

## THE ANALYSIS OF THE CREDIT SPREAD BONDS FOR BANKING SUB-SECTOR EFFECT IN 2014 – 2016

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**ABSTRACT:** *The credit spreads are the interpretation of the bond returns received by investors as measured by the difference between the corporate bonds yield rate and government bonds. The purpose of this study is to analyze the impact of changes in macroeconomic variables. Such as volatility of stock returns, default probability and inflation on banking sub-sector credit spread bonds. This study analyzes the change of credit spreads bonds based on the category of the grades, the investment grade and non-investment grade. The data were analyzed using panel data which consist of several companies with investment grade and non-investment grade categories during 2014 - 2016. The result showed that the relationship of default probability and inflation variables had significant effect in the credit spreads of investment grade bonds, while the variable volatility of stock return had no significant effect. While significant effect was found in the non-investment grade bonds, the variable volatility of stock returns, default probability and inflation.*

**KEYWORDS:** Credit Spreads, Volatility of Stock Returns, Default Probability, Inflation, Panel Data

### INTRODUCTION

Bond is one of the fund resource aside from profit, bank loan and stock. Levingeret *al.* (2014) stated that bond is an effective company funding as the yearly rise of bond market. According to Bank of Indonesia (2016) statistic data, many investors are put interest on bond market that resulted to the rise of bond issuance of issuer and government.

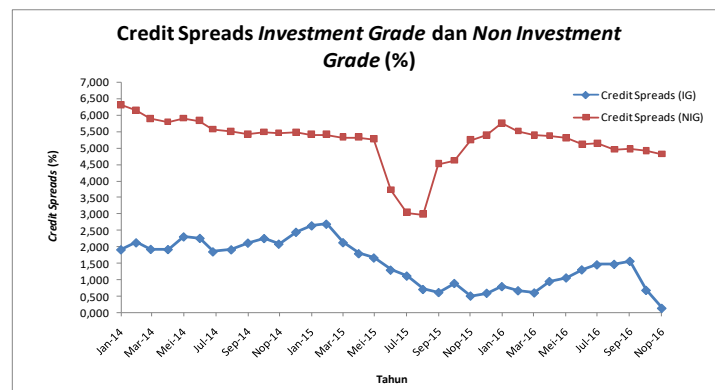
**TABLE 1: Business Corporate Obligation in 2016**

No	Business Sector	Outstanding (Billion)
1	Banking	124.977.665
2	Non-Banking Financial Institution	70.670.365
3	Trade. Service and Investment	9.162.865
4	Property, Real Estate, Infrastructure, Construction	26.872.865
5	Mining	14.252.465
7	Infrastructure & Transportation	21.751.865
8	Food Industry	5.415.865
9	Agriculture	6.395.865
10	Telecommunication	26.360.865
11	Basic industry & Chemicals	5.817.865

Table 1 shows that banking sector dominate corporate bond market. The corporate use of bond

as funding is the main reason of this phenomena. Moreover, the investors prefer to invest in this sector as it indicates huge funding. Indonesia Stock Exchange (2016) recorded that banking sector has Rp. 124.977 trillion outstanding value. Therefore, banking domination in corporate bond correlates to long-term equity needs. It is also one of major actor in a country economy growth, both for the community and industry sector.

In fact, the yield is used as an investment foundation as it defines the investor rewards. The investors want yield to maturity (YTM) components as a risk-free rate government bond added to certain credit spreads which adequate to bond credit quality. The bond market trade instrument are categorized by rating, as the investment grade and non investment grade. The obligation credit spreads of investment grade and non-investment grade, as follows:



**FIGURE 1: Credit spreads bond categorized as Investment Grade and Non-Investment Grade**

Credit spreads for non-investment grade category has bigger value than investment grade. Thus, the non-investment grade risk level is bigger than investment grade as a result of bigger yield. The conversion of credit spreads is the key of investors' decision making in terms of bond return request (Cui et al. 2013). However, in the middle of 2015, there were a degradation of credit spreads, both on investment grade or non-investment grade. The degradation showed in graphics was the result of yield degradation related to the increase growth of 2015 state budget. This growth of the state budget was a sign of gasoline subsidization contribution. In addition, the depreciation of Rupiah in the mid-year added into a supporting contribution. The stable market caused the investor to be more risk averse. On the contrary, the non-investment grade had the highest degradation as the result of investors' risk averse behavior.

