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## **Effect of Bond Age, Interest Rate and Inflation Level of Bond Results**

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### **Abstract**

Bonds are chosen by investors as investment instruments because they have a fixed return in the form of interest or coupon bonds and yields with a low level of risk. The purpose of this study was to determine the relationship and influence of bond age, interest rates and inflation on bond yields. The methodology used in this study is quantitative research design. The sample of this study is conventional government bonds listed on the IDX in 2018 determined using the purposive sampling method. Data analysis method used in this research is quantitative data analysis to calculate and estimate quantitatively some independent variables on the dependent variable partially or simultaneously. The results in this study indicate that partially the age of bonds does not have a significant effect on government bond yields, partially the interest rate has a significant effect on government bond yields and partially inflation does not have a significant effect on government bond yields. While simultaneously the age of bonds, interest rates and inflation have a significant effect on the yield of government bonds listed on the IDX in 2018.

*Keywords: Bond Age, Interest Rates, Inflation, Bond Yields*

### **1. Introduction**

The capital market is a long-term market that trades several investment instruments to investors. Investors can make these instruments as an investment field to get the desired returns. Investment is one of the important activities for companies and countries to encourage their economic activities. One investment instrument that is traded on the capital market is bonds. Bonds are chosen by investors as investment instruments because they have a fixed return in the form of interest or coupon bonds and yields with a low level of risk when compared to investments in the form of shares. Of the several types of existing bonds, government bonds are pretty much looked at by investors as an investment choice because they have the lowest risk or can even be classified as a risk-free rate because the returns are guaranteed by the government so there is no risk of default.

For a country, bonds become one of the important alternative financing besides bank financing through loans (Paramita & Pangestuti, 2016). Investors who invest in bonds can monitor the movement of the development of the government bond market by paying attention to bond yields or referred to as yields. The higher the bond yield, the more it is worth investing. However, the nature of yields is not fixed like bond interest because bond yields tend to be related to the expected returns of investors.

The age of bonds is one of the characteristics of government bonds that investors consider. In general, the longer the bond's maturity, the greater the level of uncertainty so that the greater the risk of maturity (Ma'arij & Zulbahridar, 2014). Therefore, the longer the bond maturity, the investor will expect greater returns as a form of compensation for these risks. One factor that influences other bond

yields is the interest rate. The large interest rate is used by investors as a basis for the expected rate of return (Purnamawati, 2010). In addition, an increase in inflation in an economic condition tends to drive up interest rates in general. So, when investors estimate an increase in inflation, they will ask for compensation in the form of a higher yield (Paramita & Pangestuti, 2016).

There are several studies that have analyzed factors that are considered to influence bond yields, such as bond age, interest rates and inflation. Yuliawati & Suarjaya (2017) in their research stated that the variable interest rate had a significant effect on bond yields, while the age of bonds and inflation had no significant effect on bond yields. However, the results of the study are different from those conducted by Kurniasih & Restika (2015) which in the study stated that interest rates and inflation have a significant effect on bond yields. Then in a previous study by Purnamawati (2010) stated that the results were also different where the age of the bonds significantly affected the bond yields.

Purnamawati (2010) in her study explained that bond ratings have a negative and significant effect on bond yields because bonds with low ratings are more risky bonds. Then low-ranking bonds must provide higher returns because to compensate for the possibility of a large risk. The interest rate of Bank Indonesia Certificates has a positive and significant effect on bond yields, the higher the SBI interest rate, the returns that are implied by investors from an investment will increase. So that with the higher SBI interest rates, bond issuing companies will offer large yields to attract investors to invest or invest their funds in bonds. The leverage ratio measured by DER has no effect on bond yields, this is likely because investors do not pay attention to the risks involved when buying or investing in bonds because they assume that bonds are low-risk investments.

