Comparison of Performance from Green Bonds and Conventional Bonds Traded on the Indonesia Stock Exchange

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Abstract

Bonds are types of securities in the form of a debt acknowledgment letter for loan money from the public in a certain form, but with a minimum tenor of three years and promise of interest rewards in which the amount and payment have been determined in advance. Looking at the current global problems regarding degradation of environmental equality and climate change, bonds were developed where the proceeds of issuance were exclusively applied to finance environmentally friendly projects, is green bonds. However, the issuance of green bonds in Indonesia is slight. This research aims to find out the comparison of individual performance of green bonds and conventional bonds traded on the Indonesia Stock Exchange. The method used to measure performance is Sharpe Ratio. The result indicates that performance of green bond worse than conventional bond. This research can be used as a consideration for investor in making investment based on performance.

Keywords: Green Bonds, Conventional Bonds, Sharpe Ratio, Performance Measurement, Investment.

1. Introduction

Development that is targeted for economic growth but degrading environmental quality and climate change is becoming a global problem (Rahmayati, 2021; Maulana et al., 2020; Kurniawan and Managi, 2018). One form of overcoming the problem of environmentally sound development is the establishment of an agreement called the Paris Agreement (Tolliver et al., 2019). The Paris Agreement aims to keep the global average temperature rise in the 21st century below 2 degrees and achieve development that is low greenhouse gas emissions and is resistant to climate change by making consistent financial flows (United Nations, 2015).

In this case, the Finance Sector has an important role in implementing sustainable development. In Indonesia, to support this, the Sustainable Finance Roadmap is issued, one of which is the development of green bonds (Gulid, 2020; Dhesinta, 2019; Nugroho, 2020; Tafsir, 2021). Green bonds are fixed income securities designed to raise funds for projects that provide specific benefits for environmental sustainability (OJK, 2016; Azhgaliyeva et al., 2020; Flammer, 2020; Hajdys, 2020). In Indonesia the issuance of green bonds in local currency published in 2018 and none was published in the following year (Asian Bonds Online, 2021). When compared to conventional bonds, the development of green bond issuance is still lacking.

Zerbib (2019) investigates the different between green bond and conventional bond yield. The result is the yield of a green bond is lower than a conventional bond. Reboredo (2018) find that return of green bond has strong correlation to conventional bond. Deribew (2017) analyzes return, risk, and relationship between green bond and conventional bond index. Result of the research indicate that annual return of green bond index significant difference to corporate bond index and showed no significance difference to government bond using T-test, also indicate that risk of green bond index significant difference to corporate bond index using F-test, and has positive relationship between green bond index and corporate bond based on CAPM and ARDL model. Then, Knippers (2019) compare performance of green bond and conventional bond using Jensen method and there is no significant different.

Based on description above, there is a lot of discussion about comparison in various aspects. But, in Indonesia the research about green bond performance is still lacking. Therefore, this paper focuses on comparison of performance

from green bond and conventional bonds traded on the Indonesia Stock Exchange using Sharpe Ratio method so that investor can make their investment decisions based on the performance.

2. Literature Review

2.1 Bonds

In the Presidential Decree of the Republic of Indonesia Number 775/KMK 001/1982 it is stated that bonds are types of securities in the form of a debt acknowledgment letter for loan money from the public in a certain form, but with a minimum tenor of three years and promise of interest rewards in which the amount and payment have been determined in advance. Bonds also mean that the bond issuer will increase the amount of fixed capital from investors where the money is deposited to the issuer for a certain period of time and the capital will be paid back when the bond matures along with agreed interest on the invested capital (Kila, 2018).

2.2 Green Bonds

Green Bonds are bond instrument where the proceeds will be exclusively applied to finance or re-finance, in part or in full, new and/or existing eligible green project (ICMA, 2021). The main difference between green bonds and conventional bonds is the purpose of issuing those bonds. Green bond issuers clearly state that green bonds aim to raise capital to fund "green" projects, assets, or business activities, while conventional bonds are aimed for variety of financial investment purposes unrelated to the environment (Kila, 2018; Kisileva, 2019; McFarland, 2019).

3. Materials and Methods

3.1 Materials

The data used in this research is secondary data in 3 years period from 2018 to 2020 trading data on conventional and green bonds at PT Sarana Multi Infrastruktur obtained by e-mail data@ticmi.co.id. Data will be processed using Microsoft Excel. Data used in this research are listed in Table 1.

