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Determinants of Corporate Bond Yield: Empirical Evidence from Indonesia

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Abstract

This study aims to examine the factors that determine bond yields in infrastructure companies listed on the Indonesia Stock Exchange. The research sample used 31 bonds issued by the company during the 2015–2019 period. The data analysis method to estimate the determinant of bond yield uses multiple regression models. The results prove that the increase in the coupon rate causes bond yields to increase, while the inflation rate has the opposite effect of decreasing bond yield. Interest rate, exchange rate, duration, and bond rating variables cannot affect the bond yield. The results of this study imply that investors will be interested in investing in bonds with better yields if the company has to set a higher coupon rate, especially in economic conditions that experience low inflation rates. Interest rates and exchange rates as macroeconomic variables have not been considered by investors in purchasing bonds. Bond characteristic factors, namely, the duration and rating of the bonds, are considered less important factors in bond investment decisions because they are more oriented towards getting higher yields. Therefore, further research needs to be explored further related to the behavior of Indonesian bond investors who may have different characters from investors in other countries.

Keywords: Corporate Bond Yield, Infrastructure Companies, Indonesia Stock Exchange

JEL Classification Code: E43, E44, G12,G23

1. Introduction

A number of business sectors currently have positive momentum and sentiment to be used by companies seeking funding through bond issuance. This is because the situation and conditions in the business sector are conducive and are not affected by negative sentiments such as the coronavirus outbreak. One of them is that the infrastructure sector is also considered appropriate to issue bonds today, both in terms of momentum and general industry conditions. One of the driving factors is the government policy that will continue the construction of facilities such as roads and bridges. The issuance of bonds is one of the financing alternatives that companies can do. Meanwhile, it also said, that in terms of momentum, now is the right time for corporations to issue debt securities. One of the supporting factors is the cost (cost of fund) and bond interest, which will be smaller following the cut in the benchmark interest rate by Bank Indonesia (Endri et al., 2020a). The development of bond yield to maturity can be seen from the increase in the percentage from 2015 to 2019, as shown in Figure 1.

Based on Figure 1, there is an indication that the development of the yield to maturity level of bonds that will be received by these investors will experience changes in line with changes in economic conditions, both micro and macro. The yield on the bond yield reflects the performance of a bond, which will be useful as information in making decisions by investors (Harahap et al., 2020).

The interest rate is one of the determining factors, whether the yield to maturity of a bond is attractive or not. Bond yields will increase if the market interest rate decreases. This occurs because of the interest rate risk, which is the risk of decreasing yield to bond maturity due to increased

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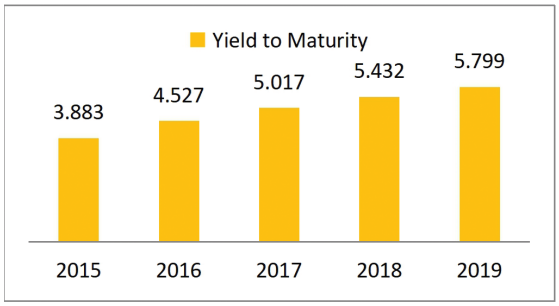

Figure 1: Yield To Maturity Movement 2015–2019

interest rates (Augustina & Restika, 2015). Another factor that affects the yield to bond maturity is the exchange rate. Lace et al. (2015) stated that the weakening of the rupiah exchange rate can cause changes in the yield of bonds received by investors. For foreign investors who enter the domestic bond market, strengthening foreign currencies is beneficial for them because they get additional benefits from exchange rate capital gains in addition to a high coupon rate from money market interest rates. In addition, the yield to bond maturity also depends on the coupon rate provided by the bond. Interest is a bond coupon that is paid regularly by the bond issuer to the holder (Yuliani et al., 2016). Coupon bonds are stated as an annual percentage of face value and are paid out at certain time intervals. Kempf and Homburg (2000) stated that the price of bonds also depends on the discount rate (coupon rate). Investors will be more attractive to invest in bonds if the offer is high at the coupon rate.

