THE MODERATING ROLE OF LEVERAGE ON CORPORATE BONDS YIELD

ABSTRACT

This study aims to identify the effect of bond credit rating, firm size, profitability, and liquidity on the yield to maturity (YTM) of listed Indonesian corporate bonds, with leverage ratio as a moderating variable. A panel data multi-linear regression with the fixed effect estimator was used to investigate the YTM of 25 listed corporate bonds from 2019 to 2021. The sample data comprise complete financial reports published in the Indonesia Stock Exchange (IDX) market and operations in the non-financial sector to increase the accuracy of information obtained. The results show that profitability proxied to return-on-asset (ROA) and firm size positively affect the YTM, while the liquidity ratio proxied to the current ratio (CR) had a negative influence. As a moderating variable, leverage proxied to the debt-to-equity ratio (DER) positively moderates the effect of CR, DER negatively moderates the effect of ROA and DER cannot moderate the bond's credit rating to influence the YTM. However, the bond's credit rating does not affect the YTM. The analysis of corporate bonds is a relatively uncommon study in Indonesia, and significant implicating for policymakers, underscoring the importance of meticulous management of CR and DER, which can decrease the YTM.

Keywords: Yield to Maturity, Profitability, Credit Rating, Liquidity, Firm Size, Leverage

JEL Classification: C01, E22, G30

INTRODUCTION

A capital market is an avenue for trading corporation bonds to obtain additional capital (Dutordoir et al., 2023), and using the Indonesia bonds index (INDOBeX) as a tool for overall trend of the Indonesia bond market. Indonesia's corporate bonds are issued annually, and its value moves volatile following several sentiments from 2017 to 2021 in the IDX market as below.

Figure 1 Corporate Bond Issuances in the IDX market (Source: *IDX market)*

	2017	2018	2019	2020	2021
Corporate Bonds (in Billion Rupiah)	159.72	110.02	124.3	96.6	107.5
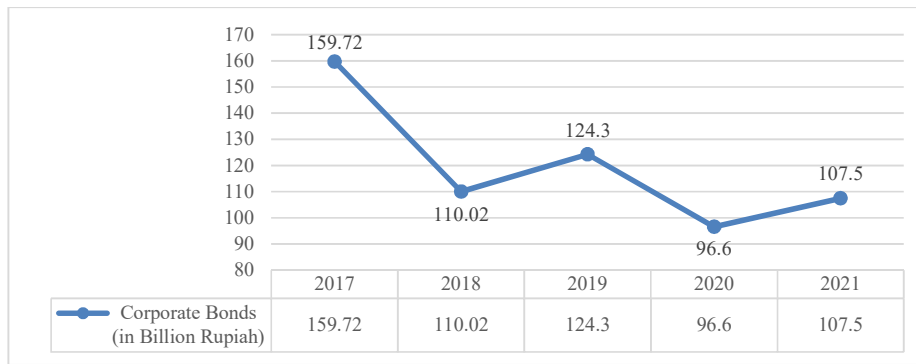
In 2018, the value of corporate bonds fell dramatically from Rp159.72 trillion to Rp110.02 trillion as an effect of growing stock in the global market. Investors prefer allocating their money to the rising stock in the global market1 which decreases the value of Indonesian corporate bonds. Furthermore, the value of corporate bonds increased significantly as an effect of the presidential election's moment in 2019 and this moment the third-largest democracy in the world (Hui, 2020), reached Rp124.3 trillion. In another notable case, corporation bonds value fell dramatically in 2020 as an effect of Covid-19 announcement in the IDX market2. Subsequently, in response to Covid-19 in 2020, corporation bond issuance was delayed, leading to a reduction in value by Rp28.15 trillion and a decreased effective yield significantly. This global health crisis had profound implications for corporations, reducing their financial performance and prompting a departure of foreign direct investment from the bond market, thereby impacting credit rating, price, and yield reductions3. In the first semester of 2021, the market witnessed a significant resurgence, with the value increasing by Rp30 trillion, sourced from 42 corporate bonds. This positive development instilled optimism in the market, suggesting a potential recovery for Indonesia's economy after 20214.

