472
MAL0711IS	-2.667	-4.249	-14.360	-24.313
MAL0711US	-3.470	-4.409	-19.523	-20.184
Petronas Bhd.				
PET10703US	-2.932	-3.479	-20.355	-26.678
PET10804EU	-1.834	-1.635	-17.015	-17.128
PET10804IS	-1.836	-1.635	-17.023	-17.136
PET0805US	-4.901	-7.208	-21.515	-29.994
PET1006US	-4.568	-4.515	-16.112	-17.531
PET1006EU	-3.056	-8.235	-12.790	-90.133
PET1006IS	-1.495	-3.245	-12.499	-31.452
PET0512EU	-4.311	-6.771	-12.241	-30.414
PET0512US	-3.993	-3.845	-17.048	-17.660
PET0815EU	-3.094	-3.680	-14.328	-23.391
PET1026EU	-3.178	-4.530	-23.964	-27.605
PET1026US	-3.337	-3.172	-13.120	-16.681
PETCAP0522EU	-4.698	-5.395	-13.998	-43.291
PETCAP0522US	-3.101	-2.925	-16.103	-16.215
Telekom Malaysia				
TEL0805US	-3.015	-5.138	-14.771	-22.145
TEL0825US	-2.933	-2.975	-16.840	-17.033
TM1210EU	-2.053	-4.765	-12.982	-52.133
Tenaga National Bhd.				
TEN150604EU	-0.337	-1.276	-12.415	-38.216
TEN150604US	-2.724	-3.358	-20.366	-21.107
TEN0407US	-2.582	-2.484	-16.686	-16.701
TEN0407EU	-2.356	-3.127	-13.088	-35.212
TNB0407US	-2.224	-2.224	-16.354	-16.358
Malaysian Treasury				
MAL1206MY	-2.264	-2.522	-14.682	-14.752
MAL0307MY	-2.000	-2.256	-14.250	-14.248
MAL0707MY	-1.976	-2.206	-14.304	-14.304
MAL1007MY	-1.839	-2.095	-14.057	-14.053
MAL1207MY	-1.662	-1.898	-14.641	-14.641
MacKinnon (1991) critical values for rejection of hypothesis of a unit root				
1%	-3.462			
5%	-2.875			
10%	-2.574			

This table provides Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test of the bonds. Lags for ADF are set for automatic selection following Schwartz Info Criterion and lags for PP as suggested by the Newey-West. Test for both levels of spreads and first difference include intercept. The highlighted results are series which rejects null hypothesis at 1% confidence level.

Table 4 - Correlation between Spreads on Malaysian Yankee Bonds with Various Sections of Term Structure and Economic Variables

	DMY short	DUS Short	DFED ALL07A1	DFED ALL30	DKLSE	DYENUSD	DNASDAQ	DOIL
Malaysia Sovereign								
S(MAL0609EU)	-0.1111	0.0477	-0.5062	-0.4685	0.1778	0.1256	-0.3471	-0.0171
S(MAL0609IS)	-0.1255	0.0749	-0.3639	-0.3213	0.1639	0.0262	-0.2240	-0.0268
S(MAL0609US)	-0.1213	0.0107	-0.3133	-0.3118	-0.0019	-0.0245	-0.1773	0.0079
S(MAL0711EU)	-0.0940	0.1339	-0.5993	-0.5599	0.1652	-0.0318	-0.3493	-0.0690
S(MAL0711IS)	-0.1541	0.1432	-0.4581	-0.4309	0.0592	-0.0914	-0.2388	-0.0415
S(MAL0711US)	-0.0489	0.0307	-0.0941	-0.0705	-0.0096	-0.1373	0.0442	-0.0871
Petronas Bhd.								
S(PET0703US)	0.1033	0.0124	0.0332	0.0464	0.0369	-0.0860	0.0625	-0.0302
S(PET0804EU)	-0.2919	-0.4458	-0.0057	0.0439	0.0094	-0.0259	-0.1161	-0.1044
S(PET0804IS)	-0.2957	-0.4475	-0.0072	0.0430	0.0112	-0.0274	-0.1203	-0.1059
S(PET0805US)	0.1433	0.0904	-0.0874	-0.0708	0.0518	-0.0014	-0.0283	0.0133
S(PET1006US)	-0.0058	-0.0586	-0.1324	-0.0618	0.0248	-0.0216	-0.0852	-0.0810
S(PET1006EU)	-0.0806	0.1359	-0.4445	-0.3767	0.2685	0.0036	-0.3492	-0.0830
S(PET1006IS)	0.0024	0.2185	-0.4313	-0.3412	0.1699	0.0831	-0.2118	0.0008
S(PET0512EU)	-0.1379	0.0911	-0.5470	-0.5251	0.1721	-0.0139	-0.3021	-0.0535
S(PET0512US)	-0.0828	0.0556	-0.0395	-0.0314	0.0640	-0.0633	0.0657	-0.1018
S(PET0815EU)	-0.1132	0.0487	-0.3228	-0.3429	0.1397	0.0512	-0.2399	-0.0041
S(PET1026EU)	-0.0219	0.0629	-0.0975	-0.1055	0.0213	-0.0634	0.0014	0.0254
S(PET1026US)	-0.0073	0.0515	-0.1566	-0.1793	0.0447	-0.0316	-0.0868	0.0376
S(PCAP0522EU)	-0.0945	0.0557	-0.2800	-0.2551	0.2524	-0.0707	-0.1499	-0.0123
S(PCAP0522US)	-0.0516	0.0505	-0.1644	-0.1444	0.0786	-0.0265	-0.0755	-0.0345
Telekom Malaysia								
S(TEL0805US)	-0.0218	-0.1519	-0.0969	-0.1005	0.0112	-0.0784	-0.0702	0.0446
S(TEL0812US)	-0.0758	0.0372	-0.3600	-0.2929	0.0262	-0.0814	-0.1072	-0.0494
S(TM1210EU)	-0.0225	0.1685	-0.3328	-0.2851	0.1278	0.1054	-0.0324	-0.0367
Tenaga National Bhd.								
S(TEN0604EU)	-0.0419	0.2098	0.1631	0.1803	0.0400	0.0707	0.1047	0.0277
S(TEN0604US)	0.0003	0.1750	0.0528	0.0182	0.0000	0.0729	0.0638	-0.0578
S(TEN0407US)	-0.0594	0.0201	0.0085	0.0388	-0.0080	-0.0443	0.0892	-0.0758
S(TEN0407EU)	-0.0959	0.1083	-0.4735	-0.4271	0.2049	0.0280	-0.2519	-0.0216
S(TNB0407US)	0.0050	0.0221	-0.0189	-0.0014	0.0368	0.0213	0.0837	-0.0355
Malaysian Ringgit Treasury								
S(MAL1206MY)	0.0318	-0.0227	-0.7127	-0.6111	0.1513	-0.2948	-0.4381	-0.0019
S(MAL0307aMY)	0.0583	-0.0328	-0.6393	-0.6094	0.0940	-0.1019	-0.3302	-0.0285
S(MAL0307MY)	0.0125	-0.0649	-0.6926	-0.6456	0.0615	-0.1695	-0.3723	-0.0433
S(MAL0707MY)	0.0398	-0.0298	-0.5711	-0.5905	0.0352	-0.1668	-0.2916	-0.1078
S(MAL1007MY)	-0.0045	-0.0378	-0.6462	-0.6419	0.0598	-0.1363	-0.3202	-0.0652
S(MAL1207MY)	-0.0525	-0.1141	-0.6380	-0.6235	0.0791	-0.1933	-0.3784	-0.1084

