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# IMPACT OF MACROECONOMIC NEWS ON MALAYSIAN BOND CREDIT SPREADS

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## ABSTRACT

*This study investigates the impact of scheduled macroeconomics news on credit spreads of Malaysian bonds of various maturities and rating groups. Using daily spreads from August 2006 through October 2009, the impact of macroeconomic news announcements on the Malaysian bond credit spreads is evident in this study. The results of the analyses show that prior to the release of the macroeconomic information, the persistency of volatility is lower when compared to the persistency for the whole sample period of study. This low persistency remains even after the announcement has been made especially for the high-grade investment bonds. The announcements, however, cause substantial reactions in the moderate and lower rating bonds. This implies that the higher the risk premium the bond carries, the more it will be affected by the announcement of macroeconomic news.*

**Keywords:** Macroeconomic news, Corporate bonds, Credit spreads, Volatility, GARCH

## INTRODUCTION

Malaysia first developed its bond market in the 1970s, when the government started issuing bonds to meet the funding needs for the development of the country. By the mid 1980s, in contrast to the equity and government debt markets, the private debt securities market has still not achieved a level of reasonable maturity. The corporate sectors were heavily relying on finance from the banks for their funding needs as most of the credit intermediation in the country was done through the banking system. The over-reliance on short-term traditional lending sources to fund long-term development projects brought disaster to the private sectors during the 1997-1998 financial crises. As a result, the loan growth was slow during the post-crisis period as banking sector was tightening the credit policy. The lessons from the financial crisis demonstrated that a more efficient financing source was

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needed in addition to traditional bank loans. This crisis has certainly helped the government to focus on the development of the country's bond market.

The development of the Malaysian corporate bond market is attributable to several factors: comprehensive regulatory framework, strong infrastructure, political stability and sound macroeconomic policies. It has enjoyed enormous growth, rising from RM4.8 billion in private debt securities outstanding in 1987 to approximately RM585 billion in 2008, an increase of 45 times. In addition, the Malaysian corporate bond market contributes significantly to the country's economy where it represents 86.82% of the country's GDP in 2006 (in contrast to 57% of GDP in 1997). Based on market capitalization, Malaysian Bond market ranked 3rd after South Korea and China and accounted for around 8% of the total size of the Asian bond market. This shows the local bond market is undergoing a continuous development.

The benchmark source of information from the debt market is the credit spread and it has been used in many ways: I) used in the assessment of the financial stability and outlook as an indicator of credit risk, ii) as one of the indicators of the efficient functioning of credit markets, iii) indicator of a country's business cycle. From late 2006 to end of 2008, credit spreads on Malaysian corporate bonds were fairly stable. But following the US subprime-mortgage market crisis, these spreads began to widen beginning the third quarter of 2008. The widening of credit spreads happened not only in Malaysia, but also globally. Longworth (2008) pointed out that this phenomenon is attributed to several factors. Among them are drying up of market liquidity by corporations and excessive pessimism about expected default rates.

The cyclical behavior of credit spreads reflects the credit riskiness of bond investments. A rather important issue that has been a focus on this credit risk is the determination of factors that affect yield spreads of bonds. Various explanatory variables have been considered in the literature which includes liquidity (e.g. Chen, Lesmond and Wei (2007), Longstaff *et al.*, (2005)), equity market variables (e.g. Elton *et al*., (2001), Collin-Dufresne, Goldstein and Martin (2001), Campbell and Taksler (2002), Treasury market variables (e.g. Longstaff and Schwartz (1995), Duffee (1998), Morris, Neal and Rolph (2000)), and macroeconomic variables (e.g. Edwards (1984), Huang and Kong (2003)).

News on macroeconomics variables are released periodically and as these announcements may contain new information regarding the economy, investors are expected to react and therefore move the asset prices and market. Therefore, the focus of this paper is to test whether the volatility of credit spreads corresponds to the announcement of macroeconomic news. Specifically, the reactions of daily credit spreads to these announcements are examined. The remainder of the paper is

organized as follows. Section 2 presents an overview of the literature on credit spreads. Section 3 describes the data and methods employed, Section 4 discusses the results of the analysis, and finally Section 5 concludes the findings.