Duration also affects bond yields because duration can be used to predict the sensitivity value of bond prices due to changes in interest rates. Therefore, it is expected that investors and investment managers can consider the risk of changes in interest rates that arise during investing in bonds, so that each investor will get the expected target (Ahmad et al., 2009). One important indicator to determine the level of risk faced by bond issuing companies is bond ratings. If the bond rating is low, the bond has a higher risk. As a result, these low-rated bonds must provide a higher yield to maturity to compensate for possible large risks (Hamid et al., 2019). Based on previous researchers, this research will examine both internal and external factors, namely interest rates, exchange rates, coupon rates, durations, inflation and bond ratings for utility infrastructure sub-sector companies listed on the Indonesia Stock Exchange (IDX) over 2015–2019.

2. Literature Review

Research on the determinants of internal and macroeconomic variables on bond yields still provides conflicting empirical evidence. Both internal and external factors are attached to bonds, which can affect fluctuations in bond market prices. The theory of arbitrage pricing (APT) developed by Ross (1976) states that returns on financial assets can be determined by general factors or macroeconomic factors and specific factors related to these assets (Nurhayati & Endri, 2020; Endri et al., 2020b). Based on the relationship between securities expected returns and risks, APT suggests a multi-factor pricing model for the many studies examining the determinants of bond yields (Che-Yahya et al., 2016; Hammami & Bahri, 2016; Hamid et al., 2019). Che-Yahya et al. (2016) conducted a study of 61 companies that issued bonds on the Malaysian bond market in 2012, concluded that maturities, coupons, trading frequency, ratings, DER and ROE had an impact on bond yields. Hammami and Bahri's (2016) research on the bond market in Tunisia proves that rating as a specific factor is a determinant of bond yields, while systematic risk cannot determine expected bond yields. Research by Hamid et al. (2019) estimates the determinants of bond yields for 36 companies for the period 2012–2016, which concludes that assets, liquidity, debt levels, profitability and ratings together have an effect on bond yields. Partially, company size and leverage have a negative impact on corporate bond yields.

Research by Trinh et al. (2020) on bond yields in Vietnam during the period July 2006 to December 2019 concluded that the variation in yields on Vietnamese government bonds was influenced by interest rates. Itself in the previous period, basic interest rates, foreign interest rates, stock market returns, fiscal deficits, public debt, and current account balances. Sihombing et al. (2014) analyzed the determinants of the government bond yield curve (SUN). The research concluded that the fluctuation of government bond yields is influenced by liquidity, macroeconomic fundamentals, and market risk factors. Augustina and Restika (2015) estimate the effect of interest rates, exchange rates, inflation and foreign ownership on bonds during the period 2010 to 2013. Empirical findings prove that inflation, interest rates, exchange rates, and foreign ownership together determine bond yields. Partially, interest rates and inflation have a positive effect on bond yields, while foreign ownership and exchange rates have a negative effect on bond yields. Yieand and Chen (2019) examine the factors that influence bond yields in Malaysia for the period 2006 to 2016. The empirical results prove that the variables of exchange rates, interest rates and economic growth can significantly influence internal variations in bond yields.

Chen et al. (2010) investigated the influence of internal factors of internal liquidity risk on corporate credit risk and bond yields using panel data for the period 1993 to 2008. The findings of the study reveal that internal corporate liquidity risk significantly affects the spread of bond yields when controlling for the determinants of bond yields. It also implies that internal liquidity risk should be incorporated

into determining bond yield spreads. Meanwhile, coupon rate and maturity are other internal factors that determine bond yields. The empirical study by Gajalla (2006) proves that bonds aged three years and over are very vulnerable to higher interest rates and price risk. This study demonstrates a positive relationship between age bonding and outcome. Meanwhile, coupon payments reflect the level of taxes that investors must pay (Alhempi et al., 2020). Chen et al. (2007) and Liu and Jiraporn (2010) found that large coupon payments give bond yields lower bond owners. Because bonds that provide a high coupon rate will bear large taxes, therefore investors must be compensated with higher yields to make bonds more attractive (Lu et al., 2010).

