



REVEALING GREENIUM AND THE ROLE OF THIRD-PARTY CERTIFICATION IN THE PRIMARY MARKET OF CORPORATE SECTOR

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Abstract

One of the issues regarding green bonds to date is related to the difference of views regarding the existence of green bond premiums or greenium in the primary market. Greenium is an event where investors are willing to accept a relatively lower yield on their investment in green bonds compared to equivalent conventional bonds. The existence of greenium can incentivize the corporate sector to further intensify low-carbon business activities. However, based on previous research, there has been no conclusive conclusion.

This study uses the matching method to find a pair of green bonds with conventional bonds that have equivalent criteria and produce 18 bond pairs in the corporate sector. The results of this study indicate that a greenium of -38 bps was found.

Additionally, in further analyzing the factors that determine the variation of greenium, OLS regression was conducted on the specific characteristics of the bonds sampled in this study. The results of the analysis show that third-party certification significantly affects greenium and has a negative relationship. Furthermore, this indicates that third-party certification can reduce the possibility of greenwashing risk, it will further increase the credibility of green bonds in the eyes of investors.

This study also shows that there is a significant influence between Credit Rating and greenium, but it has a positive relationship. The cause of this is that majority of the green bonds sampled in this study have an A rating. A low rating will result in a relatively high green bond yield. Thus, this will reduce the amount of greenium.

Overall, this study concludes that the emergence of greenium is a form of investor support for environmental sustainability. Efforts to preserve it must be planned in the long term to realize a low-emission economy.

Keyword: conventional bond, green bond, greenium, primary market, third-party certification

1. Introduction

Financing to reduce greenhouse gas emissions and increase resilience to climate impacts is an important factor for implementing a low carbon transition. One financing innovation that can attract investment interest in low-carbon projects is by encouraging the issuance of green bonds (Ng and J.Y. Tao, 2016).

Since green bonds were first issued in 2007, demand for green bonds has continued to grow every year and by 2023 it is estimated that there will be USD 130 trillion of green bonds in circulation globally. The largest green bond market is denominated by developed countries, including Europe,

America and China (World Economic Forum, 2023). Even though green bond issuance is growing steadily in the economies of developing countries including the ASEAN region, the growth of the green bond market is growing relatively slowly compared to developed country economies. The causes include the initial cost and administrative challenges experienced when the green bond was first issued. For example, new types of monitoring, reviews from external parties (external reviews), and disclosures are required to guarantee the credibility of green bonds. (Sustainable Banking Network (SBN), 2018).

One of the things that has attracted research on green bonds to date is the existence of premium green bonds or greenium.



Greenium is a negative difference in the yield of a green bond with an equivalent vanilla bond (conventional bond) (Wongaree et al., 2023). Greenium is essential for green bond market players, because for the issuer, the relatively lower yield at the time of issuance will result in a reduction in the cost of capital in the form of compensating for the costs of some or all of the additional required disclosures (Partridge and Medda, 2020).

In studies on the primary market, there are differences in the results of previous research regarding the existence of the greenium in question. Ehlers and Packer (2017), Baker et al. (2022), Gianfrante and Peri (2019) found the presence of greenium in varying amounts. However, Partridge and Medda (2020), Flammer (2021) and Stefaniuc and Thorning (2021) did not find any statistically significant presence of greenium. Therefore, this research will focus more on investigating the existence of greenium, especially in the ASEAN financial market.

Next, this research will look at whether third party certification can explain the magnitude of greenium variations. In practice in the ASEAN market, during pre-issuance, the majority of issuers have used external review services (second party opinion) to verify the conformity of the green bonds to be issued with standard requirements including the ASEAN Green Bond Standard. However, there are several publishers who also use additional certification services by third parties. This is also the motivation for this research, to see whether the additional costs incurred will provide added value for the publisher.

2. Literature Review and Hypothesis Development

Unlike 'vanilla' bonds (conventional bonds) which finance the issuer's general working capital, green bonds must be used to finance or refinance green projects or assets only. (Rimau, 2019). Hull (2015) explains that based on traditional economic theory, asset prices should reflect the present value of future cash flows. Looking at these characteristics, green bonds and conventional bonds should not be valued differently unless a green label is attached to the green bond (Ehlers and Packer, 2017).

