MJBE Malaysian Journal of Business and Economics

HETEROGENEOUS DETERMINANTS OF GREEN BOND YIELDS: EVIDENCE FROM QUANTILE REGRESSION

Siti Nurhidayah Mohd Roslen, Chua Mei Shan, Rafiatul Adlin Mohd Ruslan, Mary Pang
Department Of Economics And Financial Studies, Faculty Of Business And Management
University Technology Mara, 42300 Puncak Alam, Selangor Malaysia
School Of Accounting & Finance,
Nilai University 71800 Nilai, Negeri Sembilan, Malaysia

*Corresponding author's email:
sitihidayah@uitm.edu.my

Received Date: 10 Febuary 2026

Revised Date: 26 May 2026

Accepted Date: 26 May 2026

Published Date: 29 June 2026

DOI: https://doi.org/10.51200/mjbe.v13i1.7367

Keywords: *Green bond, bond yield, sustainable finance, sentiment, economic policy uncertainties.*

ABSTRACT

This study contributes to the literature on sustainable finance by investigating the determinants of green bonds yield to maturity across different quantiles. Using monthly data spanning from June 2019 to December 2025, quantile regression is used to assess the effects of risk-free rate (rf), consumer sentiment index (CSI), and economic policy uncertainty (EPU) on green bond yield behavior. Findings reveal that the risk-free rate exerts significant positive influence on green bonds yield across all quantiles, highlighting its role as the benchmark for expected returns on riskier investments, including green bonds. CSI shows no significant effect at lower quantiles implying that sentiment plays a limited role in lower yield green bonds. However, sentiment effects are significant for higher yield bonds. These results underscore the dual nature of green bonds as a safe haven asset yet sensitive to risk during heightened uncertainty periods.

1. INTRODUCTION

The rapid growth of the green bond market has turned green bonds into a key financing instrument that can support the transition towards a low-carbon economy. Driven by growing investor interest, green bond has been perceived as one of the important financing instruments in funding sustainable projects with global annual issuance reaching $1 trillion for the second time (the first was in 2021), according to Bloomberg statistics. Green bonds have become an imperative tool for aligning financial returns with environmental goals, especially with the increasing demand for ESG investments. While the nominal yields of green bonds often reflect the conventional sovereign bond rates, the risk premium embedded in green bond yields (Nanayakkara & Colombage, 2019) indicates a complex relationship between macroeconomic conditions (Nazarova et al., 2025), bond factors (Wang et al., 2019), investor sentiment (Piñeiro-Chousa et al., 2021), and regulatory frameworks (Saravade et al., 2023).

Existing studies have documented that green bond yields are influenced not only by fundamental risk factors but also by investor sentiment and macroeconomic uncertainty. Empirical evidence by MacAskill et al. (2021) and Wahyuningsih et al. (2025) suggests that green bond yield is mainly affected by issuance characteristics, such as ESG signals, governance quality, and issuer credibility, as well as macroeconomic conditions, including interest rates, inflation, and exchange rates. However, a critical gap remains regarding the role of market sentiment in shaping green bond yield dynamics, particularly under varying market conditions (Piñeiro-Chousa et al., 2021). This gap is significant because market sentiment is widely recognized as a key driver of price dynamics, even in relatively less liquid bond markets. Even though the bond market may not have a liquid secondary market, the changes in bond price can still happen due to sudden shifts in market sentiment. The collective shifts in market sentiments can influence investors' perceptions and emotions that can directly lead to herd behavior and temporary market reactions and green bond demands (Su et al., 2024). As a result, the bond prices will be affected, causing changes to the bond portfolio value held by investors and also determining the proceeds obtained for newly issued bonds. Motivated by these considerations, this study attempts to examine how sentiment affects green bond yields across all market conditions using the quantile regression analysis method. Findings obtained from this study can help to uncover whether market sentiment exerts an asymmetric effect on green bond yield under high, middle, and low yield distribution. This will provide additional insights into the risk and return profile of green bonds, offering a clearer perspective on portfolio allocation strategies for investors in the bond market.