However, there were only few research that conducted on Indonesia 2014 - 2016 credit spreads bond influential factors. If the influential factors of Indonesia credit spreads bond market and its dynamic movement clearly acquired, the bond prices in secondary market would be predicted.

Based on the above explanation, the problem statements of this study are as follows:

1. How were the dynamic movement of 2014-2016 banking sub-sector credit spreads bond on both investment grade and non-investment grade?;
2. How were the influence of default probability, volatility of stock return and the 2014-2016 inflation towards banking sub-sector credit spreads bond investment grade?;
3. How were the influence of default probability, volatility of stock return and the 2014-2016 inflation towards banking sub-sector credit spreads non-investment grade?

## LITERATURE

### Credit Spreads

The yield spread known as the credit spreads is the difference between the yield to maturity of two bonds, which involves corporate bonds and other bonds (often used for financial department securities) that have the same maturity and coupon rate (Sharpe et.al 1995). The greater the default risk the higher the yield spread. Credit spreads are one measure of credit risk that indicates the additional rate of yield investors can get from higher-risk bonds with lower-risk bonds. Credit spreads (CS) are proxied by the difference in yield to maturity (YTM) between bonds corporation (Corporate Bond / CB) with government bond (Government Bond / GB). Credit spreads (CS) represent the difference between the yield to maturity of corporate bonds and the yield to maturity of government bonds as benchmarks. According to Sharpe et al (1995) credit spreads can be calculated by the formula:

$$\text{Credit Spread (CS)} = \text{YTM}_{\text{OK}} - \text{YTM}_{\text{OP}}$$

### Volatility of Stock Return to Credit Spread

According Firmansyah (2006), volatility is a statistical measure for the fluctuation of the price of a security or commodity during a certain period. Given that volatility can be presented with standard deviation, the public also perceives volatility as a risk. The higher the level of volatility, the higher the level of uncertainty of the stock returns that can be obtained. The volatility of stock market returns is the fluctuation of various returns of a securities or portfolio within a given period of time in a stock market. Volatility represents the risk of returns so that they can be measured by the standard deviation.

According to Cui et.al (2013) stock market data can be an explanatory variable for credit risk, where both relationships are in good condition if stock prices will increase and credit risk will decrease and credit spreads will narrow. When the stock's volatility is on the rise, to avoid risk (risk-averse) funding needs can flow into the bond market so as to reduce credit spreads. In calculating the volatility of the stock market return can be interpreted through the calculation of the standard deviation of the return.rumus used (Bodie, Kane, Marcus, 2008) as follows:

$$\sigma = \sqrt{\frac{1}{n} \sum_{t=1}^n (R_t - \bar{R})^2}$$

### Inflation on Credit Spread

Inflation is the general rise in commodity prices caused by the lack of synchrony between the procurement program of commodities (production, pricing, printing of money and so on) with income levels owned by the public. According to the definition of Bank Indonesia, inflation is simply a continuous increase in prices, but if a price increase occurs in only one or two items it can not be called inflation, it can be said that inflation when general and widespread price increases can lead to price increases in goods others.

According to research by Dbouk and Kryzanowski (2010), on the inflationary relationship to credit spreads, inflation can have a significant effect on credit spreads. This means that when

inflation increases, the circulation of money in the community is very high and causes the price to be high, so people prefer to invest their funds in the long term and safe with the expected value of money owned in the future will be higher and benefit. The profit is obtained with fixed coupon conditions paid periodically so that bond prices will rise and cause the yield will decrease. This condition causes its credit spreads to experience a declining movement. As expressed by Nurfauziah and Setyarini (2004), that the highly volatile fluctuations in inflation impacts securities investment because with an increase in inflation means investing in short-term securities such as shares are considered to be at higher risk.

### **Default Probability on Credit Spread**

According to Gallati (2003), the default risk is part of credit risk. Credit risk is defined as the risk at which the counterparty will not repay its obligations in full value, either at maturity or at a later date. While the default risk is defined as the risks faced by the inability of the issuer to pay its obligations well. The rating of bonds is interpreted as an indication of the possibility of default issuer.