For Socially Responsible Investors, there is taste of assets which is a consideration besides returns in determining their investment portfolio and this will influence the price of these assets (Fama and French, 2007). Greenium is a manifestation of the taste of assets which is shown by the sacrifice of yield (the negative difference between the yield of green bonds and the yield of conventional bonds) which is a form of their support for investments that are pro-environmental sustainability.

In previous research on the primary green bond market, there were study results that showed the existence of greenium. Ehler and Packer (2017), conducted a comparative analysis of the credit spread on the issuance of 21 green bonds with equivalent conventional bonds periodically between 2014 and

2014. 2017 and found greenium of 18 bps. Baker et.al (2018) stated that investors are currently considering environmental factors, based on the capital asset pricing model perspective, green bond prices are expected to be lower, in reality green bonds are issued at a higher price (with a lower coupon rate) compared to conventional bonds. Gianfrante and Peri (2019) conducted an analysis of the presence of greenium from bond issuance from 2007 to the end of 2018 and found that the greenium ranged from 14.8 to 19.4 bps.

Furthermore, based on the results of other studies, it shows different results. Partridge and Medda (2018) conducted an analysis of the existence of greenium in US municipal bonds from June 2013 to January 2017. The amount of greenium found was relatively small, with an average of -4 bp, but the presence of greenium was not significant. Flammer (2021) did not find any significant greenium in 152 equivalent pairs of green bonds and conventional bonds. Stefaniuc & Thorning (2021) conducted a study of 259 green bonds and 15,741 conventional bonds from 2007 to 2013 and found mixed results. The average amount of greenium was -8 bps in the main sample. However, the greenium value is not significant at any level of significance. The presence of greenium only became significant after further analysis was carried out on sub-samples which were classified based on the specific characteristics of the bond and issuer.

The results of the research above indicate that it is necessary to investigate the presence of greenium in the primary market. Therefore, the hypothesis developed is as follows:

H1 : There is a significant negative difference between green bond yields and conventional bond yields (greenium)

The Greenbond market is characterized by the existence of voluntary standards and guidelines as well as rules and regulations issued by several jurisdictions such as China, India and Paris. Globally, the most generally accepted and widely known standard is the Green Bond Principle (GBP). (OECD, 2017).

To assess the credibility of a green bond, investors base it on the information disclosed by the issuer. Although external review is not mandatory, the Green Bond Principles recommend that issuers use external review to ensure the conformity of the green bond issued with the key features of the green bond. The form of external review can be in the form of second-party opinion (SPO), third-party verification and ratings (Ehlers and Packer, 2017)

Flammer (2021) suggests that certification can reduce information asymmetry and avoid the possibility of greenwashing. Third party certification aims to maintain the integrity of the label attached to the green bond.

Certified by a third party (CBI Certified) can provide additional greenium for the issuer. Allman and Lock (2022), found that the effect of third party certification on greenium was only significant for issuers located in Common Law countries, but the relationship obtained was positive where certification would reduce the size of greenium.

From the results of the research above, third party certification has an influence on Greenium, however there are no conclusive conclusions regarding the direction of the relationship between third party certification and Greenium. Therefore, the proposed hypothesis is as follows:

H2 : There is a significant negative influence between certification by a third party on the yield difference between green bonds and conventional bonds (greenium)

3. Research Method dan Data

The number of samples in this study was 18 pairs of green and conventional bonds issued in Southeast Asia from January 2018 to March 2023 obtained from Eikon. The issuer is domiciled in 2 countries, namely Thailand and Malaysia. In determining which conventional bonds are equivalent to green bonds that will be compared, the matching methodology is used by (Zerbib, 2019). Furthermore, all issuers in this study sample come from the corporate sector. The banking and financing sectors were excluded in this research, because these sectors are intermediary sectors. In addition, the Sukuk instrument was issued in this study to avoid inherent risks that would affect greenium.