Past studies that examined the effect of market sentiment on green bond performance were limited to regression models. These studies mainly used linear regression (Grishunin et al., 2023) and panel regression analysis methods (Piñeiro-Chousa et al., 2021). The researchers utilized bond prices and returns as indicators of green bond performance. The traditional ordinary least squares (OLS) regression estimates the mean relationship between independent and dependent variables, which does not account for potential differences in relationships that may exist at very high or very low yield levels. Thus, estimating a standard linear relationship between green bond yield and the identified independent variables may lead to serious misleading estimates of this relationship as it will average the positive and negative effects from the very low to very high green bond yield level.

In addition, green bond yields remain exposed to changes in prevailing economic factors, which may differ across markets. In the context of conventional corporate bonds, uncertainty about government policy (measured by EPU) will cause the bond risk premium to be higher when the uncertainty is high (Ioannidis & Ka, 2021). Similarly, a study conducted by Pham & Nguyen (2022) on the green bond market has also shown a strong influence of EPU on green bond returns. This past evidence shows that bond investors require higher compensation when policy uncertainty increases. Furthermore, evidence from Sisodia et al. (2022), Karim et al. (2022), and Friewald et al. (2012) have collectively shown that crisis periods can result in different bond market behavior as proven by non-financial signals of bond issuance, system-wide integration across global financial markets, and higher yield demanded by bond investors for holding less liquid bonds. The effect becomes more significant in periods of crises such as the 2008 financial crisis, the global oil price crises from 2014 to 2016, and the Covid-19 pandemic in the year 2020 (Wang et al., 2023). Although earlier research has studied the effect of EPU on green bond returns during crisis periods, little has been done on identifying possible heterogeneous relationships that may occur across different levels of green bond yields.

To address these limitations, this study used quantile regression analysis. Quantile regression estimates the relationships at different points of the yield distribution, allowing for capturing differential effects of independent variables on dependent variables at various levels of dependent

variables. In this study, the dependent variable to be studied is green bond yield. The interest is to capture the time series relationship between the level of green bond yield and the treasury benchmark risk-free rate, the consumer sentiment index (CSI), and the economic policy uncertainty index (EPU). The variations in the effect of consumer sentiment and economic policy uncertainty on green bond yield could happen due to (1) crisis effects characterized by heightened market stress and (2) asymmetric responses across different green bond yield levels associated with varying levels of sentiment and economic uncertainty. Accordingly, this study seeks to achieve the following research objectives:

i. To examine the joint effect of market sentiment and economic policy uncertainty on green bond yield during crisis periods.
ii. To analyze the heterogenous effects of market sentiment and uncertainty across different levels of green bond yields using quantile regression.

The rest of the paper is organized as follows. Section 2 presents the relevant theories that explain the yield behavior for bonds. This section also emphasizes the relationships between the risk-free rate, market sentiments, economic uncertainties, and bond yields. Section 3 describes the variables used in this study along with the methodology employed. Section 4 presents the results of the relationships for different green bond yield levels. Endogeneity test results are also presented as a robustness test. Section 5 offers conclusions and potential areas for future research.

2. LITERATURE REVIEW

The literature on the determinants of green bond yield using quantile regression analysis is scant. Existing studies have been concentrated on the factors that influence the green bond yield at the mean level using various analysis methods such as ordinary least square regression (Nurvita et al., 2024; Grishunin et al., 2023), panel regression analysis (Wahyuningsih et al., 2025; Abhilash et al., 2024; Basarić, 2022; Nanayakkara & Colombage, 2019), two-step regression analysis (Zerbib, 2019), and systematic literature review analysis (MacAskill et al., 2021). There exist some published studies on the question of the effects of independent variables at different yield levels of green bonds, such as in Jiang et al. (2022), Mar'i et al. (2024), and Hassan et al. (2024). These studies, which used quantile regression techniques, mainly examined the relationship between independent and dependent variables using bond return data instead of bond yield data. Although previous studies on green bonds have employed quantile regression, they predominantly focus on green bond returns. This study contributes to the literature by examining green bond yields instead, which provides different economic interpretations and implications. The use of different dependent variables leads to distinct insights.

To explain the factors that determine bond yield, Arbitrage Pricing Theory (APT) can be used. The APT is a multifactor asset pricing model that provides the benchmark in setting the rates of return that can be used in security valuation and investment performance evaluation. It explains the expected return as a function of systematic risk factors and the associated risk premiums. In the context of this study, the 10-year U.S. Treasury yield denotes the risk-free rate, while the green bond yields are treated as risky assets whose yield reflects the compensation for exposure to systematic risk factors. The relationship between the risk-free rate and the green bond yield can show if there is a risk premium required by investors for bearing additional risks in green bonds.