The fluctuation in interest rates affects Yield-to-Maturity (YTM) because of the impact on bond prices, coupon reinvestment risk, opportunity costs, and interest rate sensitivity. In the bond market, bonds are the debt instruments with expected yield to finance projects of corporates and classified as an investment instrument to produce yield, which determines the bond's price (Ross et al., 2021). Investors accept coupon bonds that contain a fixed interest rate, are paid periodically, and are redeemed at a face value after the contract expires (Ross et al.,

2021). The yield curve, or the term structure interest rate is a graphical representation of the relationship between the interest rates and the time to maturity of bonds with similar credit quality but different maturity dates (Fabozzi & Mann, 2021), and is calculated by comparing yield and time (Nawalkha et al., 2005). According to Brigham and Houston (2021), bonds contain a higher yield than dividends, and the yield obtained often consists of interest rate and capital gain in a package. Bond prices and yields have an inverse relationship. If interest rates rise, then existing bond prices tend to fall (Amihud & Mendelson, 1991). The coupon payments of existing bonds become less attractive compared to newly issued bonds with higher interest rates (Brigham & Houston, 2021).

YTM has a crucial role to play in shaping investment decisions, funding strategies, and market efficiency in the bond environment. A good understanding of YTM investors and issuers to make the best decisions that fit their goals. Before investing in bond securities, investors read signaling that informs by assessing the company's financial performance. Signaling theory is particularly relevant when information is asymmetric, showing that one party has more information than another. Furthermore, investors initially perceive and evaluates newly released data as either a positive or negative signal and are motivated to invest when the information is considered positive (Mishkin & Eakins, 2011). High profitability signifies robust financial performance achieved by maximizing asset cost-efficiency (Fridson & Alvarez, 2022; Subramanyam, 2014). Most corporates often facilitate their business operation using an internal fund source proxied to return-on-asset (ROA) by exploiting total assets (Camino-Mogro & Bermúdez-Barrezueta, 2019). Profitable corporations possess a resilient financial foundation, enabling them to navigate potential economic downturns and fulfill debt obligations. This condition diminishes perceived default risk, making investors accept lower bond yields (Ross et al., 2021). A company with a strong ROA can attract more investors seeking stable returns. Increased demand for the company's bonds can drive up their bond prices, resulting in lower yields. Furthermore, this theory is consistent with Shu et al. (2023) studies, that a highly profitable organization could independently cover operations and finance business expansion by issuing bonds at lower yields

H1: ROA affects negative to the YTM of corporate bonds.

The credit rating of bonds plays a

crucial role in conveying information about the performance of corporations (Fabozzi & Mann, 2021). Bond's credit rating system employed a severe symbol scale that ranged from Aaa, representing the highest investment quality, to D denoting the lowest credit rating. Saadaoui et al. (2022) stated that the agencies evaluate bond performance using a standardized scale, where the intensity of the advertisement influences the content of investment signals for investors. Changes in credit rating are observable in the high-yield market, which is often caused by fallen angel issuers who are initially rated as investment-grade and later downgraded to high-yield (Fabozzi & Mann, 2021). A higher bond credit rating shows a more robust financial position and a lower probability of default. This rating influences investors to decrease their demand for high yields, thereby impacting the supply-demand dynamics of high-rated bonds. The equilibrium achieves led to an increase in the price of these bonds and a reduction in yield (Martellini et al., 2003). This theory is supported by Saadaoui et al. (2022) that the issuance of index-eligible bonds reduced costs, and high credit rating influences on the market for new bond issuances (Zhang & Wang, 2022).

H2: Rating affects negative to the YTM of corporate bonds.

Liquidity analysis focuses on operational activities of corporation to generate profits from products and service sales, and working capital measurements (Subramanyam, 2014). The liquidity ratio, represented by the current ratio (CR), is the financial metric that assesses the capability to settle short-term obligations with current assets (Fridson & Alvarez, 2022). An existing liquidity effect aligns with cash flows between two instruments that renders results independent of any pricing risk theory. Furthermore, asset liquidity emphasizes in asset pricing (Amihud & Mendelson, 1991) and plays an essential role. A higher CR typically corresponds to a lower YTM because corporations with a robust CR are generally financially stable and less risky. Based on this result, bonds liquidity negatively influences the YTM (O'Haraa & Zhou, 2021).

H3: CR affects negative to the YTM of corporate bonds.

