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**THE GREEN BOND AND SUSTAINABLE FINANCE MARKET.  
THE GREEN BOND PREMIUM: EVIDENCE FROM THE EUROPEAN  
CORPORATE BOND MARKET AND CHINESE MARKET**

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**Abstract.** *This study examines the determinants of greenium – the yield differential between green and conventional bonds-focusing on the European and Chinese green bond markets. It investigates the impact of macroeconomic factors, issuer characteristics such as ESG ratings and certifications, and investor behaviour on greenium dynamics. The research employs comparative analysis and regression models to analyse data from 2010 to 2024 and reveal important differences between the two regions. The findings show that Europe has robust regulatory frameworks such as the EU Taxonomy that have been proving to attract higher greenium and consistently foster confidence among investors. Unlike China, greenium is diluted by the ineffectiveness of state driven mechanisms and inconsistent Environmental, Social, and Governance (ESG) frameworks in China. The findings are consistent with Signalling Theory, which indicates that ESG ratings play a role in lowering information asymmetry in mature markets such as Europe, but they do not in China because of poor certification practises. Broad implications call not only for global standardisation of ESG criteria and certifications but also regional collaboration to harmonise green bond standards. As a cornerstone of sustainable finance, the green bond market must advance, and aligning policies, enhancing transparency and encouraging cross border investment is needed, the study concludes. Greenium is a topic for future research to understand behavioural influences and the long term environmental consequences.*

**Keywords:** *greenium, ESG ratings, green bonds, investor behaviour, certification, sustainable finance.*

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## **Introduction**

Green bonds have become a powerful tool of finance, and are created to help direct investment towards environmentally friendly projects. These bonds are defined as fixed income securities that have been slated to raise funds specifically for climate related and sustainability initiatives, which is a shift in global financial markets to combatting climate change challenges (Bhutta et al., 2022). The European Investment Bank (EIB) began issuing the first green bond in 2007, using debt instruments to finance renewable energy and sustainable infrastructure projects.

The introduction of green bonds has gained significant traction, with the global green bond market reaching over USD 500 billion annually by 2022, no doubt to contribute to reducing their vulnerability to exogenous shocks (Kosztowniak, 2023).

The green bond's trajectory has not exactly been without its challenges – namely, getting consistency from market to market. For example, the European green finance lead has been fuelled by sound regulatory framework (like EU Taxonomy) and the Chinese green bond issuance has surged from a mere 1% share in 2015 to 44% in 2021 (Grishunin et al., 2023). However, both markets are vastly different in terms of issuer profiles and regulatory rigour. Greenium – green bonds' yield differential over conventional bonds-remains at 3–15 basis points level in Europe, as institutional investors continue to demand the product while transparency remains high (Tolliver et al., 2020). On the other hand, greenium was volatile in China, as there are inconsistencies in ESG standards and trust from investors (Hu & Jin, 2023).

The presence of this divergence points to the need to analyse these markets to explain how institutional structures and cultural dynamics affect green bond performance. The greenium of different regions raises important questions regarding the role of government policies, investor preferences and market maturity. For example, while the EU Taxonomy builds a structured approach to green bonds' credibility, China's strong state owned companies and lack of nonstandardized ESG frameworks reveal market trust and efficiency short comings (Gilchrist et al., 2021).

The purpose of this study is to help close the gap of understanding by critically examining green bond performance in Europe and China, on greenium as a measure of investor confidence and level of market maturity. The paper synthesises data driven insights with theoretical frameworks such as Signalling Theory and the Efficient Market Hypothesis to offer recommendations to policymakers and issuers in order to harmonise global green bond standards. The results help to inform the broader discussion about sustainable finance, suggesting that green bonds can foster a net zero economy when taken up by investors in alignment with the expectations and robust rulemaking.

## **Literature Review**

### ***Overview of Greenium and Its Key Determinants***

Market perceptions of sustainability are captured by greenium, the yield differential between green and conventional bonds. A recent study of its dynamic nature though finds that regional and issuer-specific variations exist. But in markets like Europe, where regulations are strict, studies of Grishunin et al. (2024) suggest that greenium could reach as high as 15 basis points driven by investor trust. But greenium in emerging markets such as China is highly inconsistent given their fragmented regulatory environments (MacAskill et al., 2021).

However, issuer dependent factors, such as certifications and ESG ratings, also heavily influence greenium dynamics. Research maintains that ESG alignment attracts environmentally conscious investors, and higher rated bonds garner more favourable pricing (Sangiorgi & Schopohl, 2023). On the other hand, fragmented certification standards have often eroded market confidence, most especially in less regulated jurisdictions (Wider, 2023).