In this study, besides risk-free rate, two more variables are to be considered as the determinants of green bond yield which are consumer sentiment, and economic policy uncertainty. However, many past studies on the effect of market sentiments in the green bond market have been using green bond price returns as a measure of green bond performance. A study conducted by Piñeiro-Chousa et al. (2021) has shown that the market sentiment extracted from social networks can positively affect the green bond returns. However, the effect of market sentiment may not be straightforward and may be delayed (Pineiro-Chousa et al., 2022) due to different market conditions, bond characteristics, and other factors. Furthermore, because the green bond markets are internationally connected, returns of domestic green bonds are not only influenced by the return of foreign bonds but also by foreign investor behavior and sentiment (Le et al., 2025). Collectively, these findings suggest that market sentiment is an important determinant of green bond performance. Most of this past research is using bond returns to measure bond performance. This present study is going to use bond yield to maturity to capture the green bond performance based on its risk. Higher market sentiment index implies a positive investor outlook about the economy and financial environment. In this condition, the demand for green bond investments will be higher, resulting in a lower green bond yield. In short, it is expected that the higher market sentiment index is going to lead to lower green bond yield.

The effect of economic policy uncertainty (EPU) on green bond performance has also been well documented in the past. Study conducted by Pham & Nguyen (2022) reported that the relationship between EPU and the green bond market will vary depending on the market conditions. When the market is highly uncertain, the green bond returns are more sensitive to a slight change in EPU. An increasing EPU indicates higher uncertainty will result in lower green bond returns. The magnitude of effect on green bond returns is more noticeable for increasing EPU than decreasing EPU conditions (Syed et al., 2022). This result can be supported by a systematic review by Gyamerah & Asare (2024), which concluded that the connections between EPU and green bonds were more pronounced during periods of global uncertainty. The effect of EPU on green bond returns also varies at different return quantiles, suggesting a heterogenous effect of EPU on green bond performance (Wei et al., 2022). The EPU tends to have a stronger negative effect on green bond returns during bearish or weak return states (Xi et al., 2023). However, the green bonds are still considered as a portfolio risk diversifier because green bond returns do not move perfectly with other investments when there is high economic uncertainty (Haq et al., 2021). All this evidence suggested that the green bond's actual returns are significantly influenced by EPU. But one question that remains unanswered is about how these market factors are going to affect the expected return from green bonds, assuming that the investors hold the bond until maturity.

3. METHODOLOGY

3.1 Data

This study used monthly time series data from June 2019 to December 2025 to analyze the determinants of green bond yields. The period since 2019 is chosen to take into account a more diverse range of issuers which were coming from sovereigns, municipalities, financial institutions and private corporation across many sectors. The empirical framework is built around the S&P Green Bond Index's yield as the dependent variable. To capture the multidimensional determinants of this yield, the study also incorporates three primary independent variables which are the 10-year US Treasury Yield (to represent the risk-free benchmark), the Consumer Sentiment Index (CSI) (as a proxy of market sentiment), and the Economic Policy Uncertainty (EPU) Index (to measure the macroeconomic policy stress). A summary of the variables, their definitions and their respective sources is presented in Table 1.

Table 1: Summary of Variables and Data Sources

Variable Type	Variable Name	Proxy/Indicator	Data Sources
Dependent	Green Bond Yield (YTMGREEN).	S&P Green Bond Index's yield to maturity.	Refinitive Workspace database
Independent	Risk-Free Rate (rf).	10-year US Treasury Yield.	Refinitive Workspace database
Independent	Consumer Sentiment (CSI).	Consumer Sentiment Index.	Produced by University of Michigan, Obtained from Refinitive Workspace database
Independent	Policy Uncertainty (EPU).	Economic Policy Uncertainty Index for U.S. market.	Federal Reserve Bank of St. Louis.