Firm size, represents by total assets (Berk & DeMarzo, 2017), and is divided into large, medium, and small sizes. These firm size factors exerts an impact on business expansion (Alarussi & Gao, 2021). More prominent firms exhibit lower bond yields compared to minor variants, attributed to their diversified operations and strong financial resources, reducing susceptibility

to specific economic downturns. These organizations are also better positioned to meet debt obligations, minimizing the risk of default for bondholders, bond price, and yield (Brigham & Ehrhardt, 2020). Isayas (2022) study stated that small corporations face challenges, necessitating more extraordinary market control efforts. This dynamic led them to issue large index-eligible bonds that introduces a significant trade-off (Calomiris et al., 2022) and large firm reduce the YTM.

H4: Firm size affects negative to the YTM of corporate bonds.

Leverage describes corporate's capacity to meet its long-term liabilities, and elevated debts significantly influences financial stability, which fall under the extreme leverage category (Berk & DeMarzo, 2017). Therefore, a growing corporation reframes from high leverage to fund its business operation. Elevated debt escalates business defaults and prompts lenders to protect depreciated assets, mitigating debt repayment risk. Leverage, proxied by the Debt-to-Equity Ratio (DER), assesses the amount of equity that covered a third party's debt (Subramanyam, 2014). High-leverage corporations often issues bonds to generate more productive assets, but this typically causes increases debt risk, while high debt risk can increase the YTM

(Fabozzi & Mann, 2021). High DER can increase the YTM, while high ROA can reduce the YTM. Corporate bonds with high debt allocate the ROA to cover their debt repayment, while less ROA can increase debt risk and the YTM. In this study, high debt can weaken the effect of ROA on the YTM and this theory is consistent with Fabian and Philip (2017) result.

H5: DER moderates the effect of ROA on the YTM of corporate bonds.

A consistent view suggests that favorable bond rates cannot alleviate business default risk, and an elevated debt level increases financial distress and the YTM. This view can lead corporate bonds with high ratings to increase their leverage to influence high YTM, and this theory is consistent with Xie et al. (2018) research.

H6: DER moderates the impact of rating on the YTM of corporate bonds.

The financial strength of robust corporations is evident in the composition of their CR and DER. Corporations often utilize a blend of long-term debt and equity required to address significant cash requirements to maintain DER at a desired constant level. High debt levels impose additional short-term obligations, potentially impacting CR negatively, as the organizations need increased current assets to meet current liabilities (Fridson &

Alvarez, 2022). Corporations with a high CR often experience lower YTM, which signals greater financial stability and reduces risk. Consequently, investors accept lower yields on bonds issued by such organizations. This concept supports the idea that leverage plays a role in shaping the connection between liquidity and YTM (Beck et al., 2017).

H7: DER moderates the influence of CR on the YTM of corporate bonds.

Based on the results, authors elaborate the YTM determination into panel data multi-regression model from 2019 to 2021. The results of this study are expected to help investors and management officers maximize the performance of Indonesia's corporate bonds. This purpose can be achieved by broadening the scope of leverage ratio as an aggregate risk factor that significantly influences bond yields. Using leverage as a moderating variable introduces the potential to enhance or weaken profitability, liquidity, credit rating, and firm size.

METHODS

Sample Data

This study elucidates the effect of dependent variable represented by the YTM of listed corporate bonds, and leverage represented by DER, served as the moderating variable. Meanwhile, the independent variables include profitability represented by the ROA, the credit rating, liquidity proxied by the CR, and firm size. FS is converted into logarithm natural shape (ln) to decline heteroscedasticity data and improve the interpretation of results in the context of the percentage change (Gujarati & Porter, 2020).

The sample data contains quantitative data with a purposive sampling method that categorizes corporate bonds with complete financial reports and grouping them into the non-financial sector. Furthermore, taking out the financial sector in the sample data requirement can lead to an accurate result in this study. Dataset comprises 25 corporate bonds listed in the IDX market from 2019 to 2021. Data of YTM sourced from IBPA and annual corporation's financial reports is sourced from IDX market.