Saputra & Prasetyono (2014) in their research explained that the BI rate had a positive and significant effect on bond yields because if the BI rate had increased it would be responded to by an increase in the rate of return required by investors because bond prices tended to fall due to rising BI interest rates. In other words, if the BI rate increases, the yield required by investors will also increase. Inflation has a positive and significant effect on bond yields, this is due to changes in the inflation rate that is very volatile, will have an impact on investment in securities because with rising inflation means investing in securities such as bonds is considered increasingly risky because market conditions are experiencing an overall price increase, so with the high risk caused by the inflation rate, investors expect higher yields on investment, in other words the inflation rate affects the size of the bond yield desired by investors. GDP has a negative and significant effect on bond yields, increasing GDP is a positive signal to invest. A high GDP indicates that existing investments have a small level of risk while bonds that have a small risk provide a small yield. Bond ratings have a negative and significant effect on bond yields. Then, this study also shows the BI rate, inflation, GDP, and bond rating together have a significant effect on bond yields.

Referring to the discussion, a research will be conducted to test the consistency of the results of previous studies conducted on the effect of bond age, interest rates and inflation on bond yields because there are a number of differences in the results of these studies.

## **2. Literature Review**

### **Age of Bonds**

One of the instruments traded in a capital market is bonds. Bonds are debt securities issued by issuers (can be legal entities or companies, can also be from the government) that require funds for operational and expansion needs in advancing the investments they carry out (Namjuddin & Amri, 2016). The age of the bonds according to Ma'arij and Zulfahridar (2014) is the date on which the bondholders will get the principal repayment or the nominal value of the bonds they own. The

maturity period of the bonds varies from 365 days to more than 5 years. In general, the longer the bond's maturity, the greater the degree of uncertainty, so the greater the risk of maturity.

### Interest Rates

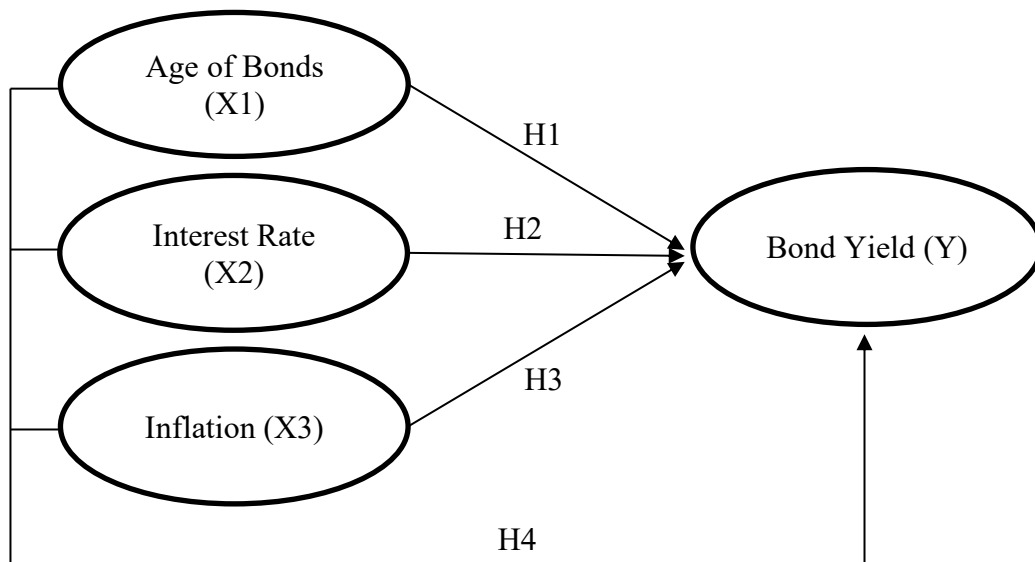
The interest rate according to Boediono (1994) is the price of the use of investment funds (loanable funds). The interest rate is one indicator in determining whether someone will invest or save. High interest rates will encourage investors to invest their funds in banks rather than investing in the production sector or industry that has a greater level of risk. Thus, the inflation rate can be controlled through an interest rate policy

### Inflation

Inflation is an economic situation where the level of prices and general costs rise; for example rising rice prices, fuel prices, car prices, labor costs, land prices, rental of capital goods (Zakaria, 2009). Inflation is an event that illustrates the situation and conditions in which the price of goods has increased and the value of the currency has weakened, and if this happening continuously will result in the deterioration of the overall economic condition and be able to shake the political order of a country. Samuelson (2001) provides a definition that inflation is a condition where an increase in the level of general prices, both goods, services and factors of production

### Bond Yield

Situmorang (2017) provides a definition of the return or return to be obtained from bond investments expressed as yields, that is, the results that investors will get if they place their funds to buy bonds. Before deciding to invest in bonds, investors should consider the size of the bond yield, as a measure of the annual rate of return that will be received.