Note: DUS short and DMY short are the short term rates for 30days in the respective countries. DOIL is the difference of price for sweet crude oil price traded this table does not report some of the variables (Gold and EMBI+Malayssia) as majority of the correlations for these variables are less than 10% significance.

Table 5 - Test of Stationary of Spreads between Samples

		Trace Statistics	ADF (levels)	ADF (difference)
Between samples with equivalent maturity				
PET0512US	- PET0512EU	38.44**	-5.06	-9.64
MAL1207MY	- TNB0407US	45.51**	-2.40	-6.39
	- TEN0407EU	45.98**	-2.23	-15.37
	- TEN0407US	45.75**	-2.49	-5.96
	- MAL0307MY	58.02**	0.26	-10.12
	- MAL0707MY	58.72**	-0.67	-10.69
	- MAL1007MY	68.64**	-3.33	-10.04
TEN150604US	- TEN150604EU	9.74	-1.02	-9.96
	- PET10804IS	7.12	-1.45	-6.87
	- PET10804EU	6.97	-1.43	-6.87
Between samples same issuer but different maturity				
MAL0609US	- MAL0609EU	35.13**	-5.48	-9.49
	- MAL0609IS	31.79**	-4.90	-10.48
	- MAL0711US	15.73*	-2.42	-10.41
PET10703US	- PET10804IS	11.25	-1.65	-6.65
	- PET10804EU	11.21	-1.63	-6.64
	- PET0805US	12.30	-1.66	-7.54
PET10703US	- PET1006IS	12.53	-1.46	-7.51
	- PET1006EU	17.61*	-2.32	-9.13
	- PET1006US	11.63	-1.41	-7.54
	- PET0512IS	12.55	-2.00	-8.13
	- PET0512EU	12.06	-1.93	-8.04
	- PET0815EU	13.55	-2.30	-7.66
	- PCAP0522EU	17.84	-3.78	-8.02
	- PCAP0522US	14.34	-3.03	-6.33
	- PET1026EU	14.17	-2.55	-7.25
	- PET1026US	14.17	-3.02	-6.74
TEN150604US	- TEN150604EU	9.74	-1.02	-9.96
	- TEN0407US	18.49*	-3.21	-6.28
	- TNB0407US	19.26*	-3.30	-6.21
TEL0805US	- TM1210EU	18.58*	-3.31	-8.13
	- TEL0812US	14.58	-2.72	-6.22

Note: Johansen cointegration test 4 lags, critical 5% (15.41)*, 1% (20.04) **. The null hypothesis is that series are not cointegrated; while intercept is restricted within the cointegration space. Augmented Dickey-Fuller test with four difference lags and intercept– critical value 5% (-2.87)*, 1% (-3.46)**

Table 6 - Regressions of Changes in Credit Spreads Between Malaysian Yankee Bonds and US Government Bonds

$$\Delta CS = \alpha_0 + \alpha_1 \Delta(US) + \alpha_2 \Delta(US)^2 + \alpha_3 \Delta(slope) + \alpha_4 \Delta(USshort) + \alpha_5 \Delta(YENUS) + \alpha_6 \Delta(crudeoil) + \alpha_7 \Delta(KLSE(-1))$$
$$+ \alpha_8 \Delta(EMBIMAL) + \Delta CS_{t-1} + \Delta CS_{t-2} + MA(1)$$