Therefore, investors in ranking use should not only expect a reflection of statistical factors alone, as they are a long-term risk assessment, including non-statistical factor considerations (Moody, in Sharpe et al., 1995). In measuring the default risk can be calculated with the default probability approach that can be searched by using the Z-Score equation found by Altman. In addition, the default probability can be calculated using the Bayes formula approach (Defusco et al, 2001). According to Richard Defusco et al (2001) the default probability is calculated using the Bayes formula approach, ie:

$$DP = 1 - \frac{(1 + Rf)}{(1 + R)}$$

According to research Dbouk and Kryzanowski (2010), that the relationship of default risk to the credit spread is having a significant effect. It is also supported by Tan and Yan (2010) research which examines that credit risk (default) shows a more influential portion of the movement of credit spreads. Based on the results of the study, the relationship between bond rating and default risk is related to each other. This is because the rating of bonds is an indicator of timeliness of payment of principal and interest on bond debt, in addition to the rating of the bonds reflect the risk scale of all bonds traded. Thus the rating of bonds shows the security scale of bonds in paying principal and interest obligations in a timely manner. The higher the rating of bonds, the more avoidance of credit risk which means that the lower the default risk, thus causing the movement of credit spread is increasing.

### **METHODOLOGY**

The writer used secondary data from Indonesian relevant institutions periodically. The institutions were Indonesia Stock Exchange, Indonesia Bond Market Directory and Central Bureau of Statistics. The population of this research were the 2014 - 2016 government and corporate bond in Indonesia Stock Exchange. The researcher chose this period as the momentum of rise of government and corporate bond trading. This research conducted government and corporate bond. Corporate bond data consists of investment grade bond and

non investment grade bond. There are 5 companies corporate bond investment grade and 3 companies non investment grade bond.

The sample selection criteria were as follows:

1. The government and corporate bond issued between 2014-2016;
2. Banking corporate bond issued between 2014-2016;
3. The government and corporate bond had maturity above 2014;
4. The corporate bonds had rating investment grade and non-investment grade in 2014 – 2016;
5. Go public corporates that had issued comprehensive financial report.

The data were processed using the Eviews 9 program. This research applies panel data method which expected to give overview in the influence of Indonesia credit spreads bond variables. The use of panel data method was based on Pierre Collin et.al. 2001 research. There were two models to be used, there were investment grade and non-investment grade, as the figure below:

The general models used in this study were as follows:

$$CSIG_{it} = \alpha_i + \beta_1 VRSIG_{it} + \beta_2 Inf_{it} + \beta_3 DP_{it} + \varepsilon_{it} \quad (1)$$

$$CSNIG_{it} = \alpha_i + \beta_1 VRSNIG_{it} + \beta_2 Inf_{it} + \beta_3 DPNIG_{it} + \varepsilon_{it} \quad (2)$$

## EMPIRICAL RESULTS

### Selection of the Best Model

In the panel data method there are several econometrics models such as Pooled Least Square (PLS), Fixed Effect Model (FEM), and Random Effect Model (REM). Several test is required to determine the most appropriate econometrics models. The Chow test was used to determine whether the FEM or PLS. Meanwhile, the Hausman test was used to determine whether the REM or FEM.

**TABLE 2: Best Model Selection Results For Two Models**

	Investment Grade Model	Non Investment Grade Model
	<b>FEM</b>	<b>PLS</b>
<b>Chow Test</b>	<i>p</i> (0.000)	<i>p</i> (0.5378)

Source: Eviews 9

In Table 2 showed in investment grade model that the probability value of the Chow test (0.0000) smaller than the real level of 5 percent, which means the FEM model. And in non

investment grade model that the probability value of the Chow test (0.0000) bigger than the real level of 5 percent, which means the PLS model.

### Classical Assumption Test Results

Classical assumption test is necessary to be conducted so that the model can produce an estimator that meet Best Linear Unbiased Estimator (BLUE) criteria. Classical assumption tests include normality test, multicollinearity test, heteroscedasticity test and autocorrelation test.