**Figure 1. Research Design**

Hypothesis:

H1: The age of a bond has an effect on the bond yield

the longer the maturity of the bond, the greater the level of uncertainty so that the greater the risk of maturity (Ma'arij & Zulbahridar, 2014). Previous research by Purnamawati (2010) found that the age of bonds had a significant effect on bond yields

H2: Interest Rates affect Bond Yields

An increase in interest rates has a relationship to bond yields, because it will cause the price of bonds that are still circulating to fall, while a decrease in interest rates will cause bond prices to rise (Purwanti & Purwidiанти, 2017). Previous research by Yuliawati & Suarjaya (2017) found that interest rate variables influence bond yields

H3: Inflation affects the Bond Yield

If inflation increases, then it will affect the interest rate which will also increase. Increased interest rates cause bond prices to decline and yields will increase (Purwanti & Purwidiанти, 2017). This is in line with previous research by Kurniasih & Restika (2015) which states that inflation affects the bond yields

H4: Age of Bonds, Interest Rates, Inflation simultaneously affects the Bond Yield

Previous research by Yuliawati & Suarjaya (2017) states that variable age bonds, interest rates and inflation have a significant effect on bond yields.

### **3. Methods**

Data collection methods used in this study are literature studies conducted by processing literature, articles, journals, previous research results, and other written media relating to the topic of discussion of this research. In addition, data collection is done by collecting all secondary data and all information used to solve problems contained in documents.

The dependent variable used in this study is bond yields, while the independent variable in this study is the age of bonds, interest rates and inflation.

The population in this study are all government bonds listed on the Indonesia Stock Exchange. The sample taken is the type of government bond chosen by the purposive sampling method. Purposive sampling is a sampling technique with certain considerations. The criteria for consideration and sample selection in this study are conventional government bonds, government bonds that have a fixed rate, government bonds with semiannual compounding, government bonds denominated in rupiah, government bonds listed on the Indonesia Stock Exchange as of August 2018. The analysis technique the data used in this study is multiple linear regression.

### **4. Results and Discussion**

#### **Multiple Linear Regression Analysis**

Multiple linear regression analysis is used to determine the direction of the influence of the age of bonds, interest rates and inflation on government bond yields. This analysis was processed using the SPSS 22.0 for Windows program.

**Table 1. Results of Multiple Linear Regression Tests**  
Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Std Coefficients		
	B	Std. Error	Beta	t	Sig.
1 (Constant)	.026	.008		3.130	.004
Age of Bonds	.000	.000	.154	1.851	.073
Interest Rates	.007	.001	.936	5.379	.000
Inflation	.000	.001	-.041	-.234	.816

a. Dependent Variable: YTM

Based on the table in multiple linear regression obtained by the multiple linear regression equation as follows:

$$Y = 0.026 + 0.000X_1 + 0.007X_2 + 0.000X_3 + \epsilon$$

The multiple linear regression equation shows the direction of each independent variable to the dependent variable, where the regression coefficient of the independent variable that is positive means it has a direct effect on Yield to Maturity (YTM). The regression equation can be described as follows:

a.  $\beta_0$  constant

The constant value obtained is 0.026, which means that if there is no variable bond age, interest rates and inflation, then the amount of Yield to Maturity (YTM) that occurs is 0.026.

b.  $\beta_1$  constant

The value obtained is 0,000 which means that if the bond age variable is increased by 1 unit, the Yield to Maturity (YTM) will increase by 0,000 units.

c. Constant  $\beta_2$

The value obtained is 0.007, which means that if the interest rate variable is increased by 1 unit, the Yield to Maturity (YTM) will increase by 0.007 units.

d. Constant  $\beta_3$

The value obtained is 0,000 which means that if the inflation variable is increased by 1 unit, the Yield to Maturity (YTM) will increase by 0,000 units.