	MAL0609US		**MAL0711US**		**TEN150604US**		**TEN0407US**		**TNB0407US**		**TEL0805US**	
	coeff	p-	coeff	p-	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-value
Constant (x100)	-0.565	(0.013)	-0.039	(0.764)	-0.138	(0.512)	0.032	(0.898)	-0.001	(0.997)	-0.069	(0.681)
Δlog(US)	-1.721	(0.000)	-1.496	(0.000)	-0.562	(0.000)	-0.195	(0.278)	-0.186	(0.306)	-0.642	(0.000)
$\Delta log(US)^2$	10.798	(0.011)	1.549	(0.576)	0.436	(0.092)	1.048	(0.624)	1.765	(0.414)	-0.978	(0.444)
Δlog(slope)	0.547	(0.186)	1.002	(0.004)	0.601	(0.051)	0.082	(0.803)	-0.062	(0.851)	0.335	(0.280)
Δlog(US short)	0.310	(0.116)	0.541	(0.000)	0.346	(0.139)	0.057	(0.732)	-0.023	(0.892)	-0.345	(0.051)
Δlog(YENUSD	0.565	(0.176)	-0.585	(0.061)	0.287	(0.555)	-0.255	(0.503)	0.232	(0.542)	-0.633	(0.155)
Δlog(crudeoil)	-0.103	(0.410)	-0.134	(0.112)	-0.172	(0.208)	-0.124	(0.245)	-0.061	(0.574)	0.051	(0.639)
Δlog(KLSE(-1))	-0.195	(0.514)	-0.225	(0.286)	-0.718	(0.034)	-0.525	(0.055)	-0.046	(0.673)	0.377	(0.171)
Δlog(EMBImal)	-2.661	(0.003)	-2.736	(0.000)	-1.118	(0.219)	-1.347	(0.066)	-1.374	(0.061)	-1.715	(0.075)
ΔCS_{t-1}	0.427	(0.004)	0.532	(0.000)	0.009	(0.974)	-0.421	(0.337)	0.147	(0.880)	0.580	(0.000)
ΔCS_{t-2}	-0.112	(0.217)	0.098	(0.123)	-0.213	(0.019)	-0.180	(0.034)	-0.024	(0.887)	0.095	(0.204)
MA(1)	-0.708	(0.000)	-1.050	(0.000)	-0.226	(0.397)	0.261	(0.559)	-0.297	(0.759)	-0.988	(0.000)
Diagnostics												
Std Error	0.041		0.032		0.044		0.033		0.034		0.044	
Adj R^2	0.270		0.324		0.323		0.039		0.002		0.239	
Durbin Watson	2.001		2.029		2.010		1.981		1.993		1.998	
F Stat	8.034	(0.000)	10.114	(0.000)	10.031	(0.000)	1.773	(0.061)	0.954	(0.490)	6.971	(0.000)
Residual test (Ljung-Box Q-statistics)												
Q(5)	-0.073	(0.490	0.033	(0.827)	0.113	(0.076)	0.046	(0.484)	-0.007	(0.994)	0.021	(0.082)
Q(10)	0.043	(0.275	-0.053	(0.261)	0.012	(0.424)	-0.028	(0.794)	-0.021	(0.997)	-0.045	(0.137)

(continued)

	TEL0825US		PET10703US		PET0805US		PET1006US		PET0512US		PET1026US	
	coeff	p-	coeff	p-	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-
Constant (x100)	0.076	(0.587)	0.000	(0.999)	-0.655	(0.021)	0.145	(0.292)	0.116	(0.561)	0.025	(0.891)
Δlog(US)	-2.468	(0.002)	-1.122	(0.000)	-0.760	(0.013)	-0.870	(0.000)	-1.135	(0.000)	-1.227	(0.305)
$\Delta log(US)^2$	5.561	(0.423)	0.026	(0.827)	4.432	(0.054)	-1.924	(0.276)	0.938	(0.793)	8.376	(0.390)
Δlog(slope)	1.441	(0.011)	1.262	(0.027)	0.059	(0.934)	0.628	(0.066)	0.935	(0.006)	0.634	(0.438)
Δlog(US short)	0.624	(0.008)	0.214	(0.559)	-0.112	(0.780)	0.144	(0.421)	0.430	(0.007)	0.407	(0.241)
Δlog(YENUSD)	0.209	(0.313)	-0.290	(0.745)	0.300	(0.750)	0.006	(0.986)	-0.151	(0.636)	-0.278	(0.324)
Δlog(crudeoil)	0.000	(0.996)	-0.378	(0.130)	0.178	(0.501)	-0.103	(0.341)	-0.117	(0.189)	0.017	(0.832)
Δlog(KLSE(-1))	-0.002	(0.785)	-0.526	(0.413)	0.462	(0.512)	-0.033	(0.906)	0.095	(0.677)	-0.159	(0.424)
Δlog(EMBImal)	-0.760	(0.060)	-1.294	(0.360)	-0.602	(0.787)	-2.402	(0.004)	-1.452	(0.015)	-0.231	(0.657)
ΔCS_{t-1}	-0.554	(0.268)	0.789	(0.000)	0.382	(0.000)	0.752	(0.000)	0.157	(0.569)	-0.462	(0.141)
ΔCS_{t-2}	-0.145	(0.068)	0.081	(0.274)	0.235	(0.001)	-0.019	(0.806)	-0.105	(0.259)	-0.226	(0.002)
MA(1)	0.435	(0.389)	-0.988	(0.000)	-1.053	(0.000)	-1.056	(0.000)	-0.350	(0.216)	0.334	(0.300)
Diagnostics												
Std Error	0.018		0.081		0.101		0.036		0.028		0.025	
Adj R^2	0.039		0.647		0.334		0.232		0.130		0.024	
Durbin Watson	1.976		1.988		2.018		1.964		1.960		1.997	
F Stat	1.781	(0.059)	35.789	(0.000)	10.515	(0.000)	6.731	(0.000)	3.836	(0.000)	1.471	(0.145)
Residual test (Ljung-Box Q-statistics)												
Q(5)	0.072	(0.490)	0.040	(0.626)	0.027	(0.686)	-0.027	(0.089)	-0.022	(0.887)	0.026	(0.652)
Q(10)	-0.052	(0.544)	0.055	(0.654)	-0.081	(0.475)	0.021	(0.619)	-0.040	(0.834)	0.068	(0.854)

(continued)

