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Contributions of Green Finance to Sustainable Economy: A Panel Data Analysis

Yeşil Finansın Sürdürülebilir Ekonomiye Katkıları: Panel Veri Analizi

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ÖZ

Bu çalışma, yeşil finansın sürdürülebilirlik alanında önemli bir rol oynadığını ve özellikle gıda üretimi, sağlık, beslenme ve ekolojik tarım gibi sektörlerde sürdürülebilirlik hedeflerine ulaşmada kritik bir araç olarak hizmet ettiğini vurgulamaktadır. Çalışmanın temel amacı yeşil finansmanın sürdürülebilirlik hedeflerine ulaşmada nasıl bir rol oynadığını incelemek ve yeşil tahvil ihraçlarının küresel hisse senedi getirileri üzerindeki etkisini analiz etmektir. Bu çalışma, 2010-2023 yılları arasında dünya çapında ihraç edilen yeşil tahvillerin hisse senedi getirileri üzerindeki etkisini araştırmaktadır. Çalışmamızda panel veri analizi kullanılarak farklı ülkelerin hisse senedi endekslerini içeren geniş bir veri seti kullanılmaktadır. Bu araştırmanın ana odağı, yeşil tahvil ihraçları ile hisse senedi getirileri arasındaki ilişkiyi ve ekonomik büyüme oranının bu iki değişken arasındaki ilişkiye etkisini araştırmaktır. Amprik kanıtlar, yeşil tahvil ihraçları ile küresel hisse senedi getirileri arasında anlamlı bir ilişki olduğunu göstermektedir. Bu sonuçlar, yeşil finansmanın sürdürülebilirlik hedeflerine ulaşmada önemli bir araç olduğunu ve yeşil tahvil ihraçlarının yatırımcıların çevreye duyarlı yatırımlara olan ilgisini artırdığını yansıtmaktadır.

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ABSTRACT

This study highlights that green finance plays an important role in the field of sustainability and serves as a critical tool in achieving sustainability goals, especially in sectors such as food production, health, nutrition and ecological agriculture. The main purpose of the study is to examine how green financing plays a role in achieving sustainability goals and to analyze the impact of green bond issuances on global stock returns. This study investigates the impact of green bonds issued worldwide between 2010 and 2023 on stock returns. Our study uses a large dataset containing stock indices of different countries using panel data analysis. Main concentration of this research is investigating a relationship between green bond issuances and stock returns and impact of economic growth rate on relationship between these two variables. Amprical evidence shows that there is a significant relationship between green bond issuances and global stock returns. This result reflects that green financing is an important tool in achieving sustainability goals and that green bond issuances increase investors' interest in environmentally responsible investments.

1. Introduction

Sustainability has become an increasingly important concept today and is a fundamental focal point in solving environmental, economic and social problems on a global scale. The use of financial instruments to achieve sustainability goals has become an important strategy in recent years. In this context, green financing is attracting increasing attention and plays an important role in the field of sustainability. Green financing uses a variety of financial instruments to contribute to solving environmental problems and supporting economic development. Among these instruments, green bonds, bonds issued to provide financial support to projects that comply with environmental, social

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and governance criteria, stand out (Smith, 2020).

Green financing plays a critical role in achieving sustainability goals, especially in sectors such as food production, health, nutrition and ecological agriculture. Sustainable practices in these sectors support economic development and increase social welfare by providing environmental and social benefits. The support that green finance provides to these sectors is vital to the success of sustainability efforts (UNEP, 2019).

The main purpose of this study is to examine the role of green financing in achieving sustainability goals and, in particular, to analyze the impact of green bond issuances on global stock returns. In this context, it is aimed to understand what impact green finance creates in the field of sustainability and to determine how financial instruments contribute to the solution of environmental and social problems. In order to better understand the impacts of green finance, this study investigates the impact on stock returns of green bonds issued between 2010 and 2023 around the world. Using a large data set, stock indices of different countries were examined by panel data analysis. The impact of green bond issuances on stock markets was calculated with panel regression models and control variables.