### Statistical Test T

Based on table 1. Multiple Linear Regression Test Results, the results of the T statistical test can be explained as follows: Based on the t test table, it can be seen that the bond age variable, the t value obtained is 1,851. T table value obtained from the statistical table with two sides  $df = 36-3-1$  (32) at a significance level of 0.05 is 2.03693. That is, the value of t count is smaller t table that is  $1.851 \leq 2.03693$ . Meanwhile, if seen from the level of significance, the significance obtained is greater than the level of significance that is set at  $0.073 > 0.05$ .

Based on this analysis, the decision on the first hypothesis is  $H_0$  accepted. So, it can be concluded that the age of bonds does not have a significant effect partially on government bond yields. Based on the t test table it can be seen that in the interest rate variable, the t count obtained is equal to 5,379. T table value obtained from the statistical table with two sides  $df = 36-3-1$  (32) at a significance level of 0.05 is 2.03693. That is, the calculated t value is greater than t table that is  $5.379 > 2.03693$ . Meanwhile, if seen from the level of significance, the significance obtained is smaller than the level of significance that is set at  $0,000 < 0.05$ .

Based on this analysis, the decision on the second hypothesis is H02 rejected. It can be concluded that the interest rate variable has a significant effect partially on government bond yields. Based on the t test table, it can be seen that in the interest rate variable, the t count obtained is -0.234. T table value obtained from the statistical table with two sides  $df = 36-3-1$  (32) at a significance level of 0.05 is 2.03693. That is, the calculated t value is smaller than t table that is  $-0.234 \leq 2.03693$ . Meanwhile, if seen from the level of significance, the significance obtained is greater than the significance level specified, which is  $0.816 > 0.05$ .

Based on this analysis, the decision on the third hypothesis is H03 accepted. It can be concluded that the inflation variable has no significant effect partially on government bond yields.

**Simultaneous Significance Test Results (F-test)**

The F test is used to test the effect of the independent variables together on the dependent variable. The testing procedure is as follows:

a. Using F arithmetic and F tables.

F count can be seen from the ANOVA table output. Whereas the F table can be found in the statistical table at the 0.05 significance with  $df1 = k-1$  and  $df2 = n-k-1$ . Decision making is if  $F \text{ arithmetic} < F \text{ table}$  then H0 is accepted. And if  $F \text{ count} > F \text{ table}$  then H0 is rejected.

b. Using a significance level of 0.05

Decision making is that if it is significant  $> 0.05$  then H0 is rejected. And if the significance  $< 0.05$  then H0 is accepted.

**Table 2. F Test (Simultaneous Test)**

ANOVA<sup>a</sup>

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	.010	3	.003	39.247	.000 <sup>b</sup>
Residual	.003	32	.000		
Total	.012	35			

a. Dependent Variable: YTM

b. Predictors: (Constant), Inflation, Age of Bonds, Interest Rates

Based on the F test table, the calculated F value obtained was 39,247. F value of the table obtained from the statistical table with  $df1 = 3$  and  $df2 = 32$  at the 0.05 significance level is 2.90. That is, the calculated F value  $> F \text{ table}$  ( $39.247 > 2.90$ ). Meanwhile, if seen from the level of significance, the significance obtained is smaller than the level of significance that is set at  $0,000 < 0.05$ . Then it can be concluded that the age of bonds, interest rates and inflation variables together influence the yield of government bonds.

**Table 3. Coefficient of Determination**

Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.887 <sup>a</sup>	.786	.766	.00907	1.930

a. Predictors: (Constant), Inflation, Age of Bonds, Interest Rates

b. Dependent Variable: YTM

From the table of the coefficient of determination can be seen Adjusted R Square value of 0.766. So, the contribution of the influence of the independent variable (age of bonds, interest rates and inflation) of 76.6% while the remaining 23.4% is influenced by other factors not examined.