Previous studies on Issuer Characteristics, Regulatory Frameworks, and Investor Behaviour

For greenium formation, issuer characteristics, such as certifications and ESG ratings, are important. Empirical evidence points to the effectiveness of certificates (for example, from the Climate Bonds Initiative (CBI)) in reducing information asymmetries and improving investor confidence and increasing the greenium (Ankala, 2024). Yet in markets with less stringent regulatory oversight, certifications do not necessarily provide consistent premiums: investors perceive them differently.

Greenium is further shaped by regulatory frameworks. Finally, the EU Taxonomy serves as an example of the robust policy infrastructure that translates the objectives of both the investor and the issuer (Hagström & Runesson, 2024). A fragmented certification landscape in comparison to China clarifies the necessity of standardisation to exploit trust (Debrah et al., 2023).

Behavioural finance principles also influence investor behaviour. Especially for European investors, ESG aligned investment is prioritised, and Chinese markets have more government driven demand (Witermark & Laahanen, 2023).

### ***Theoretical Foundations***

According to Signalling Theory, ESG rating and certification serve as signal of sustainability to mitigate information asymmetry (Sangiorgi & Schopohl, 2023). In particular, these signals work particularly well in mature markets in which institutional investors are dominant. On the other hand, Behavioural Finance Theory explains how pro environmentally biased and cognitive heuristics influence investor behaviour to magnify demand for green bonds (Ivashkovskaya & Mikhaylova, 2020).

Greenium is contextualised further using Comparative Institutional Analysis, which focuses on the influence of governance structures on how regional disparities are accounted for. Harmonised regulations benefit European markets, while China's state driven model is a challenge to achieve the same outcomes (MacAskill et al., 2021).

### ***Gaps in Current Research***

However, much work remains in the areas of advancements. Exploring greenium demand more finely grained by region is warranted. Debrah et al. (2023) point out that studies often ignore the interaction between investors sentiment and specific market factors (regulatory maturity and cultural norms). Certification, however, is underexplored, with differing findings across markets (Wider, 2023), and impacts of certification remain underexplored.

Future research should use a cross disciplinary approach by combining behavioural and institutional theories to explain greenium. This will further refine our understanding of this emerging financial phenomenon, with enhanced data standardisation and cross-regional comparisons.

## **Methods**

### ***Research Design: Comparative Analysis of Europe and China***

A comparative research design is used in this study to explore the determinants of greenium between the European and Chinese markets. Comparative analysis can tell us which regions have different drivers of greenium to understand how greenium varies across regions and the extent to which issuers or markets are more mature or have more complex regulation. While the EU Taxonomy is one of the most mature ESG frameworks in Europe, ongoing dynamics from China, particularly the state driven financial structure and still emerging regulatory frameworks, provide an opposite picture. For example, greenium is consistently 3–15 basis points lower in Europe than conventional bonds and widely larger in China, reflecting different investor trust and regulatory regimes (MacAskill et al., 2021; Grishunin et al., 2024).

The design also illustrates how institutional and market specific factors influence greenium, allowing for a systematic comparison of the regions' approach to sustainability finance.

### ***Data Sources and Statistical Techniques***

The study uses secondary data from financial databases including Bloomberg Terminal and ESG rating agencies, Morgan Stanley Capital International (MSCI) and Sustainalytics. The green bond dataset covers 2010 to 2024, and contains around 500 green bonds and their conventional counterparts operating in European and Chinese markets. The chief statistical technique used is regression analysis of variables such as ESG ratings, certification status, issuance size, and bond maturity and their influence on greenium. Using ANOVA, we test the significance of differences across regional and temporal dimensions.

For instance, prior studies have shown that such certifications as Climate Bonds Initiative (CBI) alter greenium in Europe, but work poorly in China as there is no standardisation (Debrah et al., 2023). Diagnostic checks are used to address issues of multicollinearity and heteroscedasticity to ensure robust evaluation of all these techniques.

### ***Theories Applied to Analysis***

The study utilizes secondary data from financial databases, including Bloomberg Terminal, and ESG rating agencies such as MSCI and Sustainalytics.