In accordance with a study conducted by Zerbi (2019), the matching criteria that will be used to determine equivalent conventional bonds based on the green bonds that will be paired in this research are as follows:

Table 1 – Matching Methodology

Bond Characteristic	Matching Criteria
Issuer	Same
Currency	Same
Bond grade	Same
Bond structure	Same
Seniority	Same
Coupon type	Same
Issue date	+/- 6 years
Issue size	+/- 400%
Maturity	+/- 2 years

Next, after obtaining bond pairs according to the criteria mentioned above, for conventional bonds whose maturities are not exactly the same as the green bonds being compared, synthesizing is carried out to find the yield of synthetic conventional bonds using an interpolation approach. First, look for each triplet consisting of 1 green bond with 2 conventional bonds whose maturity is closest to the green bond maturity date.

Then look for synthetic bonds with a yield calculated based on the following formula (Stefaniuc et. al, 2021):

Equation 1 – Sintetical Conventional Bond Yield's Formula

$$\tilde{Y}_{CB} = Y_{CB_short} + \frac{Y_{CB_long} - Y_{CB_short}}{X_{CB_long} - X_{CB_short}} * (X_{GB} - X_{CB_short})$$

Table 2 – Description of Variable in Synthetical Conventional Bond Yield's Formula

\tilde{Y}_{CB}	: Synthetic conventional bond yield $_i$
Y_{CB_long}	: Yield on conventional bonds whose maturity is longer than the maturity of green bonds in the triplet $_i$
Y_{CB_short}	: The yield on conventional bonds has a shorter maturity than the maturity of green bonds in the triplet $_i$
X_{CB_long}	: The maturity of conventional bonds is longer than the maturity of green bonds in triplets $_i$
X_{CB_short}	: The maturity of conventional bonds is shorter than the maturity of green bonds in triplets $_i$
X_{GB}	: Green bond maturity in triplet $_i$

There are 8 synthetic bonds in this study which come from 8 triplets. The remaining 10 bonds are non-synthetic bonds. To find out whether there is a significant negative difference between green bond yields and equivalent conventional bond yields (greenium), the Wilcoxon signed-rank test is used.

To see the effect of third party certification on greenium, a cross sectional regression was carried out as follows:

$$Y_i = \beta_0 + \beta_1 Cert + \beta_2 CR + \beta_3 LnIA + \beta_4 MTYC + \beta_5 CY + \beta_6 UoP + \epsilon$$

Table 3 – Description Variable in Cross Sectional Regression

Varia bel	Description	Type	Measurement
Y_i	Greenium $_i$	Quantitative	$Y_{gb} - Y_{cb}$
$Cert$	Third Party-Certified $_i$	Qualitative	0 = No Certification 1 = Certified
CR	Credit Rating $_i$	Qualitative	AA atau AA+ = 1 A atau A- = 2
IA	Issue amount $_i$	Qualitative	Up to USD 50 million =1 USD 50 to 100 million =2 >USD 100 juta USD = 3
$MTYC$	Maturity $_i$	Qualitative	Up to 5 years = 1 6 to 10 years = 2

10 years = 3

<i>CY</i>	Currency pada tahun i	Qualitative	Thailand Bath = 1 Malaysian Ringgit = 2
<i>UoP</i>	Usage of Proceed	Qualitative	Renewable Energy = 1 Clean Transportation = 2 Green Building = 3
<i>IYBC</i>	Issued Year	Qualitative	Covid Declaration Date = 11 March 2020 Covid Declaration Ended Date = 5 May 2023 Before Covid = 1 After Covid = 2

The Shapiro-Wilk normal test was carried out to see the normality of the data distribution used in the regression. Next, the VIF test and Berucsh-Pagan Test were carried out to see whether there was multicollinearity and heteroscedasticity in the residuals of the regression model used.