## LITERATURE REVIEW

According to survey carried out by Sundaresan (2000), credit spreads are an important and established research topic in finance and receive much attention as a measure of credit risk. Credit spread is the difference between the yields on a default able corporate bond and on a government bond of comparable time to maturity. Credit spreads exist because of the default risk inherent in corporate bonds, and they have been shown not to be constant over time. The fact that credit spreads appear to be volatile has prompted a search for factors that affect it. Most works on credit spread have focused on the determinants of bond yields and yield premier. Among the most common explanatory variables that are found important are factors that relate to the fundamentals of the economy. The ability of a country to service its debt depends on its fundamentals such as the relative size of its debt, its expected future revenues, its expected GDP growth rates, inflation, exchange rates and domestic interest rates. For example, Sachs (1985) examined the role of various macroeconomic and financial fundamentals in the debt crisis of the early 1980s in East Asia and Latin America regions. He rationalized empirically the use of certain economic fundamentals in the determination of the risk-premium in capital markets. In his discussion, he emphasized the importance of trade and exchange rate management for these nations' performance. He also argued that current account affects the default premium.

Using data of public guaranteed loans issued to LDCs between 1976 to 1980, Edwards (1984) investigated the determinants of the spread between the interest rates charged to a particular country and the London Interbank Borrowing Rate. It was found that the level of spread is positively related to the debt over GNP ratio and debt service to exports ratio. On the other hand, the spread is negatively related to the international reserves to GNP ratio and the propensity to invest.

Eichengreen and Mody (1998) somehow found that changes in spread over time are explained by market sentiment rather than by shifts in a country's fundamentals. In a related study, Min (1998) has classified variables that determine credit spread into four groups: (i) liquidity and solvency variables, (ii) macroeconomics fundamentals, (iii) external shocks and (iv) dummy variables. Liquidity and solvency variables, specifically, debt-to-GDP ratio, the international reserves-to-GDP ratio, the debt service ratio and export and import growth rates are found to be significant in the yield spread determination. The macroeconomic fundamentals that are found to be significant in the bond spread determination include the domestic inflation rate, net foreign assets as measured by the

cumulative current account, the terms of trade and real exchange rate. Min (1998), however, found that external shocks as measured by real oil price and international interest rates were not significant in the bond spreads determination. This finding is not consistent with earlier study by Hamilton (1983) who argued that oil shocks have been a central driving force of the business cycle and hence the higher the real oil price is, the higher will be the yield spread since it will cause recession worldwide, which was later confirmed by Gisser and Goodwin (1986) and Dotsey and Reid (1992).

In a study by Manzoni (2002), credit spreads appear to be negatively correlated with interest rate variables as well as the exchange rates against US dollar. On the other hand, credit spreads are found to be positively correlated with the business cycle variables. Using panel data framework and data from 16 emerging market issuers, Rowland and Torres (2004) try to identify the determinants of the spread and the creditworthiness. They concluded that the GDP growth rate, the external-debt-to-GDP ratio, the external-debt-service-to-GDP ratio, the debt-to-exports ratio, the reserves-to-GDP ratio, and the exports-to-GDP ratio have significant influence on the spread.

Other than factors that influence bond credit spreads, the impact of macroeconomic news on credit spreads has become a topic that has gained a lot of attention and discussions by financial analysts. This has led to a broad and extensive study on this issue. Macroeconomic news announcements are always referred as measurement of public information to test the efficiency of financial markets. The arrival of new information has been proven to have significant impact on prices of assets. As for the debt markets, macroeconomic news has a potential in driving the co-movement of corporate and treasury bond yield which eventually affect the spreads of these two bonds. An extensive literature has documented the importance of various announcements to the bond market. Grossman (1981) and Urich and Wachtel (1981), for example, has established the significance of money supply announcements to the bond market while Hardouvelis (1988), and Edison (1996) suggest the importance of employment, producer price index, consumer price index and other announcements to the bond market. Jones *et al.* (1998) found that these announcements are important to the market of treasury securities where market prices quickly incorporate the information from these announcements. A study performed by Balduzzi *et al*. (2001) support this finding. The impact of macroeconomic announcements varies with different grade of bond instruments. As Huang and Kong (2007) found out, these announcements mainly affect the high-yield bond of the US bond market.