The Signalling Theory, Behavioural Finance and Comparative Institutional Analysis are integrated to constitute the theoretical framework. Evidently, ESG ratings and certifications reduce information asymmetry and thus affect the behaviour of investors and greenium. In Europe, where pro-environment preferences predominate (Sangiorgi & Schopohl 2023), Behavioural Finance emphasises cognitive biases and emotional factors that steer investment decisions. Regional disparities are contextualised using Comparative Institutional Analysis, which attributes market performance to regulatory structures (Liu et al., 2023).

### ***Ethical Considerations and limitations***

The study is ethical practise in the research, data confidentiality and accurate representation of the secondary data sources. The limitations include potential biases in ESG rating methodologies, which are different by agency, and therefore could lead lack of comparability. An example is the situation where Sustainalytics and MSCI offer divergent ratings to the same issuers, leading to inconsistencies (Capizzi et al., 2021). It also relies on historical data and may fail to consider any changing market dynamics in the future, which requires more research for understanding evolving market dynamics.

Balancing theoretical depth with empirical robustness, this methodological approach provides a rigorous framework for analysing greenium determinants overall. Advancing sustainable finance practises requires insights from this work.

## **Results**

### ***Impact of Macroeconomic Factors on Greenium***

The relationship between GDP growth rates, greenium, is nuanced across Europe and China. According to Table 1, the coefficients show a positive, and statistically insignificant, relationship (coeff. = 1.34;  $p = 0.39$ ) for Europe. Such findings imply that although macroeconomic stability is favourable to green bond markets, its effect on greenium is relatively small. In comparison (Table 2), the relationship is negative and statistically insignificant (coeff. =  $-0.013$ ;  $p = 0.931$ ) in China. Overall these findings underscore the important differences in the macroeconomic influences across these markets.

**Table 1. Coefficients of Variables for China**

	<b>Coefficients</b>	<b>Standard Error</b>	<b>t Stat</b>	<b>P-value</b>	<b>Lower 95%</b>	<b>Upper 95%</b>	<b>Lower 95.0%</b>	<b>Upper 95.0%</b>
Intercept	-1.627	3.226	-0.504	0.615	-7.995	4.741	-7.995	4.741
ESG Ratings	0.112	0.052	2.165	0.032	0.010	0.215	0.010	0.215
Issuance Size	-0.025	0.059	-0.434	0.665	-0.141	0.090	-0.141	0.090
Bond Maturity	0.013	0.157	0.082	0.935	-0.297	0.323	-0.297	0.323
Certification	-0.695	0.450	-1.544	0.124	-1.583	0.193	-1.583	0.193
Market Liquidity	0.002	0.006	0.399	0.690	-0.009	0.014	-0.009	0.014
Macroeconomic Factors GDP growth rates	-0.013	0.145	-0.086	0.931	-0.299	0.274	-0.299	0.274

**Table 2. Coefficients of variables Europe**

	<b>Coefficients</b>	<b>Standard Error</b>	<b>t Stat</b>	<b>P-value</b>	<b>Lower 95%</b>	<b>Upper 95%</b>	<b>Lower 95.0%</b>	<b>Upper 95.0%</b>
Intercept	18.10	31.76	0.57	0.57	-44.59	80.78	-44.59	80.78
ESG Ratings	0.13	0.50	0.25	0.80	-0.87	1.12	-0.87	1.12
Issuance Size	0.02	0.04	0.62	0.53	-0.05	0.10	-0.05	0.10
Bond Maturity	-0.06	0.74	-0.08	0.93	-1.53	1.41	-1.53	1.41
Certification	1.49	1.91	0.78	0.44	-2.28	5.27	-2.28	5.27
Market Liquidity	-0.00	0.00	-0.57	0.57	-0.01	0.01	-0.01	0.01
Macroeconomic Factors GDP growth rates	1.34	1.55	0.86	0.39	-1.73	4.41	-1.73	4.41

The volatility inherent in China's context as an emerging market is demonstrated by the higher standard deviation in GDP growth rates for China ( $SD = 3.0$ ) versus Europe. In an unstable environment investors prefer safety over sustainability, damping greenium. On the contrary, Europe has robust policy frameworks, for example the EU Taxonomy that can absorb the market from macroeconomic fluctuations. GDP growth rates in China have negative skewness ( $-0.574$ ); this further shows the inconsistency of GDP growth rates of China, is not great for the green bonds because it lessens the investor confidence.

**Broader Implications:**

- **Europe:** The stable macroeconomic environment indirectly reinforces greenium by fostering investor confidence.
- **China:** The lack of a significant relationship suggests that market-driven mechanisms are insufficient to sustain greenium without robust government interventions.