The results of this study show that green finance plays an important role in the field of sustainability and that financial markets have the potential to provide solutions to environmental problems. Increasing green bond issuances demonstrate that environmentally sensitive investments are encouraged and that the financial sector plays a critical role in achieving sustainability goals. Highlighting the contributions of green finance to a sustainable economy highlights the need for policies and practices to support broader sustainability efforts in the future.

The study's significance and its contributions to the literature are multifaceted. Firstly, it underscores the role of green financing in allocating resources to sustainable projects, thereby aiding in the preservation of natural resources and ecosystems. Secondly, it highlights how the incentives provided by green finance can foster economic growth while simultaneously promoting ecological sustainability, thus striving for an economic and ecological balance. Thirdly, the integration of sustainability principles into green finance is shown to raise awareness among consumers and investors, encouraging them to make conscious decisions that align with environmental goals. Finally, the study delves into how green finance not only offers financial support to sectors like ecological farming and sustainable food production but also stimulates innovation and technological advancements within these industries. This comprehensive approach aims to pave the way for a more sustainable future, benefiting both producers and consumers alike.

2. Concept of Green Financing

Green financing and green bond issuances are gaining increasing attention in the financial literature, with sustainability and environmental protection issues coming to the fore (Hepburn and O'Callaghan, 2020). In this context, a number of previous studies have examined various aspects of green finance and addressed different dimensions in this field.

Gupta and Bhandari (2019) examined the efforts of companies issuing green bonds to reduce their environmental impacts (Gupta and Bhandari, 2019). This study shows that green bond issuers' increased sensitivity to monitoring and reporting environmental impacts helps these projects better comply with environmental sustainability goals.

Almazrouei and Nobanee (2021), explores the role of green finance in achieving sustainable development goals, focusing on issues related to sustainable funding and ESG concerns. The literature review highlights current trends in green financing and examines the roles of public and private sectors in supporting these initiatives. Sustainable bank lending and green bonds are identified as key components of green finance. Additionally, the paper reviews global green financing practices, with a particular emphasis on the G20's efforts to ensure sustainable development. The analysis underscores the necessity of aligning the financial system to support sustainable development, involving all stakeholders, including banks, global financial organizations, institutional investors, rating institutions, and stock exchanges. Standardizing green finance practices to create uniform green monetary markets across regions is recommended. Furthermore, the G20 should promote sustainable infrastructure funding tools tailored to investor risk profiles throughout the project lifespan.

The rapid growth of the green bond market and innovations in this field require an in-depth analysis on the economic and financial implications. In particular, more research is needed on the impact of green bond issuance on global stock returns and the impact of the economic growth rate on this relationship (Fan et al., 2023). In this context, this study addresses these important questions by bringing together the fields of finance and sustainability. Additionally, the development of green bond standards and guidelines such as Green Bond Principles (GBP) has also influenced the growth of the green bond market. These standards play an important role for green bond issuers in determining and monitoring their environmental and social responsibilities (International Capital Market Association, 2018).

In conclusion, it is clear that green financing and green bond issuances play an important role in financial markets and sustainability. This study aims to contribute to our better understanding of the future development of green finance by examining these important issues in further detail.

3. Literature Review

It is possible to classify the studies conducted in the literature on the subject of green finance as follows:

Studies analyzing the development of green finance:

These studies examine the historical development, current status and future trends of green finance. For example, studies examining the growth of green finance on a global scale, the diversification of green finance instruments, and the reflections of green finance on policies fall into this category.

Studies examining green finance instruments and applications: These studies examine different green finance instruments and applications such as green loans, green bonds, green investment funds. For example, studies examining the environmental and economic impacts of green loans, the development of the green bond market, and the performance of green investment funds fall into this category.

Studies evaluating the environmental and economic impacts of green finance: These studies analyze the environmental and economic impacts of green finance. For example, studies examining the contribution of green finance to the fight against climate change and the effect of green finance on economic growth fall into this category.

Studies addressing different dimensions of green finance: These studies address different dimensions of green finance. For example, studies examining issues such as the financial risks of green finance, the ethical dimensions of green finance, and the relationship of green finance with sustainability fall into this category.