## DATA AND METHODOLOGY

The period of this study runs from August 2006 to October 2009. Daily yields for the period 2001-2009 for various rating groups and maturity of bonds were extracted from the Bond Pricing Agency

of Malaysia. However, the yields reported were stable throughout 2001 to mid-2006. Changes in these yields were only obvious beginning August 2006. As a result, only data beginning this date were used in this study. Six categories of bonds for maturities 5-year, 10-year, 15-year and 20-year are chosen to represent three distinct features of rating groups and they are AAA, AA1, A1, BB1, B1 and B3. AAA and AA1 represent the high-grade investment bond that has superior safety for payment of financial obligations. A1 and BB1 are issues that have moderate safety for payment of financial obligations. Finally, B1 and B3 are high yield issues that have very low safety for payment of financial obligations. Table 1 below provides summary statistics for these six rating groups.

**Table 1: Descriptive statistics of daily credit spread**

| Rating | Maturity | Mean | Median | S.D. | Skewness | Kurtosis | Max. | Min. |
|---|---|---|---|---|---|---|---|---|
| AAA | 5 | 0.861 | 0.76 | 0.319 | 1.279 | 4.071 | 1.91 | 0.41 |
| | 10 | 1.124 | 1.08 | 0.319 | 1.623 | 5.958 | 2.23 | 0.55 |
| | 15 | 1.243 | 1.18 | 0.321 | 1.445 | 5.257 | 2.32 | 0.73 |
| | 20 | 1.356 | 1.32 | 0.362 | 1.004 | 3.856 | 2.45 | 0.71 |
| AA1 | 5 | 1.103 | 1.080 | 0.369 | 1.034 | 3.753 | 2.25 | 0.56 |
| | 10 | 1.420 | 1.320 | 0.398 | 1.130 | 4.192 | 2.65 | 0.73 |
| | 15 | 1.568 | 1.470 | 0.404 | 0.975 | 3.617 | 2.76 | 0.91 |
| | 20 | 1.715 | 1.640 | 0.444 | 0.713 | 2.903 | 2.93 | 0.95 |
| A1 | 5 | 2.989 | 2.920 | 0.815 | 0.233 | 1.619 | 4.70 | 1.64 |
| | 10 | 3.711 | 3.580 | 0.863 | 0.338 | 1.763 | 5.50 | 1.97 |
| | 15 | 4.155 | 4.040 | 0.908 | 0.133 | 1.910 | 5.91 | 2.04 |
| | 20 | 4.605 | 4.470 | 0.989 | 0.029 | 2.077 | 6.41 | 2.10 |
| BB1 | 5 | 9.254 | 9.120 | 0.589 | 0.151 | 2.639 | 10.67 | 7.80 |
| | 10 | 10.433 | 10.190 | 0.603 | 0.658 | 2.196 | 11.90 | 9.31 |
| | 15 | 11.033 | 10.78 | 0.567 | 0.549 | 2.445 | 12.39 | 9.64 |
| | 20 | 11.561 | 11.35 | 0.648 | 0.316 | 2.363 | 12.98 | 9.95 |
| B1 | 5 | 11.967 | 11.80 | 0.544 | 0.541 | 2.238 | 13.27 | 11.11 |
| | 10 | 13.919 | 13.66 | 0.581 | 0.465 | 2.221 | 15.27 | 12.67 |
| | 15 | 15.219 | 14.99 | 0.544 | 0.462 | 2.333 | 16.46 | 13.96 |
| | 20 | 16.325 | 16.12 | 0.640 | 0.369 | 2.175 | 17.73 | 14.87 |
| B3 | 5 | 13.784 | 13.24 | 1.726 | 1.973 | 6.156 | 19.88 | 12.29 |
| | 10 | 15.752 | 15.29 | 1.754 | 1.963 | 6.208 | 22.00 | 14.47 |
| | 15 | 17.088 | 16.64 | 1.812 | 1.939 | 5.935 | 23.34 | 15.49 |
| | 20 | 18.173 | 17.85 | 1.707 | 1.745 | 5.362 | 23.84 | 16.40 |

The table reports the descriptive statistics for the credit spreads. The third to seventh column contains the mean, the median, the standard deviation, the skewness, the kurtosis, the minimum and the maximum values of the spreads for full-sample period.