4. Result

Statistic Descriptive

Category	Subcategory	#Pairs	Ygb	Issue amount	Maturity (avg)
Main Sample		18	3.39	43.505.000.000	6.39
Credit Rating	AA	7	3.45	9.555.000.000.00	4.71
	A	11	3.35	33.950.000.000.00	7.45
Currency	Thai Baht	16	3.34	43.450.000.000	6.75
	Malaysian Ringgit	2	5.05	55.000.000	3.50
Verification	CBI Certified	11	3.10	29.200.000.000	7.36
	Non CBI Certified	7	3.84	14.305.000.000	4.86
Use of Proceeds	Renewable Energy	11	3.08	27.750.000.000	6.45
	Clean transportation	4	3.60	14.700.000.000	9.00
	Green Building	3	4.23	1.055.000.000	8.00
Issue date	Before Covid	5	4.28	12.755.000.000.00	6.80
	During Covid	13	3.04	30.750.000.000.00	6.23

The majority of samples in this study almost entirely came from companies domiciled in Thailand. The total sample consists of 18 green bonds originating from 7 issuers. The highest number of green bond issuances each year will be in 2022 during the Covid period.

The most common use of green bond issuance proceeds is for renewable energy, followed by environmentally friendly transportation. The average green bond yield is 3.39%, the

issuance amount is USD 43.5 million with an average maturity of 6.39 years.

The number of green bonds certified was 11 bonds with an average yield of 3.1%. The average maturity for certified green bonds is 7.36 years, which on average has a maturity of 2.5 years longer than the average maturity for green bonds that are not certified.

Judging from the year of issuance, the average green bond yield decreased during the Covid-19 period compared to before Covid. Before the Covid-19 period, the average green bond yield was 4.28%, while during the Covid-19 period, the average green bond yield decreased to 3.04%. From the average number of publications per year, before the Covid-19 period it was USD 6.38 million per year, while during the Covid-19 period it was USD 7.7 million per year. This indicates that investor interest in green bonds has increased during the Covid period, so that the green bond market has become more liquid and caused the average green bond yield to decrease.

Green Bond Premium

Category	Subcategory	#Pairs	Mean	Median	Two Tailed Test
Main Sample		18	-0.38	-0.495	0.03423 *)
Verification	CBI Certified	11	-0.60	-0.65	0.01855 *)
	Non CBI Certified	7	-0.02	-0.20	0.93750
Issue Amount	s.d 50 juta USD	8	-0.51	-0.17	0.4609
	50 s.d 10 juta USD	4	-0.65	-0.22	0.875
	> 100 juta USD	6	-0.65	-0.61	0.03125 *)
Credit Rating	AA	7	-0.72	-0.68	0.001953 *)
	A	11	0.17	0.18	0.5781
Currency	Thai Baht	16	-0.51	-0.58	0.003357 *)
	Malaysian Ringgit	2	0.68	0.68	0.50
Maturity	s.d 5 tahun	9	-0.19	-0.20	0.57
	5 s.d 10 tahun	8	-0.55	-0.58	0.03906 *)
	> 10 tahun	1	-0.72	-0.72	1.00
Use of Proceeds	Renewable Energy	11	-0.45	-0.45	0.05
	Clean transportation	4	-0.75	-0.70	0.13
	Green Building	3	0.38	0.45	0.50
Issue date	Before Covid	5	-0.12	-0.54	0.8125
	During Covid	13	-0.48	-0.45	0.01709 *)

From the table above, the average greenium in the entire sample above is -38 bps, in line with expectations and indicating the presence of greenium in the primary market. The P-value is 0.0342 or lower than 0.05, so this research successfully accepts Hypothesis H1 proposed in this research and concludes that on average, there is a significant negative difference between green bond yields and equivalent conventional bond yields (greenium).

For further analysis of the presence of greenium, it was carried out on subsamples, which were formed from the main sample and grouped into various types of categories. First, greenium is grouped based on the presence of third party certification, there is a greenium of -60 bps for certified green bonds. Meanwhile, greenium which is not certified has a magnitude of -2 bps. This indicates that third party certification has a different influence on the market. Furthermore, in the category of issuance amount, a greenium of -65 bps was found in green bond issuance amounts above 100 million USD. This shows that the indication of the existence of greenium is determined by liquidity considerations.