	PCAP0522US		*MAL0609EU*		*MAL0609IS*		*MAL0711EU*		*MAL0711IS*		*TEN150604EU*	
	coeff	p-	coeff	p-	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-
Constant (x100)	-0.022	(0.900)	0.089	(0.697)	0.204	(0.292)	0.142	(0.549)	0.041	(0.778)	-0.463	(0.002)
Δlog(US)	-1.857	(0.032)	-1.268	(0.000)	-1.311	(0.000)	-1.763	(0.000)	-1.579	(0.000)	-0.550	(0.000)
$\Delta\log(US)^2$	8.831	(0.273)	-2.239	(0.586)	-3.946	(0.290)	-5.345	(0.174)	0.572	(0.850)	0.387	(0.128)
Δlog(slope)	1.081	(0.088)	-0.216	(0.571)	-0.035	(0.919)	-0.305	(0.422)	0.025	(0.930)	1.104	(0.000)
Δlog(US short)	0.533	(0.044)	0.043	(0.814)	0.220	(0.172)	0.230	(0.198)	0.286	(0.021)	0.510	(0.044)
Δlog(YENUSD)	-0.052	(0.845)	1.813	(0.000)	0.553	(0.130)	0.881	(0.014)	0.117	(0.655)	0.404	(0.353)
Δlog(crudeoil)	-0.023	(0.762)	-0.101	(0.398)	-0.174	(0.123)	-0.097	(0.340)	-0.073	(0.350)	-0.005	(0.967)
Δlog(KLSE(-1))	-0.232	(0.229)	0.446	(0.125)	0.093	(0.716)	-0.612	(0.018)	-0.535	(0.005)	0.110	(0.709)
Δlog(EMBImal)	-0.239	(0.633)	-2.418	(0.006)	-4.642	(0.000)	-3.321	(0.000)	-4.663	(0.000)	-1.906	(0.051)
ΔCS_{t-1}	0.033	(0.909)	0.180	(0.435)	0.129	(0.449)	-0.432	(0.307)	0.116	(0.565)	-0.036	(0.838)
ΔCS_{t-2}	-0.089	(0.276)	0.081	(0.531)	0.078	(0.504)	-0.145	(0.146)	0.034	(0.786)	-0.049	(0.677)
MA(1)	-0.158	(0.599)	-0.637	(0.004)	-0.705	(0.000)	0.228	(0.595)	-0.637	(0.001)	-0.555	(0.001)
Diagnostics												
Std Error	0.023		0.039		0.038		0.032		0.026		0.046	
Adj R^2	0.029		0.416		0.359		0.539		0.525		0.423	
Durbin Watson	1.989		1.994		1.998		1.987		2.010		2.002	
F Stat	1.567	(0.111)	14.557	(0.000)	11.637	(0.000)	23.209	(0.000)	21.897	(0.000)	14.921	(0.000)
Residual test (Ljung-Box Q-statistics)												
Q(5)	0.014	(0.928	0.012	(0.745)	0.027	(0.768)	0.011	(0.916)	-0.001	(0.200)	0.042	(0.765)
Q(10)	-0.015	(0.916	-0.006	(0.945)	-0.032	(0.985)	-0.107	(0.285)	-0.079	(0.289)	0.000	(0.995)

(continued)

	TEN0407EU		*TM1210EU*		*PET10804EU*		*PET1006EU*		*PET1006IS*		*PET0512EU*	
	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-	coeff	p-value	coeff	p-value
Constant (x100)	0.469	(0.024)	-0.408	(0.025)	0.179	(0.846)	0.244	(0.294)	-0.112	(0.685)	0.263	(0.093)
Δlog(US)	-0.516	(0.007)	-1.598	(0.000)	-0.763	(0.044)	-1.165	(0.000)	-1.118	(0.000)	-1.250	(0.000)
$\Delta\log(US)^2$	-4.405	(0.066)	10.653	(0.007)	-3.144	(0.477)	-3.640	(0.160)	0.212	(0.926)	-3.782	(0.233)
Δlog(slope)	-0.503	(0.139)	0.324	(0.363)	2.037	(0.037)	0.454	(0.287)	-0.338	(0.347)	-0.227	(0.440)
Δlog(US short)	0.013	(0.941)	0.195	(0.207)	0.512	(0.362)	0.050	(0.819)	0.249	(0.187)	0.080	(0.548)
Δlog(YENUSD	0.699	(0.084)	0.767	(0.033)	-0.044	(0.974)	1.462	(0.041)	0.766	(0.084)	0.615	(0.028)
Δlog(crudeoil)	-0.129	(0.261)	-0.018	(0.848)	-0.384	(0.334)	-0.127	(0.272)	0.164	(0.211)	-0.095	(0.229)
Δlog(KLSE(-1))	-0.679	(0.018)	0.780	(0.001)	-0.371	(0.708)	-0.871	(0.103)	-0.573	(0.075)	-0.241	(0.223)
Δlog(EMBImal)	-1.992	(0.021)	-3.965	(0.000)	4.854	(0.062)	-2.651	(0.051)	-4.890	(0.000)	-3.460	(0.000)
ΔCS_{t-1}	0.452	(0.000)	0.150	(0.200)	-0.109	(0.978)	-0.754	(0.000)	-1.418	(0.000)	0.204	(0.322)
ΔCS_{t-2}	0.280	(0.002)	-0.083	(0.360)	0.027	(0.968)	-0.165	(0.021)	-0.447	(0.000)	0.032	(0.796)
MA(1)	-0.921	(0.000)	-0.724	(0.000)	-0.055	(0.989)	0.550	(0.000)	0.977	(0.000)	-0.657	(0.001)
<u>Diagnostics</u>												
Std Error	0.039		0.038		0.120		0.065		0.042		0.027	
Adj R^2	0.383		0.457		0.022		0.416		0.461		0.508	
Durbin Watson	1.993		2.014		2.000		1.930		2.045		1.973	
F Stat	12.777	(0.000)	16.965	(0.000)	1.430	(0.162)	14.560	(0.000)	17.018	(0.000)	20.588	(0.000)
<u>Residual test (Ljung-Box Q-statistics)</u>												
Q(5)	0.023	(0.532)	0.039	(0.355)	0.041	(0.570)	0.070	(0.127)	-0.021	(0.316)	-0.055	(0.601)
Q(10)	-0.155	(0.422)	-0.044	(0.571)	-0.065	(0.616)	-0.027	(0.575)	-0.019	(0.619)	-0.063	(0.737)

(continued)

	PET0815EU		*PCAP0522EU*		*PET1026EU*	
	coeff	p-	coeff	p-value	Coeff	p-
Constant (x100)	0.191	(0.314)	0.424	(0.152)	0.215	(0.036)
Δlog(Y)	-1.601	(0.003)	-6.895	(0.000)	-3.957	(0.001)
$\Delta\log(Y)^2$	1.244	(0.833)	-9.029	(0.591)	-6.740	(0.408)
Δlog(slope)	-0.175	(0.708)	3.616	(0.005)	1.697	(0.022)
Δlog(US short)	0.095	(0.650)	1.645	(0.002)	0.892	(0.006)
Δlog(YENUSD)	0.470	(0.109)	0.180	(0.724)	-0.231	(0.294)
Δlog(crudeoil)	-0.081	(0.040)	-0.057	(0.697)	-0.165	(0.002)
Δlog(KLSE(-1))	-0.202	(0.196)	0.534	(0.141)	-0.437	(0.003)
Δlog(EMBImal)	-4.680	(0.000)	-3.956	(0.000)	-3.742	(0.000)
ΔCS_{t-1}	-0.784	(0.056)	0.363	(0.006)	0.318	(0.000)
ΔCS_{t-2}	-0.260	(0.033)	-0.199	(0.010)	0.259	(0.000)
MA(1)	0.443	(0.290)	-0.612	(0.000)	-0.988	(0.000)
Diagnostics						
Std Error	0.027		0.050		0.026	
Adj R^2	0.361		0.309		0.353	
Durbin Watson	1.987		1.403		1.996	
F Stat	11.753	(0.000)	9.511	(0.000)	11.350	(0.000)
Residual test (Ljung-Box Q-statistics)						
Q(5)	0.026	(0.035)	-0.079	(0.000)	0.072	(0.490)
Q(10)	0.065	(0.020)	0.062	(0.006)	-0.052	(0.544)