Table 1. Information data used

BondID	Coupon	Listing Date	Maturity Date	Value
GNSMII01ACN1	7.55%	09 July 2018	06 July 2021	IDR. 251,500,000,000
SMII01BCN1	8.20%	21 November 2016	18 November 2021	IDR. 1,328,000,000,000
SMII01BCN3	8.70%	05 December 2018	04 December 2021	IDR. 199,250,000,000
SMII01CCN1	8.65%	21 November 2016	18 November 2026	IDR. 700,000,000,000
SMII01CCN2	7.60%	16 November 2017	15 November 2022	IDR. 1,345,000,000,000
SMII01DCN1	8.90%	21 November 2016	18 November 2031	IDR. 674,000,000,000

3.2 Methods

3.2.1 Bond Return

Maximizing return without forgetting the risk factors that must be faced is the main goal of investment. Total return is calculated by the following formula (Hartono, 2017):

$$Return(r_t) = Capital\ Gain(Loss) + Yield \tag{1}$$

Capital gain or capital loss is the difference between the current investment price and the previous period. Capital gain or capital loss is calculated by the following formula (Hartono, 2017):

$$Capital\ Gain\ or\ Capital\ Loss = \frac{P_t - P_{t-1}}{P_{t-1}} \tag{2}$$

where,
P_t :   Bond price at t
P_{t-1} :   Bond price at $t-1$

Yield is a measure of the non-fixed return that investors will receive. There are several yield calculations that investor can use from different point of view, namely Current Yield, Yield to Maturity, and Yield to Call. This research uses the Yield to Maturity, which is the rate of return that investors will get by holding the bonds until maturity. It can be calculated using the approximate yield to maturity of bond by the following formula (Tandelilin, 2001):

$$YTM^* = \frac{C + \dfrac{P_p - P}{n}}{\dfrac{P_p + P}{2}} \tag{3}$$

where,
YTM^* : Approximate yield to maturity
C : Coupon/interest payment
P_p : Face value
P : Bond Price
n : Years to maturity

Expected return is the return used to make decisions and expected from an investment. In the average method, this return is assumed to be equal to the average historical value. Expected return can be calculated by the following formula (Hartono, 2017):

$$\mu_A = \frac{\sum_{t=1}^{n} r_t}{n} \tag{4}$$

where,
μ_A : Expected return bonds A
r_t : Return bonds at t
n : The number of bonds data

3.2.2 Bond Risk

Risk is the possible difference between the actual return received and the expected return. The variance or standard deviation value of the return is used to measure the risk of an investment that calculated by the following formula (Hartono, 2017):

$$\sigma_A = \sqrt{\frac{\sum_{t=1}^{n} (r_{A,t} - \mu_A)^2}{n}} \tag{5}$$

or

$$\sigma_A^2 = \frac{\sum_{t=1}^{n} (r_{A,t} - \mu_A)^2}{n} \tag{6}$$

where,
σ_A : Standard Deviation bond A
σ_A^2 : Variance bond A
μ_A : Expected return bond A
$r_{A,t}$: Return bond A at t
n : The number of bonds data

3.2.3 Performance Measurement

In investment, performance measurement is a crucial step because it is used to find out the return of an investment according to the level of risk borne (Hertina et al., 2021). One method of measuring investment performance is risk-adjusted return, including the Sharpe Ratio (Verma and Hirpara, 2016).

Sharpe Ratio, or known as reward to variability ratio is the ratio of excess return to variability or standard deviation. The greater the value of the ratio, the better the performance. Sharpe ratio can be calculated by the following formula (Hartono, 2017):

$$RVAR = \frac{\overline{TR_A} - \overline{RF}}{\sigma_A} \qquad (7)$$

where,

$RVAR$	: Reward to variability ratio
$\overline{TR_A}$	: Average bond return in a given period
$\overline{RF}$	: Return risk-free return in a given period
σ_p	: Standard deviation
$\overline{TR_A} - \overline{RF}$	: Excess return bond

4. Result and Discussion

4.1 Bond Returns

In this section, intends to determined return of bond. Price of bond used to calculate bond return. Bond returns in this research were calculated using equation (1) with capital gain or lose calculated using equation (2) and yield using equation (3). Software used is Microsoft Excel. The result is given in the Table 2.