The bond yields represent the yield to maturity (YTM) or the returns received by the bondholders if the bondholders hold the bond from the day it is issued until the maturity date. Following Piñeiro-Chousa et al. (2021), this study chose the S&P Green Bond Index's yield data from the Refinitive Workspace database. Specifically, we retrieved information of the monthly YTM for this index. The dataset covers June 2019 until December 2025. Additionally, the monthly data for risk-free rate namely 10-year US Treasury Yield and the Consumer Sentiment Index (CSI) published by University of Michigan were collected from the same platform. The 10-year constant maturity Treasury yield is widely regarded as a key benchmark for investment valuation, loan pricing, and risk-premium because it represents the long-term market expectations about future inflation, economic growth, and monetary policy (Dagkus, 2024).

The CSI data encompasses the monthly survey conducted by University of Michigan that measures the consumer confidence and optimism about the current and future economic conditions. This index also assesses the consumer attitudes towards their personal finance, business conditions and overall economic activities. The CSI value is in index form with no fixed upper bound. The usual range of this index is from 50 to 110. Increasing CSI value indicates improving consumer confidence, with stronger expected consumptions and growth, added with higher inflation expectations.

The third independent variable is the Economic Policy Uncertainty Index (EPU) for U.S. market. This data was sourced from the Federal Reserve

Bank of St. Louis. The EPU index measures the frequency of newspaper reports about policy related uncertainty including on government spending and deficits, regulations, monetary policy, taxes, trade and legislation. Similar to CSI, the EPU is an index number with average level of 100 as a base value. High index value indicates higher uncertainty.

3.2 Modeling Framework

To establish a baseline, an Ordinary Least Squares (OLS) regression was estimated with green bond yield (YTMGREEN) as the dependent variable. The model includes the three explanatory variables which are risk-free rate (rf), consumer sentiment (CSI), and market uncertainty (EPU). Multicollinearity was evaluated using variance inflation factors (VIF). VIF quantifies how much the variance is inflated. A VIF of 1 means that there is no correlation among the kth predictor and the remaining predictors, and hence the variance of regression coefficient is not inflated at all. VIFs exceeding 10 are signs of serious multicollinearity issue. All statistical analyses were performed using Stata software. Statistical significance was defined as 2-tailed p-value <.05.

Quantile regressions developed by Koenker and Bassett (1978) is conducted on the time series data in this study. This study employs quantile regression to examine the heterogeneous effects of consumer sentiment (CSI) and economic policy uncertainty (EPU) on green bond yield across different points of the yield distribution. Quantile regression allows the estimation of the effects at various quantiles by capturing the asymmetric responses at low, median, and high bond yield levels. Let $YTMGREEN_t$ denotes the green bond yield, and F(y) is the cumulative distribution function. τ refers to the quantiles. The τ-th quantile of $YTMGREEN_t$, denoted by Q(τ) can be presented in the following function:

$$\mathbf{Q}(\boldsymbol{\tau}) = \inf \boldsymbol{y}: \boldsymbol{F}(\boldsymbol{YTMGREEN_t}) \geq \boldsymbol{\tau} \qquad \textbf{(1)}$$

Where; inf refers to the infimum (or the greatest lower bound) which is the smallest value of 〖YTMGREEN〗_t satisfying the inequality. The quantiles must be in the range of zero to one.
In the context of this study, while 〖YTMGREEN〗_t denotes the green bond yield at time t, let X_t be the explanatory variables used in this study. The X_t variable includes the treasury benchmark risk-free rate (〖rf〗_t), Consumer Sentiment Index (〖CSI〗_t), and Economic Policy Uncertainty Index (〖EPU〗_t). Specifically, the quantile regression model for the τ-th quantile of green bond yield (y) can be specified as follows:

$$\mathbf{Q}(\boldsymbol{\tau}|\boldsymbol{X_t}) = \boldsymbol{\beta_0}(\boldsymbol{\tau}) + \boldsymbol{\beta_1}(\boldsymbol{\tau})\boldsymbol{rf_t} + \boldsymbol{\beta_2}(\boldsymbol{\tau})\boldsymbol{CSI_t} + \boldsymbol{\beta_3}(\boldsymbol{\tau})\boldsymbol{EPU_t} + \boldsymbol{\varepsilon_t}(\boldsymbol{\tau}) \quad \textbf{(2)}$$

Where; $Q(\tau|X_t)$ is the τ-th conditional quantile of green bond yield, $\beta_0(\tau)$, $\beta_1(\tau)$, $\beta_2(\tau)$, $\beta_3(\tau)$ are the quantile-specific coefficients for constant term, risk-free rate (rf_t), Consumer Sentiment Index (CSI_t), and Economic Policy Uncertainty Index (EPU_t), respectively. $\varepsilon_t(\tau)$ is the quantile specific error term.