3. Research Methodology

3.1. The Sample

Sampling in the study uses criteria, namely, (1) the utility infrastructure sub-sector company bonds that occurred on IDX for the 2015–2019 period, and (2) the availability of complete related data in accordance with the variables to be studied during the 2015–2019 period. Based on the above criteria a total of 31 corporate bonds selected as the research sample.

3.2. Measure of Bond Yield

The identification of variables in this study consists of bond yield (Y) in infrastructure sub-sector companies listed on the IDX as the dependent variable. Thus, the bond yield to maturity is formulated as follows:

$$Y = \frac{C + \frac{F - P\text{bond}}{n}}{\frac{F - P\text{bond}}{n}} \times 100\%$$

3.3. Measures of Determinants Bond Yield

The independent variables in this study consist of interest rates, exchange rates, coupon rates, duration, inflation, and bond ratings

a. Interest rates are calculated using the BI 7 Days RepoRate taken during the 2015–2019 study period. Data obtained from the official website of Bank Indonesia (BI).
b. The exchange rate of the rupiah against the dollar for the period 2015–2019 is taken from the official website of BI.
c. Coupon is the bond interest rate that must be paid by the bond issuer.
d. Duration is the value of the Proportion to the Present Value divided by the resulting Cash Flow multiplied by the year in which it was paid, formulated as follows:

$$\text{DUR} = \left[\frac{\sum_{t=1}^{n} t * \frac{\text{CP}t}{(1+i)^{\text{t}}}}{\sum_{t=1}^{n} \frac{\text{CP}t}{(1+i)^{\text{t}}}} \right]$$

e. Inflation data used is data published on the website https://www.bps.go.id/ as of December 31 during the 2015 to 2019 research period.
f. Bond rating is the value at each rating according to the rating issued by PEFINDO. The bond rating is as follows:
g.

Rating Value	Rating
1	AAA – BBB
0	BB – D

3.4. Empirical Regression Model

This study seeks to determine the influence of interest rates, exchange rates, coupon rates, duration, inflation and bond ratings on the yield to maturity of sub-sector company bonds, utility infrastructure listed on IDX, in the observation period 2015–2019. Analysis of research data uses multiple linear regression models. The following are the methods used in analyzing the data in this study:

a. Descriptive statistical
   Descriptive statistics provide an overview of data seen from the mean, SD, variant, max, min, sum, range, kurtosis and skewness.
b. Classical Assumption Test Analysis
   The classical assumption test was conducted to state normality, multicollinearity, heteroscedasticity, and autocorrelation.
c. Multiple Linear Regression Analysis
   The research estimation model is formulated:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon$$

Information :
Y = Yield to Bond Maturity
α = Constant
X_1 = Interest Rate

X_2 = Exchange Rate
X_3 = Coupon
X_4 = Duration
X_5 = Inflation
X_6 = Bond Rating
ε = Disturbance Term

4. Results and Discussion

4.1. Descriptive Statistics

Data processing uses Eviews 10 and the results of descriptive statistics on the research variables are shown in Table 1.

The analysis results obtained in general the BI rate 2015–2019 of the 31 observations studied. The mean, median, max, min and SD of all variables (Interest Rate, Exchange Rate, Coupon Rate, Duration, Inflation, Bond Rating) are known as in Table 1. If seen from all the variables that have a SD value that is smaller than the mean, this indicates that the distribution of data variables is smaller or there is no large enough gap from the lowest and highest values.