**TABLE 3: The results of the classical assumption test**

Information	Value	
	Investment Grade Model	Non Investment Grade Model
Prob chi-squared (resid) *)	0.19270	0.2030
Prob chi-squared (resid) **)	0.21000	0.3180
Prob (Jarque Berra)	0.47514	0.0635

Source: Eviews 9

\*) Autocorrelation Test

\*\*\*) Heteroscedasticity Test

### Normality Test

In the first model that investment grade model, Jarque-Berra probability value of 0.47514 indicates that the probability value is bigger than the real level of  $\alpha$  of 5 percent. Probability is bigger than the 5% significance level indicating  $H_0$  is accepted and the residual is normally distributed. And then in the second model that non investment grade, Jarque-Berra probability value of 0.06535 indicates that the probability value is bigger than the real level of  $\alpha$  of 5 percent. Probability is bigger than the 5% significance level indicating  $H_0$  is accepted and the residual is normally distributed.

### Multicollinearity Test

Multicollinearity testing is by looking at the value of correlation between independent variables. The correlation value between independent variables is not high (no more than 0.8) so it can be said there is no multicollinearity problem in the both model.

### Heteroscedasticity Test

Heteroscedasticity test aims to see whether in a regression model there is a variation inequality between residuals of observation to another observation. The results of the tests that have been performed show the probability value prob chi-squared on white heteroskedasticity test on both models with  $\alpha$  of 0.05 or 95 percent confidence interval, indicating a value bigger than  $\alpha$ . Therefore it can be concluded that the model in this study does not contain heterokedastisitas. In Table 3 prob chi-squared value obtained in the first model is 0.2100 so there is no problem of heteroscedasticity and the second model is 0.03180 so there is no problem of heteroscedasticity.



**Autocorrelation Test**

This autocorrelation occurs in general in the time series data. The autocorrelation test was performed using The Breusch - Godfrey (BG) test. Based on test results that have been done with  $\alpha$  of 0.05 or 95% confidence interval shows the value of prob chi-squared is greater than  $\alpha$  for both models. So it can be concluded that the model in this research does not contain autocorrelation or free autocorrelation. In Table 3 it can be seen that the prob chi-squared value obtained in the first model is 0.1927 so there is no problem of autocorrelation and then prob chi-squared value obtained in the second model is 0.2030 so there is no problem of autocorrelation.

**Descriptive Analysis**

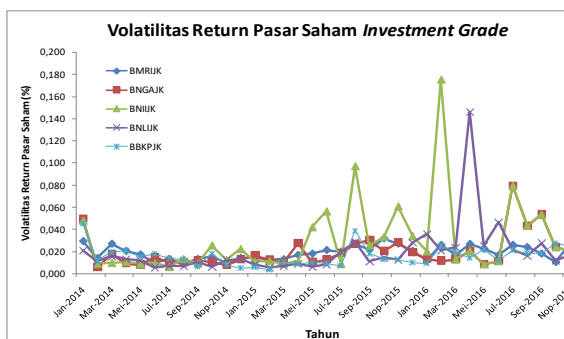
**Default Probability Investment Grade Bond and Sub-Sector Banking Non-Investment Grade Bond**

Default probability theory has high influence in bond prices issue. The higher the issuers' default risk, the prices will fall down and yield will go up. The result will be a contrary to bond yield. On investment grade bond, the default probability shows the average of 0.3 or 30 percent. On PT Bank Mandiri Tbk (The Mandiri Bank) issuer had the lowest default probability value in 2014 - 2016 compared to the five other issuers. The value resulted as the bank has high value. Consequently, there was a low risk of failure in default probability. Bringham dan Houston (2006) argued that high bond quality shows the failure of the probability.