For all rating groups, the mean daily spreads portray the characteristics of an upward sloping yield curve. Magnitude of daily spreads increases as credit rating soars. Rating group B3 has the largest magnitude of daily spreads with spreads for the 15-year bond is as high as 23.34% and as low as 15.49%. Except for the B3 rating groups, the magnitude of daily spreads is largest for the 20-year maturity bonds. Median daily spreads decrease when corresponding credit ratings improve but

increase as maturity increases. The standard deviations daily spreads of B3 rating group also indicates a volatility curve that is almost hump-shaped with the 15-year maturity bond showing the highest volatility. In addition, generally, daily spreads are significantly positively skewed and fat tailed.

Unit root tests were performed on each series using the Augmented Dickey-Fuller test, including a constant term and a time trend. The lag-length was chosen using the AIC.[3] The null hypothesis of a unit root could not be rejected at any reasonable level of significance for each time series and for this reason, differenced data series are therefore applied.

The data for macroeconomics news are from Bank Negara (central bank of Malaysia) website. The news is released on the last Wednesday of the month through the release for distribution of the Monthly Statistical Bulletin (MSB) which provides reports on the condition of the country's economy for the past month. This report is discussed in four sections: price, monetary, banking system, and exchange rates and international system. News release on the Malaysian benchmark interest rates, Overnight Policy Rate (OPR) is also considered in this study. Unlike announcement on the distribution of MSB, announcement of the changes on OPR is only made once in two months.

The main goal of the paper is to study how public information moves the yields of bonds and eventually affect the credit spreads. First, the mean differences of the credit spreads for the pre- and post-announcement dates are determined. Since the release of the MSB is periodic and made on Wednesdays, seven business days of pre- and post-announcements are assumed appropriate for this study. Second, an analysis is performed to test whether the volatility of spreads corresponds to known properties of the news. In other words, the reaction of daily credit spreads to the periodic release of the macroeconomic news is examined. Since it is now common to measure volatility in financial time series using the GARCH model, this model is therefore used in this study. The preferred model is the GARCH (1,1) model proposed by Bollerslev (1986):

$$\Delta s_t = \mu_0 + \varepsilon_t$$
$$\sigma^2_t = \omega + \alpha\varepsilon^2_{t-1} + \beta\sigma^2_{t-1}$$

where $\Delta s_t$ denotes the first difference of the credit spreads on day $t$, $\varepsilon_t$ is a random variable with conditional mean zero and conditional variance $\sigma^2_t$.

## RESULTS AND DISCUSSION

[3] Optimal lag length of 3 is selected based on Akaike and Schwarz information criterion (AIC and SIC).

Table 2 shows the impact of macroeconomic news on mean credit spreads of bond issues for all rating groups and maturity periods. For the high-grade investment bonds, the significant differences in mean credit spreads between the pre- and post announcement dates is only visible in the 20-year maturity. For all other rating groups, the significant differences in mean credit spreads between the pre- and post-announcement dates exists for all maturities. This proves that the more risk premium carried by a bond, the more it is affected by the release of the country's macroeconomic news.

**Table 2: Mean differences in pre- and post-announcements**

| Rating Groups | Maturity | | | |
|---|---|---|---|---|
| | 5 | 10 | 15 | 20 |
| AAA | .349 | .207 | -.922 | -2.713* |
| AA1 | -.161 | -.629 | -1.566 | -2.602* |
| A1 | -2.902* | -3.649* | -4.337* | -5.105* |
| BB1 | -2.092* | -2.257* | -2.834* | -4.386* |
| B1 | 2.590* | 2.609* | 3.028* | 3.428* |
| B3 | 7.119* | 6.957* | 7.021* | 6.132* |

*denotes significant at 5% level

Table 3, Table 4 and Table 5 present the results of GARCH (1,1) analysis of the full-sample, as well as pre- and post-announcement dates. It is clear from Table 3 that the parameters $\alpha$ and $\beta$ in the GARCH (1,1) model are significant at the 5% level, and hence that the constant variance model can be rejected. Furthermore, the sum of the $\alpha$ and $\beta$ parameters for all ratings and maturities, ranging from 0.703 to 0.993 with an average of 0.914, is close to unity, and therefore, suggesting that the credit spreads for the full-sample data are in the high persistence of volatility.

$$\Delta s_t = \mu_0 + \varepsilon_t$$
$$\sigma^2_t = \omega + \alpha\varepsilon^2_{t-1} + \beta\sigma^2_{t-1}$$

Where $\Delta s_t$ denotes the first difference of the credit spreads on day $t$, $\varepsilon_t$ is a random variable with conditional mean zero and conditional variance $\sigma^2_t$. The sample extends from August 2006 to October 2009. z-statistic is given in parentheses.