4.2. Regression Results

The estimation of the research model was carried out using multiple linear regression methods. To get the best regression model, it is necessary to determine the best linear bias (BLUE/Best Linear Unavailable Estimator). A series of tests can be carried out so that the regression equation that appears meets the existing BLUE requirements, namely, that there is no violation of the classical linear assumptions, namely, Autocorrelation, Heteroscedasticity and Multicollinearity.

Autocorrelation

The autocorrelation test is a test to determine whether there is a correlation between the error from time period *t* and the error in period *t*–1. The BLUE regression model is a regression model where there is no violation of the autocorrelation problem. The autocorrelation test is shown in Table 2.

The results obtained in Table 2 show that the *F*-stat prob value (2.22) of 0.375 can also be referred to as the calculated *F*-stat prob value. The prob value. *F* count is greater than the alpha level 5%, so this indicates that the residual data is normally distributed, so the regression model is considered to fulfill the autocorrelation assumption.

Heteroscedasticity

Heteroscedasticity test is a test to determine whether the residual variants of the regression model differ from one observation to another. The results of the Breusch Pagan Godfrey test show that the significance value of the independent variable is greater than 5%, this indicates that there is no heteroscedasticity pattern as shown in Table 3.

The results obtained in Table 3 show that the *F*-stat prob value (6.24) of 0.384 can also be referred to as the calculated prob *F* value. The calculated probability *F* value is greater than the alpha level of 5%, so this shows that the residual data is normally distributed, so the regression model is considered to fulfill the heteroscedasticity assumption.

Table 2: Breusch – Godfreyserial- LM Test

F - Stat	1.025	Prob. *F*	0.375
Obs *R** squared	2.644	Prob. C-S (2)	0.266

Table 3: Heteroskedaciticity Test : B–P–G

F - Stat	1.111	Prob. *F*	0.384
Obs *R** squared	6.741	Prob. C-S (2)	0.345
Scale explained SS	2.789	Prob. C-S (2)	0.834

Table 1: Descriptive Statistics

	Variable	Data	Mean	Median	Max	Min	Std. Dev
Y	Yield	31	0.930	0.910	1.362	0.568	0.177
X1	Rate	31	4.975	4.750	7.500	4.250	0.796
X2	Forex	31	9.535	9.532	9.580	9.498	0.027
X3	CR	31	8.778	8.500	11.100	7.450	0.871
X4	D01	31	2.574	2.629	3.531	2.060	0.656
X5	INF	31	3.436	3.300	6.250	3.000	0.602
X6	Rating	31	0.967	1.000	1.000	0.000	0.179

Multicollinearity

The multicollinearity test can detect interrelationships among independent variables in the estimated research model. The results of the correlation matrix test for detecting multicollinearity are shown in Table 4.

The results obtained are in Table 4 shows the value of the Centered VIF Value for the variable Interest Rate, Exchange Rate, Coupon Rate, Duration, Inflation, Bond Rating, none of which is greater than 5, so it can be concluded that the regression model fulfills the assumption of multicollinearity.

Regression Results

Methods of data analysis using multiple linear regression models. The research variables consisted of the dependent variable, namely, yield to maturity (YTM) of bonds (Y) or shortened as bond yields, while the independent variables consisted of; X1 interest rate (Rate), X2 exchange rate (foreign currency), X3 Coupon (CR), X4 Duration (D01), X5 Inflation (INF), and X6 bond rating (Rating). Before conducting multiple linear regression tests, the researcher first tested the classic assumption tests, namely, normality, heteroscedasticity, autocorrelation and multicollinearity. The result is the equation passes the classical assumption test and can be continued to test using multiple linear regression analysis. Based on the following Table 5.

Based on Table 5, a multiple linear regression equation can be made, which can be formulated as follows:

$$\text{Yield} = -1.338 + 0.047\ \text{Rate} + 0.129\ \text{Forex} + 0.100\ \text{CR} + 0.010\ \text{D01} - 0.102\ \text{Inf} + 0.248\ \text{Rating}$$

Simultaneous Test (F-test)

The results of the *F* test are shown in Table 5, where the *F*-stat prob value of 0.005 is smaller than 5% alpha which can be determined that the regression model is suitable to be used to predict the effect of the independent variables together on the variable.