### **Effect of Age of Bonds on Government Bond Yields**

The results of this study found that the age of the bonds has a regression coefficient of 0,000. The calculated t value obtained is smaller than t table that is  $1.851 < 2.03693$  and the resulting significance value is greater than the specified significance level of  $0.073 > 0.05$ . So, it can be concluded that the age of bonds does not have a significant effect on government bond yields. In this case H01 is accepted and Ha1 is rejected.

The results of this study do not support the theory and previous research regarding the relationship between bond age and bond yields. This research shows that inflation has no significant effect on government bond yields. The results of this study are strengthened by the results of previous research conducted by Yuliawati & Suarjaya (2017) which states that the age of bonds does not have a significant effect on government bond yields. This is because government bonds are included in risk-free investments and guaranteed returns by the state so that the risk of maturity is not a special consideration in investing government bonds. Because the level of risk of government bonds is lower than corporate bonds so investor confidence is positive even though the specified time period is long term. In other words, investors believe that investments through government bonds do not run the risk of default.

The results of this study found that the age of the bonds have a regression coefficient of 0.007. The calculated t value obtained is greater than t table that is  $5.379 > 2.0369$  and the resulting significance value is smaller than the specified significance level of  $0.000 < 0.05$ . So it can be concluded that interest rates have a significant effect on government bond yields. In this case H02 is rejected and Ha2 is accepted.

Thus, according to the coefficient sign that has a positive direction shows that the higher the interest rate, the higher the yield of government bonds offered and vice versa because the current interest rate can be a reference for investors in obtaining more profits from their investments. The higher the interest rate, investors want a rate of return that is more in the future than the current interest rate. The results of this study are supported by the results of previous research by Yuliawati & Suarjaya (2017) which states that interest rates affect the yield of government bonds. In this case the government also attracts investors by offering higher yields than Bank Indonesia interest rates.

The results of this study found that the inflation variable has a regression coefficient of 0,000. The t value obtained is smaller than t table that is  $-0.234 < 2.03693$  and the resulting significance value is greater than the specified significance level of  $0.816 > 0.05$ . So, it can be concluded that inflation has no significant effect on government bond yields. In this case H03 is accepted and Ha3 is rejected.

The results of this study do not support the theory and previous research regarding the relationship between inflation and bond yields. This research shows that inflation has no significant effect on government bond yields. The results of this study are reinforced by the results of previous research conducted by Yuliawati & Suarjaya (2017) which states that inflation has no significant effect on government bond yields. This is due to the value of inflation that changes significantly every period is not followed by changes in the yield offered. As happened in 2006 to 2007 when the government issued bonds series FR0040 and FR0042 the change in inflation in that period was very volatile, but the yields offered were not much different.

The results of this study found that the age of bonds, interest rates and inflation have a calculated F value greater than F table that is  $39.247 > 2.90$  and the resulting significance value is smaller than the specified significance level of  $0.000 < 0.05$ . So, it can be concluded that the variable age of bonds, interest rates and inflation have a significant effect simultaneously on the yield of government bonds. In this case  $H_0$  is rejected and  $H_a$  is accepted.

Based on the results of the coefficient of determination test, the value of Adjusted R Square obtained is 0.766. So, the contribution of the influence of the variable age bonds, interest rates and inflation together amounted to 76.6% while the remaining 23.4% is influenced by other factors not examined. Thus, investors can use these three variables together as a material consideration in investing through government bonds because the contribution of the three variables together is quite large in influencing government bond yields.

## **5. Conclusion**

The results of this study found that the age of bonds does not significantly influence the yield of government bonds. Therefore, the first hypothesis which states that the age of bonds has a significant effect on government bond yields is rejected. Furthermore, interest rates have a significant effect on government bond yields. Therefore, the second hypothesis which states that interest rates have a significant effect on government bond yields is accepted. The results of subsequent studies found inflation had no significant effect on government bond yields. Therefore, the third hypothesis which states that inflation has a significant effect on government bond yields is rejected. On the other hand, the age of bonds, interest rates and inflation simultaneously have a significant effect on government bond yields. Therefore, the fourth hypothesis which states that the variable age of bonds, interest rates and inflation simultaneously have a significant effect on the yield of government bonds is accepted.

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