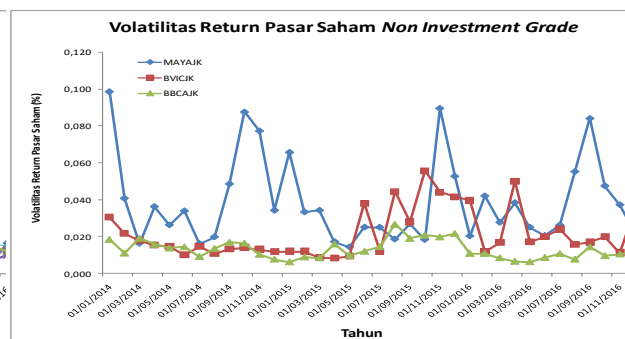
The non-investment grade bond rating had high default probability value, at the average above 0.4 or 40 percent. The highest average value in 2014-2016 served by PT Bank MAYAPADA International Tbk. Although there are some factors to be explained, one of the major factor was the low profitability value in 2014 which resulted to its default risk.

**Volatility of Investment Grade Bond Stock Return and Banking Sub-sector Non-Investment Grade Bond**

According to Sandrasari (2010), the Volatility of Stock Return is the movement of the stock return. It shows the fluctuated stock price pattern which determines the stock return value.



**FIGURE 2. The Volatility of Investment Grade Bond Stock Return**



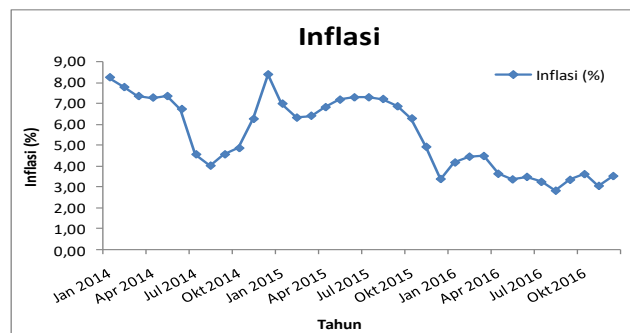
**FIGURE 3. The Volatility of Non Investment Grade Bond Stock Return**

The figure 2 shows that volatility of investment grade stock return has different trends compared to volatility non investment grade bond (figure 3). The most fluctuated pattern occurred in 2014 to 2016. It happened to PT Maybank Indonesia Tbk and PT Bank Permata Tbk. It indicates the instability of stock prices. Whereas, PT Bank Mandiri, had a stable volatility of investment grade stock market.

The volatility of investment grade stock return has different trend on non-investment grade. As can be seen in Figure 3, it is clearly seen that the issuers had fluctuated trends. The fluctuated one occurred to PT Bank Mayapada International. One of the major factors covered on the drastically degradation stock prices which affected by unpredictable macro economy situation. Moreover, the investors' risk averse behavior in stock investment also affected the fluctuation. Most of the investors chose stable financial ratio of bond issuers.

### Inflation

Inflation is one of monetary crisis moments where there is a tendency of increasing the goods prices. In 2014, Indonesia's inflation tend to degrade. It can be seen from January 2014 inflation movement to April 2014. The inflation value was 7% as affected to gasoline subsidy. This condition led to the instability of fiscal as the government gave high amount of subsidy. In January 2014, the inflation showed 8,22% and in April 2014 has degraded to 7,25% (Bank Indonesia 2014). The graphic can be sen on figure 6, which the inflation degradation occurred until 2014 quarter.



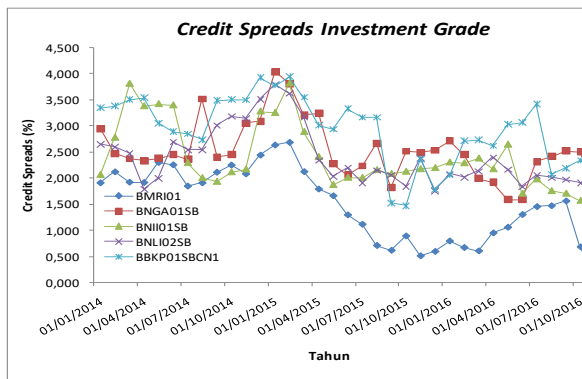
**FIGURE 4. 2014 – 2016 Inflation in Indonesia**

In 2015, the second quarter showed significant changes to 6,47% or higher than the previous quarter survey in 5,67%. This description correlates with Rupiah exchange rate, the inventories, and stable commodity of distribution (Bank Indonesia 2015).