Table 4: Multicollinearity Test

Variable		Coefficient Variance	Uncetered VIF	Centered VIF
Y	Yield	135.8931	216388.7	NA
X1	Rate	0.003970	160.3782	3.880399
X2	Forex	1.455582	210736.5	1.723125
X3	CR	0.002435	301.6102	2.849849
X4	D01	0.004514	51.70986	1.472504
X5	INF	0.002661	51.53374	1.488899
X6	Rating	0.025263	38.92900	1.255774

Partial Test (t-test)

The results of the *T* test can be seen in Table 4.6 used to prove whether the independent variable individually affects the dependent variable. The results of the *T* test for multiple linear regression analysis in this study are as follows:

a. The interest rate variable shows a *t*-stat of 0.756 with a prob value of 0.457, the result is greater than 0.05, so it can be said that the interest rate variable has no significant effect on yield to maturity.
b. The Exchange Rate variable shows a *t*-stat of 0.107 with a prob value of 0.915, the result is greater than 0.05, so it can be said that the exchange rate variable has no significant effect on yield to maturity.
c. The Coupon Rate variable shows a *t*-stat of 2.035 with a prob value of 0.050, the result is greater than 0.05, so it can be said that the coupon rate variable has a positive effect on yield to maturity.
d. The duration variable shows a *t*-stat of 0.147 with a prob value of 0.884 the result is greater than 5%, so it can be said that the duration variable does not have a significant effect on yield to maturity.
e. The inflation variable shows a *t*-stat of –1.972 with a prob value of 0.062, the result is smaller than 0.010, so it can be said that the inflation variable has a negative effect on yield to maturity.
f. The bond rating variable shows a *t*-stat of 1.562 with a prob value of 0.131, the result is greater than 0.05, so it can be said that the bond rating variable has no effect on yield to maturity.

Table 5: Regression Results

Variable		Coeff.	SD	*t*-Stat	Prob
	Constant	–1.338	11.657	–0.115	0.909
X1	Rate	0.047	0.063	0.756	0.457
X2	Forex	0.129	1.206	0.107	0.915
X3	CR	0.100	0.049	2.035	0.050
X4	D01	0.010	0.067	0.147	0.884
X5	INF	–0.102	0.051	–1.972	0.062
X6	Rating	0.248	0.158	1.563	0.131
R-Squred		0.507	Mean dep. var		0.930
Adj. *R*-Squred		0.384	S.D dep. var		0.177
S.E of Regression		0.139	AIC		–0.905
SSR		0.467	SC		–0.582
Log like lihood		21.034	H-Quinn criter		–0.799
F-stat		4.119	D-W stat		2.351
Prob (*F*-statc)		0.005			

Coefficient of Determination

The coefficient of determination test can be seen from Table 5 by looking at the value of *R* Square. The value of *R* Square is 0.507 indicating the model in this study can explain 51% of the bond yield variable. So, it can be concluded that interest rates, exchange rates, coupon rates, duration, inflation and bond ratings can have an effect on yield of 51% while the remaining 49% (100%–51%) is influenced by other variables.

4.3. Discussion

In the bond market in Indonesia, interest rates do not determine the yield of bonds. This is due to the fact that most corporate bond owners are institutional investors who invest for the long term and have little effect on changes in interest rates that occur in the money market. The empirical findings of this study differ from Mega and Widayat (2019) and Van Landschoot (2008), which reveal that interest rates have a positive effect on bond yields. In contrast, Sihombing et al. (2014), Jaramillo and Weber (2012) and Budina and Mantchev (2000) state that interest rates have a negative effect on bond yields. Anwar and Suhendra (2020) show that linking interest rates to monetary policy on central bank independence can reduce bond yields.