To explore the effect of rf, CSI, and EPU on green bond yield across the entire distribution, quantile regression analyses were applied at various quantile levels (from 10th to the 90th percentile). This approach allows the identification of yield drivers that vary across different yield level (i.e. the level of compensations offered to investors for a given bond). All independent variables (rf, CSI, and EPU) were entered simultaneously within multivariate quantile regression framework to control for potential confounding effects and to estimate the independent relationship between the variables across different quantiles.

4. FINDINGS

4.1 Descriptive Statistics

Table 2 presents the summary statistics for the green bond yield to maturity (YTMGREEN), the risk-free rate (rf), consumer sentiment (CSI), and economic policy uncertainty (EPU) over the sample period from June 2019 until December 2025. The average YTM for green bond, globally is 4.24% with a standard deviation of 1.52%. The yield ranges from a minimum of 1.67% to 6.54%. The value of kurtosis (1.43) that is below 3 implies that the bond yield distribution has lighter tails and a flatter peak, suggesting fewer extreme values compared to a normally distributed data. The skewness value of less than zero (skewness = -0.37) indicates that most of the data are spread out more to the left. This result shows that most of throughout the sample period, the yield of green bonds is mostly below the average level.

Compared to the risk-free rate (rf), green bond is offering 1.29% higher yield from year 2019 to 2025. This is normal findings as the rf represents the lowest return an investor can expect from an investment with zero or lowest level of risk. Align with positive risk-return trade-off, investors will not accept additional risk unless the expected rate of return from the riskier investment offers better return than the rf. The difference between yield of green bond with the risk-free rate can be named as spread. The positive yield spread aligned with the existence of *greenium* as reported in earlier research in the same field.

The consumer sentiment index (CSI) records an average value of 69.58, with a standard deviation of 11.48%. CSI trend is declining in the sample period beginning February 2020 which is the post-Covid-19 pandemic period as shown in Figure 1. The declining value of consumer sentiment index reflects ongoing concerns by consumers about the overall strength of business conditions and economic state. Despite these concerns, the index's slight increases from August 2020 to December 2020, and from June 2022 to January 2024 are the positive signs, indicating a modest improvement in economic perceptions over the past two years. However, the index remains below the 6-year average of approximately 69.58 starting February 2025 until December 2025, indicating persistent consumer caution. The condition could be further justified by the heightened economic uncertainty observed from October 2024 to April 2025 as shown by the Economic Policy Uncertainty (EPU) index in Figure 2. Overall, these findings suggest that there are reduced spending and investment in the market, as a result of caution among consumers which may negatively affecting the financial markets activities.

Table 2. Descriptive Statistics

Statistic	YTMGREEN	rf	CSI	EPU
N	74	74	74	74
Mean	4.24	2.95	69.58	218.70
StdDev	1.52	1.39	11.48	114.93
Min	1.67	0.54	50	77
Max	6.54	4.88	98.4	725
Skewness	-0.37	-0.38	0.50	2.03
Kurtosis	1.49	1.55	2.88	7.78

Figure 1. Consumer sentiment index distribution from June 2019 to December 2025

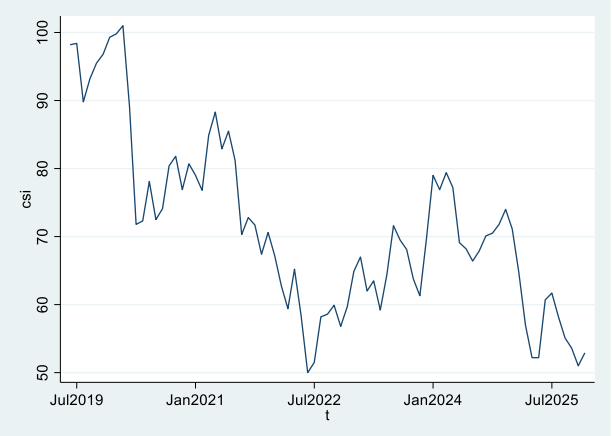
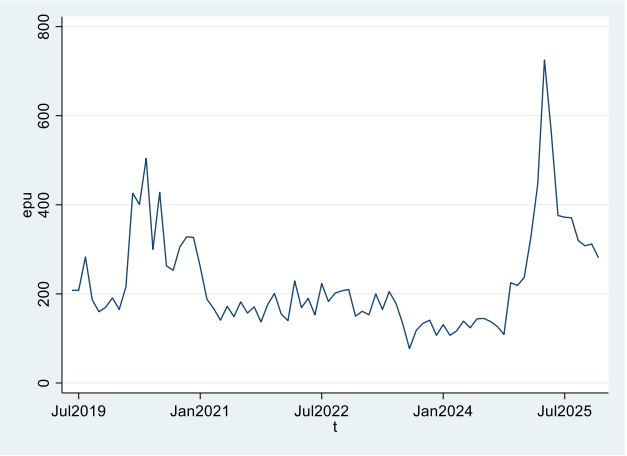