Notes The table reports the result from a mean equation specification of the regression model as specified above. **ΔCS** is the changes in the credit spread, **ΔUS** is the daily changes in US government T-bond with the closest to maturity of sample bond, **ΔUS^2** is the term to capture the curvature of the US T-bond, Δ(slope) is changes of the difference between US 30 day T-Bill rate and 30 year T-bond. **ΔKLSE(-1)** is the proxy for asset factor of daily change on the KLSE Index. **ΔYENUSD**, **ΔCrudeOil** and **ΔEMBIMAL** are market variables of changes in the Japanese Yen US dollar exchange rate, Brent Sweet oil contract and return of JP Morgan Emerging Market Bond Index+Malaysia. All the daily changes in deterministic variables and explanatory variable are computed in natural logarithm. AR(1), AR(2) and MA(1) are Autoregressive and Moving average terms at lags 1 and 2, respectively. Probability values are reported in parenthesis. The sample period was from 28 May 2002 to 24 March 2003

Table 7 - Ratio of Standard Error Term from Basic Specification (Equation 1) over Standard Error Term from Extended Specification

Panel 1

MAL0609US	**MAL0711US**	**TEN150604US**	**TEN0407US**	**TNB0407US**	**TEL0805US**
1.032	1.109	1.032	1.018	0.985	1.095

TEL0825US	**PET10703US**	**PET0805US**	**PET1006US**	**PET0512US**	**PET1026US**
1.025	1.019	1.200	1.090	1.031	1.007

PCAP0522US	*MAL0609EU*	*MAL0609IS*	*MAL0711EU*	*MAL0711IS*	*TEN150604EU*
1.035	1.067	1.088	0.988	1.063	1.136

TEN0407EU	*TM1210EU*	*PET10804EU*	*PET1006EU*	*PET1006IS*	*PET0512EU*
1.056	1.104	3.114	1.116	1.044	1.069

PET0815EU	*PCAP0522EU*	*PET1026EU*
1.010	1.108	2.131

Panel 2

MAL0609US	**MAL0711US**	**TEN150604US**	**TEN0407US**	**TNB0407US**	**TEL0805US**
1.024	1.125	1.068	1.091	1.029	1.114

TEL0825US	**PET10703US**	**PET0805US**	**PET1006US**	**PET0512US**	**PET1026US**
1.056	1.074	1.198	1.111	1.071	1.000

PCAP0522US	*MAL0609EU*	*MAL0609IS*	*MAL0711EU*	*MAL0711IS*	*TEN150604EU*
1.043	1.026	1.026	1.000	1.000	1.109

TEN0407EU	*TM1210EU*	*PET10804EU*	*PET1006EU*	*PET1006IS*	*PET0512EU*
1.026	1.026	1.042	1.062	1.000	1.000

PET0815EU	*PCAP0522EU*	*PET1026EU*
1.000	1.060	1.038

Note: Panel 1 is computed from the standard error specified from *equation (1)* over *equation (2)*, Panel 2 are ratios from standard errors from *equation (1)over* GARCH(1,1) specification standard errors.

Appendix - GARCH(1,1) Estimation of Change in Credit Spreads Between Malaysian Yankee Bonds and US Government Bond

$$\Delta CS = \alpha_0 + \alpha_1 \Delta(US) + \alpha_2 \Delta(US)^2 + \alpha_3 \Delta(slope) + \alpha_4 \Delta(USshort) + \alpha_5 \Delta(YENUS) + \alpha_6 \Delta(crudeoil) + \alpha_7 \Delta(KLSE(-1))$$
$$+ \alpha_8 \Delta(EMBIMAL) + \Delta CS_{t-1} + \Delta CS_{t-2} + MA(1) + \varepsilon, \sigma^2 = \alpha + \gamma \sigma^2{}_{t-1} + \beta \varepsilon^2{}_{t-1}$$