Estimation Techniques

This study conducts descriptive and inferential analysis represented by panel data multi-regression. To analyze several corporate bonds in several time-series data need to apply panel data multi-regression model. There are two characteristics in panel data, consisting of cross section and time-series data. Cross-section sample data is represented by index i and in this study, proxied to Indonesia corporate bonds. The

equation of cross-section sampel data is developed as below:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + .. + \beta_p X_{pi} + \varepsilon_i \text{ i=1,2.. N (1)}$$

Meanwhile, the index of t means the time-series of sample data, represented by financial report and YTM data from 2019 to 2021 in this study. The equation of time-series data is developed as below:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + .. + \beta_p X_{pt} + \varepsilon_t \text{ i = 1,2,.N (2)}$$

Furthermore, The equation model in Panel data multi-regression as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + .. + \beta_p X_{pit} + \varepsilon_{it} \dots \dots \text{ (3)}$$

Furthermore, panel data is obtained from pooling time series observations across diverse cross-sectional units and consisting of the Common Effect (CE) estimators, which shows the presence of all observations, whether randomly or non-randomly, despite attrition or sample selection, as well as a Fixed Effect (FE) estimator. Furthermore, FE employes a binary indicator through the Least Squares Dummy Variable (LSDV) to capture intercept differences. Random Effect (RE) estimator shows the capacity to mitigate heteroscedasticity in this study (Baltagi, 2014).

Panel data models obtained underwent scrutiny using 3 statistical methods. The Chow test examines the difference between CE and FE estimators (Toyoda, 1974), and under H0 assumes the coefficients are the same across different subsets of the data, and the FE estimator deems suitable (Baltagi, 2021). Hausmann test compares between FE and RE estimators, emphasizing the importance of a difference in sampling error for initiating an endogeneity examination (Hausman, 1978), and under H0 assumes there is no systematic difference between the FE and RE coefficients and showing that the RE model is suitable (Baltagi, 2021). The LM test plays a crucial role in selecting a suitable model for RE and FE estimators (Breusch & Pagan, 1980), and under H1 assumes the lag order is greater than p, and the selected rule accepts the CE model (Baltagi, 2021).

Panel Data Model Development

In panel data regression model, an analysis utilizes the F-test, t-partial test, and coefficient determination (R2) with hypothesis testing with an error tolerance of only 5% (Gujarati & Porter, 2020). This model in this work is outlined as follows:

$$YTM_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 Rating_{it} + \beta_3 CR_{it} + \beta_4 FS_{it} + \beta_5 (DER * ROA)_{it} + \beta_6 (DER * Rating)_{it} + \beta_6 (DER * CR)_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.. \text{ (4)}$$

Information:

$\beta 0$: Constanta

$\beta 1 - \beta 7$: Coefficient regression

YTMit   : Yield to maturity (YTM $= \left(\frac{C + \frac{FV-P}{t}}{\frac{FV+PV}{2}} \right) x100\%$)

ROAit   : Return-on-asset (ROA $= \left(\frac{\text{Net Income}}{\text{Total Asset}} \right) x100\%$)

Ratingit   : Credit rating of bonds (dummy variables between 0 and 1. The value of 1 measures AAA credit-rating bonds, while 0 measures others)

CRit   : Current ratio (CR $= \left(\frac{\text{Current Assets}}{\text{Current Liability}} \right) x100\%$)

FSit   : Firm size (FS = LN(Total Assets))

DER   : Debt-to-equity ratio (CR $= \left(\frac{\text{Total Debt}}{\text{Total Shareholders Equity}} \right) x100\%$

(DER*ROA)it: Debt-to-equity ratio moderates return on assets.

(DER*Rating)it: Debt-to-equity ratio moderates credit rating of bonds

(DER*CR)it   : Debt-to-equity ratio moderates credit ratio

RESULTS AN DISCUSSIONS

Descriptive Analysis

Table 1 explains that the dependent variable proxied to YTM has a minimum value of 3.58 percent, the maximum value of 18.06 percent, and a mean value of 9.21 percent. The moderating variable proxied to the debt-to-equity ratio (DER) has a minimum value of 2.125 percent, a maximum value of 78.6 percent, and a mean value of 3.11 percent. Independent variables represented by the profitability ratio proxied to return on asset (ROA) has a minimum value of -0.098 percent, a maximum value of 0.6 percent, and a mean value of 0.04 percent.

Table 1 Descriptive Statistical Result

	YTM (%)	ROA (%)	Rating	CR (%)	FS (Rp Billion)	DER (%)
Mean	9.219	0.049	0.120	1.641	38.530	3.114
Maximum	18.068	0.607	1.000	12.757	179.356	78.609
Minimum	3.580	-0.098	0.000	0.234	0.190	-2.127
Std. Dev.	3.227	0.100	0.327	1.896	43.500	9.372
Observations	75	75	75	75	75	75

Panel Data Model Selection

Then, Rating has the minimum value of 0.00, the maximum value of 1, and a mean value of 0.12. Current ratio (CR) has a minimum value of 0.23 percent, the maximum value of 12.75 percent, and a mean value of 1.64 percent. Firm size has a minimum value of Rp0.19 billion, the maximum value of Rp179.3 billion, and a mean value of Rp38.5 billion.