**Table 3: GARCH (1, 1) process for full-sample period**

| Rating Groups | | Maturity | | | |
|---|---|---|---|---|---|
| | | 5 | 10 | 15 | 20 |
| AAA | α | 0.226 (3.183)* | 0.211 (3.876)* | 0.232 (3.284)* | 0.158 (3.560)* |
| | β | 0.477 (4.156) * | 0.742 (13.373) * | 0.709 (11.216) * | 0.826 (21.669)* |
| AA1 | α | 0.263 (3.525) * | 0.126 (4.459) * | 0.072 (3.795) * | 0.156 (2.828) * |
| | β | 0.573 (6.731) * | 0.837 (32.086) * | 0.892 (38.343) * | 0.837 (20.619) * |
| A1 | α | 0.340 (4.147) * | 0.343 (6.100) * | 0.238 (6.635) * | 0.167 (5.433) * |
| | β | 0.585 (9.599) * | 0.581 (14.036) * | 0.592 (16.721) * | 0.590 (14.109) * |
| BB1 | α | 0.283 (4.196) * | 0.244 (6.489) * | 0.193 (7.082) * | 0.185 (5.835) * |

| | | | | | |
|---|---|---|---|---|---|
| | β | 0.642 (11.804) * | 0.725 (24.242) * | 0.610 (17.732) * | 0.557 (13.840) * |
| B1 | α | 0.214 (5.371) * | 0.204 (5.146) * | 0.105 (5.431) * | 0.121 (4.193) * |
| | β | 0.721 (20.277) * | 0.774 (24.677) * | 0.822 (32.540) * | 0.840 (27.540) * |
| B3 | α | 0.029 (3.546) * | 0.076 (4.382) * | 0.061 (4.464) * | 0.054 (4.237) * |
| | β | 0.951 (64.032) * | 0.912 (51.316) * | 0.906 (48.940) * | 0.924 (54.940) * |

*****denotes significant at 5% ****** denotes significant at 10%

Prior to the announcement of the macroeconomic news, the parameters $\alpha$ and $\beta$ in the GARCH (1, 1) model (as presented in Table 4) are insignificant at the 5% level for the 5-, 15-, and 20-year maturity high-grade investment bonds. For other rating groups and maturities, the sum of the $\alpha$ and $\beta$ parameters ranging from 0.682 to 0.919 with an average of 0.792, which is much lower than the average of the full-period, indicating that there is a significant drop in the degree of persistence of volatility prior to the announcement of macroeconomic news. The value of parameter $\beta$ remains consistently higher than the value of parameter $\alpha$ for all rating groups and maturities similar to what evidenced in the full-sample period, indicating that volatility is persistent for both full-sample period and also for the period prior to the announcement of macroeconomic news.

Where $\Delta s_t$ denotes the first difference of the credit spreads on day $t$, $\varepsilon_t$ is a random variable with conditional mean zero and conditional variance $\sigma^2_t$. The sample is t-7 of the announcement dates. Z-statistic is given in parentheses.