	MAL0609US		MAL0711US		TEN150604US		TEN0407US		TNB0407US		TEL0805US	
	Coeff	p-value	Coeff	p-value	Coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-value
Constant (x100)	-0.504	(0.018)	0.244	(0.392)	-0.098	(0.454)	0.284	(0.017)	0.278	(0.004)	-0.426	(0.000)
Δlog(US)	-1.437	(0.000)	-1.611	(0.000)	-0.637	(0.000)	-0.281	(0.005)	-0.327	(0.000)	-0.533	(0.000)
$\Delta\log(US)^2$	10.044	(0.001)	-7.207	(0.072)	0.069	(0.772)	-5.992	(0.000)	-4.331	(0.000)	3.387	(0.000)
Δlog(slope)	0.290	(0.479)	1.065	(0.000)	0.458	(0.014)	-0.195	(0.340)	-0.207	(0.168)	0.319	(0.032)
Δlog(US short)	0.079	(0.641)	0.432	(0.017)	-0.171	(0.279)	0.080	(0.275)	-0.133	(0.173)	-0.237	(0.021)
Δlog(YENUSD	0.215	(0.579)	-1.051	(0.004)	0.108	(0.693)	-0.166	(0.383)	0.251	(0.163)	-0.909	(0.000)
Δlog(crudeoil)	-0.059	(0.567)	-0.012	(0.910)	-0.125	(0.216)	0.001	(0.988)	-0.111	(0.013)	0.045	(0.370)
Δlog(KLSE(-1))	0.060	(0.798)	0.108	(0.703)	-0.436	(0.003)	-0.025	(0.865)	-0.046	(0.693)	-0.081	(0.466)
Δlog(EMBImal)	-3.130	(0.000)	-3.237	(0.000)	-2.402	(0.000)	-3.058	(0.000)	-2.213	(0.000)	-2.639	(0.000)
ΔCS_{t-1}	0.211	(0.366)	0.230	(0.758)	-0.366	(0.535)	-0.630	(0.001)	-0.990	(0.000)	0.427	(0.000)
ΔCS_{t-2}	-0.132	(0.200)	0.099	(0.640)	-0.079	(0.765)	-0.270	(0.000)	-0.270	(0.000)	0.227	(0.006)
MA(1)	-0.497	(0.035)	-0.498	(0.503)	-0.085	(0.888)	0.322	(0.105)	0.696	(0.000)	-0.982	(0.000)
Variance equation												
Constant	0.000	(0.074)	0.001	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.150)
ARCH(1)	0.194	(0.010)	0.528	(0.002)	0.999	(0.000)	0.902	(0.000)	0.493	(0.000)	0.820	(0.000)
GARCH(1)	0.756	(0.000)	0.129	(0.045)	0.073	(0.000)	0.066	(0.117)	0.084	(0.000)	0.308	(0.000)
Alpha+Beta	0.950		0.657		1.072		0.968		0.576		1.129	
***Diagnostic*s**												
Std Error	0.042		0.036		0.047		0.036		0.035		0.049	
Adj R^2	0.234		0.110		0.216		0.135		0.117		0.052	
Durbin Watson	2.023		2.128		1.648		1.697		1.740		1.514	
F Stat	5.553	(0.000)	2.853	(0.001)	5.095	(0.000)	2.985	(0.078)	1.095	(0.027)	1.818	(0.038)
Residual test (Ljung-Box)												
Q(5)	-0.061	(0.384)	-0.013	(0.262)	0.076	(0.117)	0.000	(0.330)	-0.072	(0.046)	0.099	(0.000)
Q(10)	-0.004	(0.303)	-0.046	(0.281)	-0.029	(0.258)	-0.007	(0.628)	0.012	(0.197)	0.070	(0.005)
DF	-14.561	(0.000)	-15.354	(0.000)	-13.053	(0.000)	-13.053	(0.000)	-12.654	(0.000)	-14.983	(0.000)
PP	-14.632	(0.000)	-15.697	(0.000)	-12.450	(0.000)	-12.450	(0.000)	-12.657	(0.000)	-15.070	(0.000)

(Appendix continued)

	TEL0825US		PET10703US		PET0805US		PET1006US		PET0512US		PET1026US	
	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-value
Constant (x100)	0.036	(0.822)	-0.354	(0.000)	-0.375	(0.002)	-0.212	(0.289)	0.511	(0.001)	0.120	(0.710)
Δlog(US)	-1.252	(0.000)	-1.058	(0.000)	-1.286	(0.000)	-0.802	(0.000)	-0.877	(0.000)	-0.451	(0.840)
$\Delta\log(US)^2$	2.889	(0.091)	0.149	(0.015)	6.118	(0.000)	0.176	(0.925)	-10.919	(0.000)	3.337	(0.844)
Δlog(slope)	1.024	(0.000)	2.602	(0.000)	0.620	(0.005)	0.237	(0.371)	0.380	(0.234)	0.175	(0.905)
Δlog(US short)	0.462	(0.000)	0.207	(0.244)	-0.340	(0.000)	0.032	(0.805)	0.156	(0.345)	0.194	(0.771)
Δlog(YENUSD))	0.014	(0.926)	0.474	(0.355)	-0.523	(0.071)	-0.023	(0.953)	-0.147	(0.597)	-0.102	(0.846)
Δlog(crudeoil)	0.019	(0.756)	-0.593	(0.000)	0.050	(0.495)	-0.067	(0.471)	-0.095	(0.259)	0.018	(0.922)
Δlog(KLSE(-1))	-0.055	(0.782)	-0.455	(0.322)	-0.550	(0.006)	0.242	(0.472)	0.222	(0.322)	-0. 124	(0.773)
Δlog(EMBImal)	-0.434	(0.217)	3.286	(0.000)	-5.547	(0.000)	-3.671	(0.000)	-2.707	(0.000)	0.063	(0.948)
ΔCS_{t-1}	-0.375	(0.344)	0.625	(0.000)	0.033	(0.752)	-1.017	(0.000)	0.165	(0.594)	-0.074	(0.908)
ΔCS_{t-2}	-0.112	(0.233)	0.124	(0.160)	0.033	(0.696)	-0.264	(0.000)	0.001	(0.992)	-0.117	(0.348)
MA(1)	0.385	(0.344)	-0.993	(0.000)	-0.784	(0.000)	0.825	(0.000)	-0.476	(0.105)	-0.062	(0.915)
Variance equation												
Constant	0.000	(0.000)	0.002	(0.000)	0.000	(0.079)	0.001	(0.000)	0.000	(0.000)	0.000	(0.496)
ARCH(1)	0.033	(0.006)	0.883	(0.000)	1.018	(0.000)	0.501	(0.002)	0.600	(0.000)	0.022	(0.752)
GARCH(1)	0.742	(0.000)	0.065	(0.332)	0.028	(0.000)	0.183	(0.004)	0.127	(0.163)	0.560	(0.385)
Alpha+Beta	0.775		0.949		1.046		0.683		0.727		0.582	
Diagnostics												
Std Error	0.019		0.087		0.121		0.040		0.030		0.025	
Adj R^2	0.005		0.594		0.040		0.058		0.037		-0.006	
Durbin Watson	2.191		1.582		1.364		1.812		1.948		1.975	
F Stat	1.076	(0.382)	22.864	(0.000)	1.626	(0.075)	1.923	(0.026)	1.579	(0.088)	0.916	(0.543)
Residual test (Ljung-Box)												
Q(5)	-0.074	(0.172)	0.133	(0.001)	-0.029	(0.000)	-0.138	(0.028)	-0.027	(0.334)	0.013	(0.150)
Q(10)	0.010	(0.665)	0.061	(0.008)	-0.070	(0.000)	0.028	(0.325)	-0.104	(0.396)	0.061	(0.545)
DF	-15.889	(0.000)	-11.715	(0.000)	-10.712	(0.000)	-13.105	(0.000)	-14.084	(0.000)	-14.230	(0.000)
PP	-15.838	(0.000)	-11.747	(0.000)	-11.009	(0.000)	-13.491	(0.000)	-14.101	(0.000)	-14.238	(0.000)