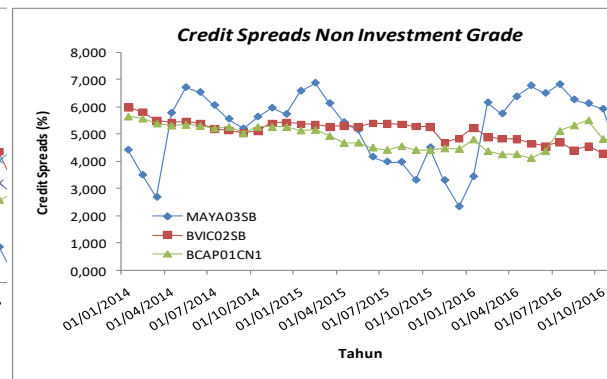
### The growth of Credit Spreads Investment Grade Bond and Banking Sub-sector Non-Investment Grade Bond

Credit spreads is the reflection of additional yield from high - risk bond which depends on low-risk bond (Sharpe, et al 1995).





**FIGURE 5. The growth of Credit Spreads Investment Grade Bond**



**FIGURE 6. The growth of Credit Spreads Non-Investment Grade**

Figure 5 shows the different movement of banking sub-sector credit spreads investment grade bond on its issuers. The credit spreads investment grade had approximately 4 percent value. It suggested that the low credit spreads value resulted to the bargaining amount of yield. Equally, this low yield value offered bigger bond price. As the correlation between yield and bond price are inversely proportional. On investment grade, The Mandiri Bank credit spreads issuers has low value than others.

Figure 6 showed that credit spreads non-investment grade has bigger value than credit spreads investment grade. It indicated that the credit spreads value on this category was high. As defined by the offered yield value on the high value difference between bonds. The high yield value indicated the low value of bonds as it inversely proportional. The high value of yield offering attracted investors to invest in regard of the issuers. On investment grade category, The Mandiri Bank credit spreads issuers had the lowest value of all.

**The Effect of Volatility stock return, default probability and inflation of banking sub-sector credit spreads**

**TABLE 4: The estimation results using fixed effect model (FEM) of the effect of volatility stock return, default probability and inflation of investment grade credit spreads.**

Independent Variables	Dependent Variable: Credit Spreads Investment Grade
C	-0.23889 (0.0000)***
VRS	-1.15030 (0.0789)***
INF	4.49426 (0.0000)***
DP	10.8534 (0.0000)***
<i>Adjusted R-Squared (R<sup>2</sup>)</i>	0.000000
<i>Prob(F-statistic)</i>	0.000000

The figure inside ( ) isp-value

\*\*\* mean that the figure is significant at the significance level of 5%

Source: Eviews 9

**TABLE 5: The estimation results using Pooled Least Squared (PLS) of the effect volatility stock return, default probability and inflation of non-investment grade credit spreads model**

Independent Variables	Dependent Variable: Credit Spreads Non-Investment Grade
C	-0.11996 (0.73150)***
VRS	7.64629 (0.0023)***
INF	8.95679 (0.0000)***
DP	12.27459 (0.0000)***
<i>Adjusted R-Squared (R<sup>2</sup>)</i>	0.000000
<i>Prob(F-statistic)</i>	0.000000

Information: the figure inside ( ) is p-value

\*\*\* mean that the figure is significant at the significance level of 5%

Source: Eviews 9

The result of the first regression was the default probability and inflation gave significant influence to credit spreads investment grade, while the volatility stock return had no influence on credit spreads investment grade. On the second regression model, the three variables, default probability, volatility stock return and inflation had significant influence to non-investment grade credit spreads.

The first default probability variable model, the investment grade had 0.000 probability value with  $\alpha$  equal to 5 percent and 10.853 coefficient. The result indicated that the first default probability had significant influence to credit spreads investment grade. On the second model, it had 0.000 probability with  $\alpha$  equal to 5 percent and 12.274 coefficient. Basically, those indications in line with default probability theory. When the higher corporate bond default risk is, the more the corporate have to offer higher yield. This occurred to compensate investors' risk that resulted to the rise of credit spreads. According to Jorion and Zhang (2007), the rating bond had correlation to default probability, where the research had stability tendency on higher bond ratings. In addition, rating information is used as frequency comparison. As the potential chance of having the same default probability to other corporates.