**Table 4: GARCH (1, 1) process for pre-announcement period**

| Rating Groups | | Maturity | | | |
|---|---|---|---|---|---|
| | | 5 | 10 | 15 | 20 |
| AAA | α | 0.019 (0.242) | 0.147 (3.122)* | 0.032 (0.533) | 0.146 (1.564) |
| | β | 0.297 (0.129) | 0.728 (11.919)* | 0.719 (1.559) | 0.163 (0.383) |
| AA1 | α | 0.009 (0.371) | 0.067 (1.845)** | 0.017 (0.875) | 0.087 (2.019)* |
| | β | 0.669 (0.633) | 0.906 (21.831)* | 0.883 (16.938)* | 0.752 (9.216)* |
| A1 | α | 0.003 (0.076) | 0.109 (1.582) | 0.119 (1.886)** | 0.147 (1.794)** |
| | β | 0.853 (6.638)* | 0.595 (5.104)* | 0.709 (8.357)* | 0.535 (4.671)* |
| BB1 | α | 0.141 (2.202)* | 0.208 (3.129)* | 0.071 (3.775)* | 0.057 (3.583)* |
| | β | 0.725 (8.843)* | 0.487 (4.999)* | 0.739 (21.338)* | 0.693 (15.858)* |
| B1 | α | 0.186 (2.311)* | 0.093 (2.169)* | 0.038 (2.877)* | 0.051 (2.448)* |
| | β | 0.644 (7.049)* | 0.781 (11.018)* | 0.870 (26.542)* | 0.811 (13.890) |
| B3 | α | 0.034 (0.875) | 0.064 (2.175)* | 0.022 (2.199)* | 0.060 (1.665)** |
| | β | 0.881 (12.304)* | 0.852 (18.676)* | 0.920 (44.075)* | 0.859 (12.393)* |

* denotes significant at 5% ** denotes significant at 10%

Several days following the announcement of the macroeconomic news, the parameters $\alpha$ and $\beta$ in the GARCH (1, 1) model (Table 5) are significant at the 5% level except for the long-term high-grade

investment bonds and high-yield investment bonds. The sum of the $\alpha$ and $\beta$ parameters ranging from 0.778 to 0.998 with an average of 0.887, higher than the average of the pre-announcement period, which suggests that there is a significant increase in the volatility persistency following the announcement of the macroeconomic news. This persistency, however, is lower than the persistency of the full-sample period. The parameter $\alpha$ for the short-term high-grade investment bonds (AAA 5-year, AA1 5-year A1 5-year) is significantly higher than the parameter $\beta$, which indicates that for these bonds, volatility reacts intensely to the shocks and therefore the volatility tends to be spikier.

$$\Delta s_t = \mu_0 + \varepsilon_t$$

$$\sigma^2_t = \omega + \alpha\varepsilon^2_{t-1} + \beta\sigma^2_{t-1}$$

Where $\Delta s_t$ denotes the first difference of the credit spreads on day $t$, $\varepsilon_t$ is a random variable with conditional mean zero and conditional variance $\sigma^2_t$. The sample is t+7 of the announcement dates. Z-statistic is given in parentheses.

**Table 5: GARCH (1, 1) process for post-announcement period**

| Rating Groups | | Maturity | | | |
|---|---|---|---|---|---|
| | | 5 | 10 | 15 | 20 |
| AAA | α | 0.585 (2.951)* | 0.231 (2.707* | 0.374 (2.526)* | 0.191 (1.086) |
| | β | 0.270 (2.402)* | 0.572 (4.104)* | 0.501 (3.991)* | 0.539 (1.501) |
| AA1 | α | 0.707 (2.221)* | 0.399 (3.062)* | 0.139 (2.295)* | 0.214 (1.938)** |
| | β | 0.082 (0.693) | 0.597 (6.004)* | 0.639 (6.321)* | 0.609 (4.732)* |
| A1 | α | 0.481 (2.445)* | 0.280 (2.151)* | 0.155 (1.376) | 0.145 (1.658)** |
| | β | 0.470 (4.139)* | 0.631 (5.432)* | 0.652 (4.184)* | 0.673 (5.505)* |
| BB1 | α | 0.479 (2.374)* | 0.348 (2.619)* | 0.278 (3.409)* | 0.272 (2.593)* |
| | β | 0.507 (5.417)* | 0.647 (6.995)* | 0.557 (5.845)* | 0.568 (4.826)* |
| B1 | α | 0.394 (2.689)* | 0.244 (2.775)* | 0.318 (2.061)* | 0.155 (3.253)* |
| | β | 0.599 (7.364)* | 0.686 (9.686)* | 0.651 (7.555)* | 0.694 (10.284)* |
| B3 | α | 0.194 (2.357)* | 0.202 (1.969)* | 0.147 (2.406)* | 0.046 (1.513) |
| | β | 0.804 (12.731)* | 0.795 (10.913)* | 0.785 (12.954)* | 0.770 (6.045)* |

* denotes significant at 5% ** denotes significant at 10%

Although the parameter $\beta$ in the GARCH (1,1) model for the pre-announcement period is lower than the parameter of the full-sample, higher parameter $\beta$ is present in almost all rating groups for all maturity periods for pre-announcements date sample compared to the post-announcements date sample. This indicates that during the pre-announcement dates, more of the realized variance in the previous period is carried over into the current period.