Figure 2. Economic Policy Uncertainty index distribution from June 2019 to December 2025



4.2 Baseline Regression Model

The results for ordinary least square (OLS) regression are shown in Table 3, along with the VIF results. A shown in the fifth column of Table 3, the VIFs does not exceed 4, which signs absence of serious multicollinearity issue. In addition, the coefficient of the risk-free rate is positive, and significant, indicating that the mean risk-free rate has important effect on the value of green bond yield to maturity. This aligns with discounted cash flow bond valuation model and term structure interest rates that highlight the importance of risk-free rate as the benchmark in setting the discount rate in valuing the bond and as the minimum rate of return that will be used for a zero-coupon bond, respectively. Results also shown that there are negative effects of consumer sentiment and economic uncertainty on green bond yield at the mean level. But the negative relationships do not pass the significance test, indicating that the relationship between consumer sentiment and economic uncertainty on green bond yield are not significant.

Table 3. OLS Regression and Multicollinearity Results

Dependent variable: YTMGREEN	Coef.	Standard error Coef.	p-value	VIF
rf	0.9661	0.0502	0.000	1.64
CSI	-0.0093	0.0054	0.092	1.70
EPU	-0.0004	0.0005	0.371	1.16
constant	2.1778	0.5487	0.000	
Adj R-squared	0.8967			
N	79			
F-stat	226.65			
Prob>F	0.0000			

4.3 Quantile Regression Models

The study further employs quantile regression analysis to explore the relationship between risk free rate (rf), consumer sentiment (CSI), economic uncertainty (EPU), and green bond yield to maturity (YTMGREEN). To interpret these results through an economic lens, it is important to differentiate between different yield levels. Lower quantiles (i.e. Q=0.1) represent bullish or stable market conditions, characterized by high bond demands, high bond prices, and low-risk compensations requirements made by bond investors. Conversely, higher quantiles (i.e. Q=0.9) correspond to bearish or distressed market states where bond investors demand higher yields to compensate for higher risks and liquidity constraints.

Table 4 shows the quantile regression results. The coefficient of the risk-free rate is consistently positive and statistically significant across all quantiles, showing a strong and persistent effect on green bond yield. The effect is more evident at Q(0.1) and Q(0.9) indicating that the effect of risk-free rate on green bond yield is greater during extreme yield conditions. In bond valuation model, risk-free rate can be the baseline discount rate for in determining the present value of bond's future cash flows. As the baseline discount rate increases, the required return on riskier bonds will also increase. Hence, the yield on green bond will be higher when there is an increase in so called risk-free bond yield.

In addition, findings also shown that there is a significant negative effect sentiment on green bond yield. Specifically, at 0.75 quantile, a 1% increase in consumer sentiment leads to 0.181% decrease in green bond yield. These findings indicate that when bond yields are relatively high, an improved market sentiment can act as a stabilizing mechanism. Higher consumer sentiment is associated with improved consumer perceptions about future outlook in income level, business environment, and economic conditions as well as higher awareness and preference for sustainable investments like green bond. Consumer sentiment was found to have a significant relationship with investor sentiment, even though it is a household survey (Qiu and Welch, 2004). It plays a key role in determining investors' portfolio rebalancing strategies and hence, capital movement in green bond market (Le et al., 2025). Positive market sentiment reduces bond yields, especially for higher yield bond with low ratings (Borovkova & Zhang, 2022). Lower rated bonds are bonds with higher risk of default and investors in these bonds will require higher risk premium on their investment (Chen, 2021). Given this situation, the lower demand pressure by consumers who also invests, pushes the green bond prices down, resulting in higher yield. Furthermore, the insignificant effect of CSI on green bond yield at the highest quantile may indicate that highest yielding bonds are less responsive to consumer sentiment and more influenced by the structural and issuer-specific factors such as the issuer term variability (Kim & Massa, 2024) and credit risk premium (Kelly et al., 2023).