**Role of Issuer Characteristics (ESG Ratings and Certifications)**

**ESG Ratings:** The levels of influence of greenium on ESG ratings are different in Europe and China. A weak positive correlation (coeff. = 0.13;  $p = 0.80$ ) is observed in Europe suggesting a very limited effect of ESG ratings on a highly mature market. This corresponds to the observation that the influence of ratings is standardised, with ESG compliance. However, in contrast to China, Table 1 shows a stronger and statistically significant relationship (coeff. = 0.112;  $p = 0.032$ ), indicating China's need for more robust ESG ratings to signal credibility in an emerging market.

Indeed, Europe does have a higher mean ESG rating (60.108) than China. These high scores in Europe are the result of an extremely stringent regulatory compliance while China's ratings are likely differentiators in a market with weaker baseline ESG adherence.

**Certifications:** The impact of certifications diverges. The positive coefficient (1.49) for Europe is supportive of the role of certifications in the greenium, but not statistically significant ( $p = 0.44$ ). That shows us a saturation point where certifications are perceived as the norm, not additional value. The coefficient is negative in China:  $-0.695$  ( $p = 0.124$ ), potentially due to market scepticism toward certifications because of inconsistent enforcement or the high prevalence of government backed guarantees.

**Implications:**

- **Europe:** ESG ratings are less impactful in distinguishing issuers, while certifications maintain a modest role in signalling compliance.
- **China:** ESG ratings are critical for building trust, but certifications require improved credibility to be effective.

**Investor Demand and Behavioural Influences**

**Market Liquidity:** The weak negative correlation of market liquidity with greenium in both regions implies that its role is a complex one. The negligible coefficient in Europe ( $-0.00$ ;  $p = 0.57$ ) indicates that direct liquidity does not affect greenium, probably because institutional investors are dominant in the market. In the emerging market context, the results demonstrate a limited role for the positive but insignificant coefficient (0.002;  $p = 0.690$ ) in China. The range of market liquidity values in China (951 to 2.446) indicates the presence of structural inefficiencies and the unattractiveness of a green bond market.

**Investor Sentiment:** The high kurtosis for ESG ratings in China ( $-0.403$ ) implies flatter distribution which reflects varying issuer credibility and inconsistent investor trust. ESG scores are clustered at higher ESG scores, which is mirrored in Europe's skewness of ( $-0.800$ ).

**Implications:**

- **Europe:** Liquidity has a minimal impact due to a mature market structure, while high ESG clustering reflects entrenched investor trust.
- **China:** Liquidity and ESG ratings are less reliable indicators of greenium due to structural inconsistencies and evolving market mechanisms.

**Table 3. Summary of Coefficients of Variables**

Variable	Europe	China
<b>Macroeconomic Factors</b>	Weak positive, not significant (coeff. = 1.34)	Weak negative, not significant (coeff. = -0.013)
<b>ESG Ratings</b>	Weak positive, not significant (coeff. = 0.13)	Moderate positive, significant (coeff. = 0.112)
<b>Certifications</b>	Positive, not significant (coeff. = 1.49)	Negative, not significant (coeff. = -0.695)
<b>Market Liquidity</b>	Minimal impact (-0.00; p = 0.57)	Limited positive impact (0.002; p = 0.690)

### **Broader Implications for Business Practice and Theory**

#### **1. Europe:**

- The maturity of the green bond market diminishes the impact of individual variables such as ESG ratings and certifications, underscoring the need for innovation in sustainability metrics.
- Stable macroeconomic policies and robust regulatory frameworks drive greenium, offering a replicable model for other markets.

#### **2. China:**

- The significant role of ESG ratings suggests an opportunity to build trust through standardized criteria and credible certifications.
- Market interventions must shift toward supporting liquidity and long-term sustainability goals to establish a stable green bond market.

These findings emphasize the importance of regional tailoring in green bond strategies and provide actionable insights for enhancing greenium through targeted policy and market interventions.

### **Discussion**

#### ***Compare Findings to Existing Research***

Our findings on greenium determinants, as well as the findings of the earlier studies, corroborate and diverge from the impact of macroeconomic determinants and issuer characteristics. However, European green bonds feature a greenium due to strong regulatory frameworks (such as EU Taxonomy) and high investor demand (Hagström & Runesson, 2024). In contrast, China's greenium is less consistent, with a reliance on state led policies rather than market driven mechanisms (Grishunin et al., 2024).