Testing of Panel Data Multi-Linear

Regression

Table 2 shows that Chow and Hausmann's tests reinforced the viability of a FE model. Both exhibited a probability value below 0.05 and endorsed the utilization of a panel data multi-linear regression with an FE estimator in this study.

Table 2 Comparison between the Chow Test and Hausmann Test

Model	Statistical Result	Df	Probability	Decision
Chow Test	4.138	(24,36)	0.0001	A fixed effect is a suitable model
Hausman test	29.797	7	0.0001	A fixed effect is a suitable model

Hypothesis Testing Result

Based

Table 3 the F-statistic, with a probability value of 0.0000, is below 0.05, leading to the acceptance of H0. This statistical result implies that ROA, credit rating of bonds, firm size, CR, and DER can moderate the effect of ROA, credit rating of bonds, and CR, thereby influencing the YTM of corporate bonds simultaneously.

Table 3 The Statistical Result

Dependent Variable: YTM	Cross-sections included: 25	
Method: Panel Least Squares	Sample: 2019 2021	
	Periods included: 3	
Variable	Coefficient	Probability
C	0.779	0.0000
ROA	0.212	0.0025
Rating	-0.123	0.2443
CR	-0.009	0.0011
FS	0.079	0.0000
DER*ROA	-0.593	0.0001
DER*Rating	-0.038	0.0183
DER*CR	0.005	0.0001
Effects Specification		
Cross-section fixed (dummy variables)		
R-squared	0.958167	Prob(F-statistic)	0.000000
Adjusted R-squared	0.922145	Durbin-Watson stat	2.633795

Determination coefficient (R2) value was 92.21%. This result suggested that the moderation of ROA, credit rating of bonds, firm size, CR, and DER moderates ROA, the credit rating and CR, thereby collectively contributing to YTM by 92.2%. Meanwhile, 7.8% of the variability in YTM is influenced by variables beyond the scope of the study.

Discussion

ROA positively affects the YTM of corporate bonds.

Table 3 explains that H1 is rejected, providing evidence that ROA has a positive impact on the YTM. During the report period, Bumi Resource Corp, Lautan Luas

Corp, and Pupuk Indonesia Corp disclose favorable financial reports, underscoring their capability to generate substantial profits. This corporation operates in significant sectors, such as the mining and chemical industries, and was successful in attaining high profits. Furthermore, these corporate issuers were seeking external funds and were able to meet the expected yield. This information contains positive signals that influence investors' decision to invest in secure bonds and simultaneously achieve high yields. The result is consistent with Poghosyan (2014) studies, where ROA has a positive influence on YTM. The positive effect of profitability on corporate bonds yield is underscored by the impact of Covid-19, which underscore the trend of interest rates, leading to a decline in bonds price and increase corporate bonds yield (O'Haraa & Zhou, 2021; Paule-Vianez et al., 2022).

Rating does not affect the YTM of corporate bonds.

Table 3 shows contradictions to the initial hypothesis that the credit rating of bonds has no impact on the YTM. During the study, several listed corporations faced business challenges during the Covid-19 pandemic, prompting them to enhance their credit rating for capital infusion and to foster business operations in anticipation of profits. According to Fabozzi and Mann (2021), investors relies on a credit rating of bonds to assess risk and gauge comparable spread. This result validates an earlier study that credit rating bond does not affect the YTM (Perry et al., 1991).

CR negatively affects the YTM of corporate bonds.

Table 3 incorporates the acceptance of H3, showing that high corporate liquidity decreases the YTM. Greater liquidity shows the ability to cover short-term debt, decrease the default risk, increase bond price, and impact lower yield. However, this can cause the loss of opportunities, as holding excessive cash or highly liquid assets implies that the corporation is not investing the resources into growth initiatives that obtain yield higher returns. These result is consistent with previous studies by (O'Haraa & Zhou, 2021) explorations.

Firm size positively affects the YTM of corporate bonds.