For EPU variable, no significant evidence found on green bond yield across all quantiles. This suggests that EPU does not impose a significant effect on green bond yield for the sample period. This could be because, the market perceived green bonds as unique investment instruments and safe haven assets (Su et al., 2024; Khamis & Aassouli, 2023) that can insulate their investment portfolio from economic uncertainties which may cause the demand and yield of green bond to be unaffected by the changes in economic policy uncertainty in the global market.

Table 4. Quantile Regression Results for the Green Bond Yield

Dependent variable: YTMGREEN	Q(0.1)	Q(0.25)	Q(0.5)	Q(0.75)	Q(0
rf	1.1073***	1.0583***	0.9253***	0.9131***	1.0960*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CSI	0.0002	0.0048	-0.0074	-.0181***	-.0104
	(0.982)	(0.707)	(0.211)	(0.009)	(0.438)
EPU	-0.0007	-0.0009	-0.0010	-.0007	.0012
	(0.589)	(0.303)	(0.180)	(0.565)	(0.616)
constant	0.5246	0.6875	2.2850***	3.3590***	2.0640
	(0.638)	(0.538)	(0.003)	(0.002)	(0.254)
Pseudo R-square	0.6562	0.7014	0.7242	0.6592	0.6217
N	79	79	79	79	79

Note: P-values are presented in parentheses. *, **, and *** denotes significant coefficient value at 10%, 5%, and 1% level, respectively.

5. CONCLUSION

Based on an in-depth study on green bond yield to maturity data from June 2019 to December 2025, this study draws several key latest conclusions that are significant for understanding the yield behavior of green bonds. Given the significant effect of the risk-free rate on green bond yields, it is proven that risk-free rate is crucial as the minimum rate of return that investors can use as a benchmark in estimating the expected returns they will get from riskier investments, including green bonds. Even though green bond is always perceived as safe haven for investments, but the fact that green bond does entails some risks that may cause the

event of default is what cause its yield to be higher than the risk-free rate. Besides that, results also shown insignificant effect of consumer sentiment (CSI) on green bond yield at lower quantiles. This implies that sentiment does not matter much for average and lower yield bonds. At higher quantiles, sentiment become significant indicating that the effect of sentiment is conditional on the market conditions. When there are high uncertainties in the market, market sentiments tend to be lower and this will create higher yield demanded from bond investors to compensate themselves from higher investment risks. The significant effect of consumer sentiments on green bond yields reveals a certain linkage between the overall consumers' attitudes and confidence about their financial situations and economy and green bond market. Investors can consider consumer sentiment index as an indicator or financial market sentiment, using their movements to guide investment decisions in green bonds, especially during high uncertainty periods.

The findings of this study offer valuable contributions to both theory and practice. From a practical perspective, the results offer important implications for investors and policymakers. For investors, monitoring shifts in consumer sentiment may enhance portfolio allocation decisions, particularly in high-yield or stressed market environments. For policymakers, the findings suggest that maintaining stable macroeconomic conditions remains essential, as movements in benchmark interest rates continue to exert a strong influence on sustainable finance markets. Theoretically, this study contributes to the literature by extending the application of Arbitrage Pricing Theory to the green bond context using a quantile-based approach, demonstrating that the effects of systematic and behavioral factors are not uniform across the yield distribution. This highlights the importance of moving beyond mean-based models when analyzing green financial instruments.

This study looks into the effect of risk-free rate, consumer sentiment, and economic policy uncertainty on green bond returns and has yielded valuable findings. However, there are still some limitations. Firstly, the data used in this study is restricted to June 2019 to December 2025 which may not capture broader structural shifts in green finance. In addition, the study does not focus on specific categories of green bonds when generalizing the findings, such as examining the variability in effects that may arise in Eurobonds and local currency bonds. Future studies may also include other potential drivers of green bond yield to maturity using variables that cover longer time span with higher frequency of data.

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