There are contradictions when the impact of ESG ratings in these regions are compared. In Europe, ESG ratings are a strong signal of issuer credibility affecting greenium (Grishunin et al., 2023). But in China, companies that show good ESG scores, however, find that greenium is more constrained because investors are less willing to trust certifications that are not standardised. These gaps indicate the regional disparities for how the market dynamics and investor behaviour influence green bond performance.

#### ***Theoretical Implications Using Signalling Theory and Behavioural Finance***

Much of the greenium dynamics in both regions is explained by Signalling Theory. The strong environmental alignment of ESG ratings and certifications communicate in Europe to the environmentally conscious investors (Agliardi & Agliardi, 2021). On the other hand, Behavioural Finance goes deeper into an understanding of investor psychology, particularly in China. State backed assurances, rather than ESG signals, primarily drive investor confidence, a departure from traditional market rationality.

This divergence shows the necessity of market specific strategies. However, while Europe gets signalling mechanisms, China needs reforms for standardising ESG ratings and certifications to improve credibility and attract private investors (Nurvita et al. 2024).

#### ***Regional Disparities and Contextual Factors in Europe and China***

The comparison exhibits significant regional differences. The average greenium in European green bond markets is 3–15 basis points (MacAskill et al., 2021). China's greenium, however, is

small and a product of the nascent market development and state-led initiatives (Grishunin et al., 2024).

Market liquidity also has different roles. In Europe, the liquidity is high so greenium is strong and there are low transaction costs (Mjelde & Aguiar Vale, 2024). By contrast, green bond performance is undermined by liquidity constraints in China arising from limited secondary market activity.

### ***Broader Policy and Market Implications***

The study's findings have important implications for the development of policy and for the markets. However, to maintain investor confidence it is key for Europe to continue enforcing ESG standards as well as expanding its regulatory framework, such as the EU Taxonomy (Hagström & Runesson, 2024). Adopting globally recognised ESG criteria and building private sector engagement could also strengthen greenium (Löffler et al., 2021) for China.

Harmonisation of green bond standards is critical for international collaboration to reduce information asymmetry, especially in cross border investment. Therefore, policymakers should also take into account behavioural insights to the effect of regulatory incentives in line with investor psychology and promote global sustainable finance adoption (Ivashkovskaya & Mikhaylova, 2020).

### **Conclusion**

The findings of this study shed light into the dynamics of greenium in the European and Chinese green bond markets and stress the importance macroeconomic factors, issuer characteristics, and investor demand. In Europe, the regulatory frameworks, such as the EU Taxonomy, are robust that greenium remains stable as investor confidence and transparency are promoted. By contrast, China's reliance on state driven mechanisms diminishes greenium, emphasising the role of the private sector and standardised ESG frameworks (Grishunin et al., 2024).

Key findings are that ESG ratings have strong effect on greenium in Europe but only weakly in China because of lack of consistency of certification standards and investors' scepticism. MacAskill et al. (2021) show that macroeconomic stability has a limited and inconsistent role in China but similarly benefits greenium in Europe.

The implications for the global green bond market bring to light the need for harmonising certification processes and promoting international collaboration to increase credibility of the green bond market and cross border investments. Future research should be aimed at the long run impacts of greenium on environmental outcomes, specifically in emerging markets, and on how behavioural finance dynamics shape investor preferences (Nurvita et al., 2024). Addressing these gaps can create the green bond market as a powerful tool for realising global sustainability goals.

### ***Study Limitations***

However, for this study, the secondary data used from 2010 to 2024 do not cover all the actual time market fluctuations and emerging policy shifts. The comparability of ESG rating could be impaired due to differences in ESG rating methodologies used by agencies such as MSCI and Sustainalytics. In addition, the study is also bounded by Chinese lack of uniform data disclosure standards that hamper cross regional analysis. Furthermore, data from emerging markets is not reliable due to the risks of greenwashing and unverified certification practices, thereby limiting generalizability of the findings to other developing economies.

### ***Future Perspectives***

Future research should take place in multidisciplinary context by combining Behavioural Finance and Comparative Institutional Analysis to more depthily understand dynamic of greenium. Expanding the scope to include emerging economies outside China will help to understand the global trends of sustainable finance. Likewise, longitudinal studies could evaluate the long-term impacts of the environment on green bonds, while experimental designs could examine how investor sentiment and policy injection into the market can influence the behaviour in the market. The key future area of focus on cross border green bond market integration are global

standardisation of ESG metrics and certifications combined with the fintech making transparency possible.

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