Table 3 challenges the initial hypothesis that firm size has a negative impact on the YTM. The arrangement of firm size in relation to total assets showed their capability to issue more bonds and distribute high bond yield. Examining the financial reports of Bumi Resources Corp,

Hartadinata Abadi Corp, Pyridam Farma Corp, and Sinar Mas Agro Resource and Technology Corp shows that these bond issuers allocated debt relative to assets to enhance YTM and business operations. Despite being large, these corporates continue to seek their external funds by issuing bonds and offering high yields to attract potential investors, especially during Covid-19. Aligns to (Cicchiello et al., 2022; Jareño et al., 2023) findings that most Indonesia corporation bonds increased their bond spreads to obtain fundings before and during Covid-19 spreads. Furthermore, investors express confidence due to their size and performance, which contributes to an enhanced reputation in the IDX market. This result is consistent with (Cavallo & Valenzuela, 2009) study.

DER can moderate ROA and negatively affect the YTM of corporate bonds.

Table 3 illustrates that DER moderated ROA and has a negative effect on the YTM of corporate bonds. A higher level of debt can enhance business productivity and increase loan interest costs, thereby reducing profits. These conflicting impacts on corporate objectives contributed to a negative impact on the YTM. Examining the financial reports of Angkasa Pura I (Persero) and Mayora Indah

Corporation shows their utilization of high debts in business operations, leading to lower profits and YTM. Investors express concerns about the performance of Indonesian corporations, which affects their investment decisions. These result validates Aggarwal et al. (2021) and Koijen et al. (2017) reports.

DER can moderate the credit rating of bonds and negatively affect the YTM of corporate bonds.

In Table 3, DER moderates the credit rating of bonds, exerting a negative impact on the YTM of corporate bonds. Elevated DER was associated with a decrease in the credit rating of bonds, thereby influencing the YTM. Despite possessing commendable bond grades, these issuers utilize high debt to augment profits and manage investment risk. The substantial debt levels influence investors in their decisions to buy or sell bond security, dismissing bond grades in their investment decisions. Empirical evidence shows that Bumi Resources Corp, Sarana Multi Infrastruktur (Persero), Angkasa Pura I (Persero), and Indosat Corp had bonds grade AA and AAA, aimed to attract potential investors by offering YTM values exceeding 7%. However, their financial reports show DER levels exceeding 81%, portraying debt levels surpassing

average industrial liabilities. This result corroborates Aggarwal et al. (2021) and Koijen et al. (2017) studies.

DER can moderate CR and positively affect the YTM of corporate bonds.

Table 3 shows that DER enhances CR and to influence the YTM of corporate bonds. High leverage in corporations, associates with elevated operational risk (Shu et al., 2023), significantly heightens yield spreads. This effect is further strengthened by high leverage in influencing YTM through liquidity. Allocating a substantial portion of the debt to capital and meeting short-term liabilities led to a reduction in the YTM. Financial reports of Indofood Sukses Makmur Corp, Barito Pacific Corp, and Semen Indonesia (Persero) shows an increase in total liabilities, aimed to enhance financial liquidity, and mitigate the short-term liabilities risk. Investors observe high liquidity funded by debt and view it as an optional choice for investment decisions. This result is consistent with Xie et al. (2018) reports.

CONCLUSION

ROA and firm size positively influence corporate bond's YTM. All sample listed corporations, characterized by high total assets and profitability, provide a substantial bond yield for investors. Furthermore, the results show that CR has a negative impact on YTM because investors interpret high cash on hand and asset liquidity as indicators of inefficient working capital and unproductive business for corporations.

DER has a negative moderating effect on the influence of ROA and bond credit rating on the YTM. Investors observe that extensive debt financing in business operations can lead to additional loan interest profits, thereby lowering the YTM. These issuers provide the highest bond rating, suggesting that a high DER shows their incapacity to enhance bond performance. Credit rating of bonds does not exert influence on the YTM. Investors scrutinizing the top bonds rating do not necessarily represent the best bonds portfolio, as many corporates potentially disseminate inaccurate information about their financial performance to attain favorable grades in the market.

Further investigation can comprise additional macroeconomic and financial variables, such as good corporate governance (GCG), earnings before interest and taxes (EBIT), corporate ownership, inflation, Bank Indonesia (BI) interest rate, and exchange rate. Subsequent studies can

also extend these reports to include small or medium-sized corporations. Moreover, cross-sectional samples are expected to be broadened to include specific business sector classifications, such as financial sector bonds.

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