To check for the adequacy of the estimated GARCH (1,1) model, two tests were performed on the residuals: Box and Jenkins (1976) methodology for up to third order serial correlation of the squared standardized residuals, and the LM-test for ARCH(3). The statistics on the standardized residuals are given in Table 6 below. Overall, as is evident from the table, and except for rating group B3, the

statistics on the standardized residuals resulting from the GARCH (1,1) model confirm that it is a good representation of the volatility process of the daily credit spreads.

**Table 6: Diagnostic tests for the GARCH (1, 1) model**

| Rating Groups | Maturity | Q(3) square | ARCH(3) |
|---|---|---|---|
| AAA | 5 | 2.521 | 0.8223 |
| | 10 | 1.195 | 0.387 |
| | 15 | 0.753 | 0.257 |
| | 20 | 4.203 | 1.464 |
| AA1 | 5 | 0.623 | 0.213 |
| | 10 | 0.413 | 0.134 |
| | 15 | 0.299 | 0.098 |
| | 20 | 2.847 | 0.932 |
| A1 | 5 | 1.155 | 0.398 |
| | 10 | 0.438 | 0.147 |
| | 15 | 0.644 | 0.218 |
| | 20 | 0.502 | 0.166 |
| BB1 | 5 | 0.929 | 0.301 |
| | 10 | 1.229 | 0.416 |
| | 15 | 0.7295 | 0.245 |
| | 20 | 1.339 | 0.454 |
| B1 | 5 | 0.345 | 0.112 |
| | 10 | 0.816 | 0.273 |
| | 15 | 1.459 | 0.472 |
| | 20 | 1.815 | 0.603 |
| B3 | 5 | 28.438* | 10.514* |
| | 10 | 5.5655 | 1.886 |
| | 15 | 3.44 | 1.218 |
| | 20 | 0.248 | 0.083 |

The table reports the diagnostic tests for the GARCH (1,1) model. For each category, the Ljung-Box Q-statistics for up to third order autocorrelation of the squared standardized residuals is stated, followed by the LM test statistic for the null hypothesis of ARCH (3)

*Indicates that the test statistic is significantly different from zero at the 5% level of significance.

## CONCLUSION

Financial asset prices are volatile and understanding the determinants of asset prices and how the market process information that relates to the determinants is crucial. Volatility of asset prices reflects the economic fundamentals of a country. Rising bond prices and low volatility are an evidence of increased confidence in commitments to price stability. High volatility, on the other hand, reflects a disorderly market. In this paper analysis of the volatility of credit spreads and how it reacts to the arrival of public information is examined. The credit spread of corporate bond is defined as the yield of the corporate bond minus the yield of a government bond with identical time to maturity. The analysis reveals that credit spreads of the Malaysian bond market are affected by the

macroeconomic news. In general, the sum of the ARCH and GARCH terms are close to unity, which imply that through the whole sample period, the credit spreads have high volatility. Prior to the release of the macroeconomic information, there is an evidence of 'calm' in the credit spreads as reflected by its lower persistency of volatility during the pre-announcement period. Specifically, when the markets know that a shock is coming, the volatility decreases. This low persistency remains even after the announcement has been made especially for the high-grade investment bonds. The results show that the macroeconomic announcements cause substantial reactions in the moderate and lower rated bonds. This implies that the higher the risk premium the bond carries, the more it will be affected by the announcement of macroeconomic news.

Much remains for further research. In particular, the results of this study are limited in that it only examines the response of credit spreads to announcements of macroeconomic news. This news is expected in terms of its arrival, and the analysis carried out therefore, corresponds to the known properties of the news. The type of news released is also limited and as a result, there is an inability to accurately measure the impact of various news announcements on credit spreads. The shock due to these announcements might also provide some insights about the shape of the yield curve. The effect of the announcements of macroeconomic news on other assets is also an area worth to be explored.

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