(Appendix continued)

	PCAP0522US		*MAL0609EU*		*MAL0609IS*		*MAL0711EU*		*MAL0711IS*		*TEN150604EU*	
	Coeff	p-value	Coeff	p-value	Coeff	p-value	coeff	p-value	Coeff	p-value	coeff	p-value
Constant (x100)	-0.080	(0.609)	0.067	(0.744)	0.206	(0.233)	0.157	(0.468)	-0.049	(0.617)	-0.661	(0.191)
Δlog(Y)	-1.502	(0.072)	-1.269	(0.000)	-1.243	(0.000)	-1.771	(0.000)	-1.774	(0.000)	-0.713	(0.000)
$\Delta\log(Y)^2$	8.354	(0.218)	-0.988	(0.767)	-4.055	(0.192)	-3.732	(0.318)	2.429	(0.263)	0.302	(0.039)
Δlog(slope)	0.726	(0.246)	-0.007	(0.984)	-0.176	(0.563)	-0.196	(0.571)	0.278	(0.350)	0.495	(0.003)
Δlog(US short)	0.415	(0.151)	0.094	(0.538)	0.072	(0.682)	0.212	(0.176)	0.337	(0.015)	0.635	(0.000)
Δlog(YENUSD))	-0.056	(0.803)	1.458	(0.000)	1.002	(0.004)	0.889	(0.010)	0.313	(0.237)	0.593	(0.009)
Δlog(crudeoil)	-0.021	(0.771)	-0.106	(0.371)	-0.131	(0.238)	-0.107	(0.266)	-0.027	(0.720)	-0.031	(0.660)
Δlog(KLSE(-1))	-0.199	(0.315)	0.284	(0.299)	-0.019	(0.063)	-0.632	(0.009)	-0.522	(0.006)	0.300	(0.068)
Δlog(EMBImal)	-0.251	(0.626)	-2.358	(0.000)	-4.438	(0.000)	-3.626	(0.000)	-4.178	(0.000)	-3.635	(0.000)
ΔCS_{t-1}	-0.159	(0.047)	0.089	(0.738)	0.202	(0.376)	0.247	(0.537)	0.534	(0.000)	0.487	(0.000)
ΔCS_{t-2}	-0.151	(0.017)	0.120	(0.419)	0.062	(0.612)	0.002	(0.990)	0.238	(0.001)	0.459	(0.000)
MA(1)	0.053	(0.642)	-0.623	(0.013)	-0.663	(0.001)	-0.539	(0.162)	-1.050	(0.000)	-0.912	(0.000)
Variance equation												
Constant	0.000	(0.289)	0.002	(0.001)	0.001	(0.035)	0.000	(0.756)	0.000	(0.319)	0.000	(0.118)
ARCH(1)	0.025	(0.000)	0.257	(0.058)	0.379	(0.008)	0.008	(0.832)	0.092	(0.207)	1.047	(0.000)
GARCH(1)	1.023	(0.000)	0.341	(0.208)	0.114	(0.698)	0.922	(0.000)	0.798	(0.000)	0.033	(0.000)
Alpha+Beta	1.048		0.598		0.493		0.930		0.891		1.080	
Diagnostics												
Std Error	0.024		0.040		0.039		0.032		0.026		0.051	
Adj R^2	0.003		0.399		0.336		0.532		0.544		0.288	
Durbin Watson	2.037		1.939		2.168		1.987		2.091		2.088	
F Stat	1.050	(0.406)	10.920	(0.000)	8.538	(0.000)	17.954	(0.000)	18.829	(0.000)	7.030	(0.000)
Residual test (Ljung-Box)												
Q(5)	0.023	(0.587)	0.017	(0.595)	-0.033	(0.193)	0.006	(0.956)	-0.016	(0.090)	-0.016	(0.515)
Q(10)	-0.043	(0.758)	-0.012	(0.827)	0.051	(0.793)	-0.111	(0.256)	-0.050	(0.098)	-0.120	(0.528)
DF	-14.729	(0.000)	-14.738	(0.000)	-15.696	(0.000)	-14.377	(0.000)	-14.884	(0.000)	-13.398	(0.000)
PP	-14.728	(0.000)	-14.817	(0.000)	-15.698	(0.000)	-14.378	(0.000)	-14.905	(0.000)	-17.110	(0.000)

(Appendix continued)