In the fourth category, namely Credit Rating, there is a greenium of -72 bps for green bonds issued with a credit rating of AA. This indicates that greenium will be found more in green bonds which have lower credit risk.

Furthermore, for the fifth category, a greenium of -55 bps was found in green bonds with maturities between 5 and 10 years. This shows that a longer maturity will increase the risk of default, so that greenium will tend to be at a maturity with a relatively lower risk of default.

For the sixth category, namely the year of publication, the average amount of greenium was significant during the Covid period at -48 bps. This shows that investors' awareness of allocating their funds to green bonds is growing during the Covid era.

Sertifikasi Pihak Ketiga

Dependent Variable	Greenium			Fit Statistic
	Coefficient	t-value	p-value	
Variables				VIF
Third Party-Certified	-0,86524 **	-3,860	0,002655 **	1,644254
Issue Amount (Ln)	0,0277	0,326	0,750606	2,270.147
Maturity	0,37726	2,020	0,068429	1,719345
Credit Rating	1,30383 ***	-5,130	0,000328 ***	2,113419
Usage of Proceed	-0,36285	-1,861	0,089715	3,037847
Fixed Effect				
Issued Year	Yes			2,375892
Fit statistic				
Observation				18
Adjusted R ²				0,7
Breusch-Pagan test	BP		p-value	
	4,7252		0,5795	
Shapiro-Wilk test	W		p-value	
	0,95019		0,428	

Due to high multicollinearity, the Currency variable was removed from this regression model. The Cert variable has a p-Value of 0.0027. This means that Hypothesis H2 of this research is accepted at a significant level of 0.01. Thus, third party certification has a significant influence on greenium and has a directly proportional relationship (negative influence) with the size of greenium.

All green bonds sampled in this study have been reviewed by a third party at the time they are issued, namely by obtaining Second Party Opinion services. Even though the publisher has to incur additional costs for the certification process from this third party, having this certification will reduce the possibility of the risk of green washing, thereby increasing its credibility value.

For the maturity variable (MTCY), it has a significant influence on greenium at a significant level of 0.1 but has an inverse relationship with the amount of greenium. This means, the longer the maturity of the green bond, the greater the amount of greenium will be reduced. The longer the maturity date, the higher the risk of default. Furthermore, for the Credit Risk (CR) variable, it has a significant influence at the 0.01 significance level but has an inverse relationship with the amount of greenium. This shows that the Credit Rating will increase the Green Bond Yield and reduce the amount of greenium. As an illustration, 61% of the green bond samples in this study had a Credit Risk Rating of A where on average

the greenium was positive at 18 bps. If explored further, 61% of the green bond samples had a total issuance of 89%.

5. Conclusion

The results of this research show that a green bond premium (greenium) was found of -38 bps. Therefore, it can be concluded that there is a significant negative difference between the yield of green bonds and equivalent conventional bonds in the primary market. This shows that on average investors will be willing to accept green bond yields that are significantly lower than equivalent conventional bond yields. These results confirm the first hypothesis proposed in this study and provide evidence in accordance with several previous studies.

Apart from that, a significant amount of greenium can also be seen in the research sample which is further classified based on bond characteristics which include certification, number of issuances, maturity, credit rating and year of issuance.

Based on the regression model used in this research, evidence was obtained that certification by a third party (CBI Certified) has a significant influence and is directly proportional to greenium at a significance level of 0.01. This confirms the second hypothesis proposed in this research and shows that third party certification can reduce the risk of greenwashing when issuing green bonds, thereby increasing the credibility of the greenbond to investors.

Overall, this research concludes that greenium results from investor motives based on concern and a choice to be pro-environment. Therefore, it is important to realize the existence of greenium, to facilitate a low carbon economy by making green investments more attractive. With greenium, the company (issuer) will use it as compensation for the large costs of issuing green bonds so that it is hoped that in the future more and more issuers will issue green bonds so that a net zero emissions economy will be realized more quickly.

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