Corporate bonds issued by the company in rupiah currency are not affected by changes in the rupiah exchange rate against the US dollar. Bond owners, mostly domestic institutional investors, place their funds in corporate bonds because they are considered to provide higher returns for the long term. Different findings were revealed by Gadanecz (2014), which states that exchange rates affect bond yields and investors' decisions to own domestic government bonds. The weakening of the exchange rate has prompted a high provision for interest rates to attract investment, which has the effect of lowering bond prices on the secondary market.

Bond coupons can determine the yield of bonds, because they are directly related to the interest of bond investors getting profits. The higher the bond coupon rate, the more increase in bond price so that the results obtained by investors will increase. The empirical findings are in line with Lu et al. (2010) that stated that bond holders get higher yields for bonds with large coupon payments. The results of this study are different from that of Che-Yahya et al. (2016) that found that an increase in coupons causes bond yields to decrease. This is due to the fact that more than half of corporate bonds issued on the Malaysian market do not have coupons.

The duration of the bonds has not been a factor considered in purchasing corporate bonds so that it does not have an impact on the yield of bonds with coupons. Duration is expressed in years, but differs from the bond maturity date. However, the maturity date of a bond is one of the main components in determining its duration, such as the coupon rate for a bond. For bonds without coupons, Kraft and Munk (2007) stated that the duration of corporate bonds is identical to the risk-free bonds of default if the risk of default and recovery does not depend on the risk-free interest of default. In the case of a coupon-free bond, the remaining time of the bond until its maturity date equals its duration. However, when a coupon is added to a bond, the total duration of the bond will always be less than the maturity date.

The increase in the inflation rate causes the bond yields received by investors to decrease. This is because the high inflation rate causes the ability of the bond issuing companies to decrease so that bond prices are cheaper. The results of the study are in line with the findings of Perovic (2015), which states that inflation has a negative effect on bond yields. Different research results were revealed by Orlowski and Kirsten (2005), which proved that inflation has a positive effect on bond yields. Hsing (2015) also concluded that bond yields have a positive effect on inflation rate expectations. Schaeffer and Ramirez (2016) prove that bond yields at the same time move against inflation shocks transmitted rapidly from one country to another in Europe. El Ouadghiri et al. (2015), using high frequency data with the event method, proves that the bond market is more controlled by changes in inflation indicators.

The bond rating has not yet determined the bond yield, because most corporate bonds are classified as investment grade and have limited bond-issuing companies. In addition, bond ratings tend not to change throughout the study period. The research results are in line with the study of Hamid et al. (2019), which states that bond ratings have no effect on corporate bond yields. The results are different from the study of Che-Yahya et al. (2016), Hammami and Bahri (2016), Bhojraj and Sengupta (2003), Elton et al. (2004) and Liu and Jiraporn (2010), which show that ratings have a positive effect on corporate bond yields. This is because bond ratings are the best indicator of the issuer's credit quality. Bond issuers with good credit quality can offer bonds with higher yields.

5. Conclusion

This study aims to estimate the effect of interest rates, exchange rates, coupon rates, duration, inflation, and bond ratings on bond yields due to infrastructure sector companies listed on IDX during the 2015–2019. Based on the estimation results using multiple linear regression models, it is evident that the coupon rate and inflation have an effect on bond yields, while the variables of interest rates, exchange rates, duration, and bond ratings do not determine bond yields. This research implies that companies that issue bonds must provide a coupon rate that is attractive to investors, especially when the economy experiences high inflation rates

as a counterweight to real results. Research has limitations, especially the factors used in determining the yield of bonds, so that many factors have no effect. Therefore, it is suggested in further research to consider the addition of other variables, both internal and external factors, for example; liquidity, profitability, corporate governance, debt levels, company size, and investor sentiment.

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