	TEN0407EU		*TM1210EU*		*PET10804EU*		*PET1006EU*		*PET1006IS*		*PET0512EU*	
	Coeff	p-value	Coeff	p-value	coeff	p-value	coeff	p-value	Coeff	p-value	coeff	p-value
Constant (x100)	0.360	(0.113)	-0.184	(0.100)	-0.356	(0.783)	-0.300	(0.210)	-0.149	(0.404)	0.219	(0.144)
Δlog(Y)	-0.646	(0.002)	-1.372	(0.000)	-0.037	(0.929)	-1.196	(0.000)	-1.173	(0.000)	-1.260	(0.000)
$\Delta\log(Y)^2$	-4.581	(0.018)	6.516	(0.024)	-1.097	(0.813)	-1.218	(0.586)	0.858	(0.601)	-2.952	(0.296)
Δlog(slope)	-0.583	(0.120)	0.322	(0.265)	1.665	(0.053)	-0.214	(0.526)	-0.101	(0.720)	-0.222	(0.424)
Δlog(US short)	0.019	(0.913)	0.240	(0.134)	0.396	(0.526)	0.043	(0.867)	0.116	(0.506)	0.072	(0.578)
Δlog(YENUSD))	0.767	(0.080)	0.524	(0.080)	0.529	(0.803)	1.377	(0.000)	0.516	(0.169)	0.568	(0.022)
Δlog(crudeoil)	-0.136	(0.271)	-0.089	(0.201)	-0.379	(0.522)	-0.012	(0.924)	0.075	(0.489)	-0.095	(0.233)
Δlog(KLSE(-1))	-0.613	(0.003)	0.575	(0.002)	-0.022	(0.988)	0.475	(0.212)	-0.549	(0.092)	0.261	(0.179)
Δlog(EMBImal)	-1.957	(0.010)	-2.740	(0.000)	12.373	(0.000)	-3.482	(0.002)	-4.746	(0.000)	-3.668	(0.000)
ΔCS_{t-1}	-1.267	(0.000)	0.205	(0.111)	-0.015	(0.997)	-0.130	(0.448)	0.328	(0.000)	0.158	(0.428)
ΔCS_{t-2}	-0.321	(0.000)	-0.012	(0.908)	0.100	(0.925)	0.064	(0.561)	0.266	(0.001)	0.013	(0.922)
MA(1)	0.977	(0.000)	-0.766	(0.000)	-0.251	(0.949)	-0.463	(0.005)	-0.923	(0.000)	-0.644	(0.000)
Variance equation												
Constant	0.001	(0.022)	0.000	(0.154)	0.011	(0.000)	0.001	(0.000)	0.000	(0.208)	0.000	(0.615)
ARCH(1)	0.409	(0.011)	0.155	(0.003)	0.535	(0.057)	0.629	(0.000)	0.124	(0.150)	0.055	(0.402)
GARCH(1)	0.131	(0.651)	0.850	(0.000)	0.107	(0.550)	0.046	(0.528)	0.761	(0.000)	0.740	(0.100)
Alpha+Beta	0.540		1.005		0.642		0.675		0.884		0.795	
Diagnostics												
Stan Error	0.040		0.039		0.125		0.069		0.042		0.027	
Adj R^2	0.379		0.426		-0.071		0.337		0.454		0.499	
Durbin Watson	2.075		2.012		1.822		1.729		2.072		1.962	
F Stat	9.597	(0.000)	12.096	(0.000)	0.015	(1.000)	8.579	(0.000)	13.415	(0.000)	15.877	(0.000)
Residual test (Ljung-Box)												
Q(5)	-0.019	(0.224)	0.020	(0.240)	0.085	(0.097)	-0.035	(0.049)	-0.014	(0.547)	-0.054	(0.641)
Q(10)	-0.189	(0.091)	0.023	(0.613)	-0.070	(0.191)	0.009	(0.166)	-0.024	(0.844)	-0.076	(0.741)
DF	-14.983	(0.000)	-14.593	(0.000)	-13.166	(0.000)	-13.485	(0.000)	-14.949	(0.000)	-14.167	(0.000)
PP	-15.070	(0.000)	-14.612	(0.000)	-13.123	(0.000)	-13.605	(0.000)	-14.946	(0.000)	-14.167	(0.000)

(Appendix continued)

	PET0815EU		*PCAP0522EU*		*PET1026EU*	
	Coeff	p-value	Coeff	p-value	coeff	p-value
Constant (x100)	0.082	(0.619)	0.217	(0.054)	0.213	(0.080)
Δlog(Y)	-1.706	(0.001)	-4.709	(0.000)	-3.947	(0.009)
$\Delta\log(Y)^2$	3.735	(0.443)	-9.988	(0.114)	-7.013	(0.482)
Δlog(slope)	-0.047	(0.910)	2.061	(0.001)	1.724	(0.091)
Δlog(US short)	0.088	(0.667)	0.924	(0.000)	0.898	(0.044)
Δlog(YENUSD))	0.567	(0.032)	0.267	(0.221)	-0.212	(0.377)
Δlog(crudeoil)	-0.132	(0.035)	-0.116	(0.025)	-0.161	(0.020)
Δlog(KLSE(-1))	-0.202	(0.196)	-0.134	(0.396)	-0.439	(0.004)
Δlog(EMBImal)	-4.649	(0.000)	-3.920	(0.000)	-3.626	(0.000)
ΔCS_{t-1}	-0.791	(0.025)	0.137	(0.496)	0.321	(0.003)
ΔCS_{t-2}	-0.299	(0.010)	0.005	(0.967)	0.248	(0.009)
MA(1)	0.399	(0.290)	-0.629	(0.000)	-0.988	(0.000)
Variance equation						
Constant	0.000	(0.082)	0.000	(0.001)	0.000	(0.869)
ARCH(1)	0.298	(0.026)	0.156	(0.053)	0.007	(0.817)
GARCH(1)	0.428	(0.055)	0.665	(0.000)	0.658	(0.749)
Alpha+Beta	0.726		0.822		0.664	
Diagnostics						
Std Error	0.027		0.053		0.027	
Adj R^2	0.343		0.224		0.342	
Durbin Watson	1.860		0.984		1.997	
F Stats	8.784	(0.000)	5.307	(0.000)	8.770	(0.000)
Residual test (Ljung-Box)						
Q(5)	-0.004	(0.021)	0.106	(0.214)	0.076	(0.468)
Q(10)	0.046	(0.033)	0.010	(0.696)	-0.055	(0.537)
DF	-13.459	(0.000)	-15.499	(0.000)	-14.558	(0.000)
PP	-13.780	(0.000)	-14.405	(0.000)	-14.557	(0.000)

The table reports the results from a GARCH (1, 1) regression model as specified above. **ΔCS** is the changes in the credit spread, ΔUS is the daily changes in US government T-bond with the closest to maturity of sample bond, $\mathbf{\Delta US^2}$ is the term to capture the curvature of the US T-bond, **Δ(slope)** is changes of the difference between US 30 day T-Bill rate and 30 year T-bond. **ΔKLSE(-1)** is the proxy for asset factor of daily change on the KLSE Index. **ΔYENUSD**, **ΔCrudeOil** and **ΔEMBIMAL** are market variables of changes in the Japanese Yen US dollar exchange rate, Brent Sweet oil contract and return of JP Morgan Emerging Market Bond Index+Malaysia. All the daily changes in deterministic variables and explanatory variable are computed in natural logarithm. $\mathbf{\Delta CS_{t-1}}$, $\mathbf{\Delta CS_{t-2}}$ and **MA(1)** are Autoregressive and moving average terms at lags 1 and 2, respectively. Probability values are reported in parenthesis. The sample period was from 28 May 2002 to 24 March 2003. The model was estimated using the heteroscedasticity consistent covariance procedure of Bollerslev and Wooldridge (1992). DF and PP are values of Augmented Dickey-Fuller and Phillips-Perron unit root test of the residuals. Lags for ADF are set for automatic selection following Schwartz Info Criterion and lags for PP as suggested by the Newey-West. Test for both levels of spreads and first difference include intercept.