The default probability phenomena indicated by rating distribution of rating institution to the companies. For instance, The Mandiri Bank was awarded AA+ rating by Pefindo (as rating institution) on its December 2009 bonds. Periodically, The Mandiri Bank showed excellent performance that resulted to higher rating in 2011. Pefindo awarded AAA rating. This rating became permanent from 2011 to 2016. These ratings had inversed relation to default probability, which showed in table 10. This table showed that Mandiri Bank had low default risk by its high rating.

Accordingly, Dbouk and Kryzanowski (2010) stated that the correlation between default risks to credit spread had positive significance. The research conducted by Tan and Yan (2010)

proved that credit risk (*default*) showed more significant influence to credit spreads. On the contrary, Cui, et al (2013) argued that default had no negative influence on credit spreads.

The first model of volatility stock return variable, investment grade had 0.0789 probability value with  $\alpha$  equal to 5 percent and -1.1503 coefficient. The result indicated that the first model of volatility stock return had no significant value of credit spreads investment grade. On the second model, had 0.0023 probability with  $\alpha$  equal to 5 percent and 7.646 coefficient. It indicated that volatility of stock return had significant value to credit spreads investment grade.

The non-investment grade model had significant influence to credit spreads, it stated by Goh and Ederington (1993) where the degradation of rating resulted by the corporate conversion leverage. Showing the equity transfer from the bond holder to shareholder. Moreover, according to Dichev and Pioskoski (2001), the correlation between bonds and downgrade rating had significant influence to stock return. On the contrary, the upgrade rating had no significant influence to stock return.

In fact, the negative effect of investment grade model can be defined in high risk high return principle, when low-risk investment grade bond could not offer high return. Whereas, yield can be offered to non-investment grade bond. In other words, the stock substitution of investment instrument is the non-investment grade bond.

The first model of inflation variable which was the investment grade had 0.000 probability value with  $\alpha$  equal to 5 percent and 4.494 coefficient. The result indicated that the first inflation model had significant influence to credit spreads investment grade. In the second model, it had 0.000 probability value with  $\alpha$  equal to 5 percent and 8.956 coefficient. Along with these numbers, the rise of inflation stimulated the rise of commodities and gold prices. Furthermore, this inflation effected the rise of bond price and costed the degradation of yield. This had a domino effect in degradation credit spreads. According to Rahman et.al (2013) there is a positive influence between inflation and yield bond. Nurfauziah and Setyarini (2004), also stated that the fluctuated inflation rate had significant effect to securities. This condition is determined as high-risk investment by the investors. In addition, Dbouk and Kryzanowski (2010). Stated that inflation had significant influence on credit spread.

### **Managerial Implications**

Based on the results of the analysis conducted on the variables affecting credit spreads, it can be formulated managerial implications as follows:

1. For investors, they can use non-investment grade bond as an alternative investment substitution when there is increasing volatility in the stock market. Conversely, for risk-averse investors, it is recommended to invest in investment grade bond;
2. For the bond issuer, the company must maintain and improve the company's financial performance so that the default risk can be maintained, because if the default risks increase, the bond yield and the bond coupon (assumption issued at par value) will increase, which will ultimately burden the company's interest expense;
3. For regulators, the financial services Authority as a capital market regulator should review the licensing of bond issuance to the company. Associated with the issuance of the bond issuance, the financial services authority must review the financial performance of the company that will issue the bond, in order to avoid default risk in the company.

## CONCLUSION

The 2014-2016 banking sub-sector credit spreads had various fluctuation in its issuers. Credit spreads investment grade had lower value and stable. Whereas, credit spreads non- investment grade had higher value and fluctuated.

From the simaltenous test to both models, the investment grade and non-investment grade, it can be concluded that the default probability, volatilitas stock market return and inflation had significant influence on credit spreads. Furthermore, the partial test to both models, the first model from the three variables, it can be concluded that there are only two significant variables to credit spreads investment grade. They are default probability and inflation variables. On the second models, from the three variables, they have significant influence to non-investment grade credit spreads. The variables are default probability, volatility of stock market return and inflation.

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