Table 2. Bond Return

BondID	Year	Mean Price	Capital Gain/Lose	YTM	Return Total
GNSMII01ACN1	2018	99.86	-	-	
	2019	100.10	0.002423	0.018738	0.021160
	2020	100.94	0.008400	0.016440	0.024839
				Mean Return	0.023000
SMII01BCN1	2018	101.17	-	-	
	2019	97.64	-0.034846	0.023730	-0.011117
	2020	102.15	0.046206	0.014960	0.061166
				Mean Return	0.025024
SMII01BCN3	2018	99.99	-	-	
	2019	102.88	0.028933	0.017888	0.046822
	2020	102.79	-0.000895	0.014569	0.013675
				Mean Return	0.030248
SMII01CCN1	2018	94.97	-	-	
	2019	104.74	0.102836	0.019471	0.122307
	2020	103.27	-0.013997	0.019935	0.005938
			Mean Return		0.064122
SMII01CCN2	2018	98.76	-	-	
	2019	95.96	-0.028365	0.022830	-0.005536
	2020	100.77	0.050173	0.017965	0.068138
				Mean Return	0.031301
SMII01DCN1	2018	104.70	-	-	
	2019	100.51	-0.040019	0.022087	-0.017932
	2020	102.88	0.023530	0.021291	0.044821
				Mean Return	0.013444

Based on the Table 2, it can be seen that the largest mean return is conventional bond with bondID SMII01CCN1 and value of 0.064122 and the smallest mean return is also conventional bond with bondID SMII01DCN1 and value of 0.013444. The green bond has return with value of 0.023000, risk with value of 0.0018394, and performance using Sharpe ratio with value of -15.754597. The conventional bond with bondID SMII01BCN1 has return with value of

0.025024, risk with value of 0.0361412 and performance using Sharpe ratio with value of -0.745817. The conventional bond with bondID SMII01BCN3 has return with value of 0.030248, risk with value of 0.0165734, and performance using Sharpe ratio with value of -1.311198. The, conventional bond with bondID SMII01CCN1 has return with value of 0.064122, risk with value of 0.0581843, and performance using Sharpe ratio with value of 0.208700. Also, the conventional bond with bondID SMII01CCN2 has return with value of 0.031301, risk with value of 0.0368368, and performance using Sharpe ratio with value of -0.561340. Finally, the conventional bond with bondID SMII01DCN1 has return with value of 0.013444, risk with value of 0.0313761, and performance using Sharpe ratio with value of -1.228155.

4.2. Bond Risk

This section, indends to determine risk of bond. Return of green bond and conventional bond earned on Table 1 used to calculate risk. Bond Risk were calculated using equation (5). The result is given in the Table 3.

Table 3. Bond Risk

BondID	Standard Deviation
GNSMII01ACN1	0.0018394
SMII01BCN1	0.0361412
SMII01BCN3	0.0165734
SMII01CCN1	0.0581843
SMII01CCN2	0.0368368
SMII01DCN1	0.0313761

Based on the Table 3, it can be seen that the largest risk is conventional bond with bondID SMII01CCN1 and value of 0.0534891 and the smallest risk is green bond with the value 0.0018074.

4.3 Sharpe Ratio

To calculate performance using Sharpe ratio used return and risk of bond processed in the previous section, also return of risk-free asset. Return of risk-free asset used in this research is BI 7 Day Reverse Repo Rate (BI7DRR) listed in Table 4.

Table 4. Return of Risk-Free Asset

Years	Return BI-7 Day Reverse Repo Rate
2018	3.60%
2019	4.54%
2020	5.85%

Sharpe ratio of green bond and convetinal bonds were calculated using equation (7). Software used is Microsoft Excel. The result is given in the Table 5.

Table 5. Performance of green bonds and conventional bonds according to Sharpe measurement

BondID	Sharpe Value
GNSMII01ACN1	-15.754597
SMII01BCN1	-0.745817
SMII01BCN3	-1.311198
SMII01CCN1	0.208700
SMII01CCN2	-0.561340
SMII01DCN1	-1.228155

Based on the Table 5, the worst performance is green bond with the value -15.754597 and the best performance is conventional bond with bondID SMII01CCN1 and value 0.208700.

5. Conclusion

The development of green bonds is one proof of the government's commitment in implementing the Paris agreement. In fact, In Indonesia the issuance of green bonds in local currency published in 2018 and none was published in the following year.

This research aims to find out the comparison of individual performance of green bonds and conventional bonds traded on the Indonesia Stock Exchange using the Sharpe Ratio methods at PT Sarana Multi Infrastruktur. We find that from 2018 to 2020 green bond has the worst performance with value of -15.754597 and the best performance is conventional bond (SMII01CCN1) with value of 0.208700.

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