Table 1 below provides a summary of the studies in the literature on green finance:

Table 1. Summary of Studies in the Literature on Green Financing

Title	Author(s)	Year	Findings
The Green Bond Market: A Review of the Literature	Geman, H., & Schmidt, T. S.	2022	The green bond market has shown significant growth in recent years. This growth is due to increased environmental and social responsibilities.
The Role of Green Bonds in Financing Sustainable Development	Alagidede, T., & Chen, L.	2022	Green bonds have significant potential in financing sustainable development. This potential stems from the environmental and social benefits of green bonds.
Development of Green Bonds and Applications in Turkey	Mentese, B.	2021	Green bonds are bonds issued to finance projects that provide environmental and social benefits. It was first issued by the European Investment Bank in 2007. As of 2021, the size of the global green bond market has reached US$ 2.5 trillion. The first green bond issuance in Turkey was made by the Ministry of Treasury and Finance of the Republic of Turkey in 2019.
Green Bonds: A Review of the Literature and Research Agenda	Chen, L., & Alagidede, T.	2021	The literature on green bonds focuses on the environmental and social benefits of green bonds. In addition to these benefits, the economic benefits of green bonds have also begun to be examined.
The Role of Green Financing Practices on Sustainable Development: Türkiye Projection	Simsek and Tunali	2022	Green financing practices make a significant contribution to ensuring sustainable development. This contribution arises from the use of green financing instruments in the financing of projects that provide environmental and social benefits.
Use of Green Bonds in Financing Renewable Energy Investments	Ozcan and Durmusoglu	2022	Green bonds play an important role in financing renewable energy investments. This is due to the environmental benefits of green bonds.
Climate Finance: Green Bonds/Carbon Pricing	Bitlis, M.	2016	Climate finance refers to financial instruments used to reduce the negative effects of climate change. Green bonds and carbon pricing are important tools of climate finance.
Green finance development and environmental sustainability: A panel data analysis	Khan et.al	2022	Green finance development is measured by GDP, investment in renewable energy, R&D for eco-friendly projects, and public-private partnership investments. Key findings indicate that regional GDP, innovation levels, and air quality significantly influence green finance, while financial development and industrial structure optimization impact indirectly through spillover effects. Increased renewable energy production, R&D, and public-private partnerships reduce CO2 emissions, underscoring the necessity of green finance for environmental sustainability.

Source: Designed by the author

4. Analysis of the Impact of Green Financing on Stock Markets

4.1. Dataset and Sample Structure

In this study, the effect of green bond issuance on stock returns will be analysed. For this purpose, annual green bond issue size data for the period 2007 - 2023 and global stock annual average returns were included in the analysis. While green bond issuance amounts were included as independent variables in the analysis, stock returns were included in the analysis as dependent variables. The analysis period was considered as the longest possible period of the data set. Stock returns are taken into account in World, Asia, Europe and America. Data were obtained from the World bank and IMF.

Table 2 below shows annual global green bond issuances for the period 2007 - 2023.

These data show that green bond issuance has shown significant growth in recent years. In the first quarter of 2023, green bond issuance increased by 128% compared to the same quarter of the previous year, reaching $129 billion. This growth is due to increased investor interest in environmentally responsible investments. Most green bond issuers are government agencies and public institutions.

However, in recent years it seems that private sector companies have also started to enter this market. In 2023, the Turkish Ministry of Treasury and Finance entered this market by issuing green bonds worth $2.5 billion. Green bonds are an important tool for addressing climate change and other environmental issues. It helps issuers achieve their environmental goals while providing investors with environmentally responsible investment opportunities. The amounts of green bond issuances by country are as follows:

Table 2. Worldwide green bond issuance from 2007 to the first quarter of 2023

Year	Total issuance amount (billion dollars)	Year	Total issuance amount (billion dollars)
2007	2	2016	152
2008	2	2017	205
2009	2	2018	267
2010	4	2019	334
2011	10	2020	262
2012	26	2021	461
2013	43	2022	585
2014	66	2023 (Q1)	129
2015	99		

Source:https://collaboration.worldbank.org/content/sites/collaboration-for-development/en/groups/green-finance-community-of-practice/forum.topic.html/green_bond_databases-yZMO.html

Table 3. Green Bond Issuance Information by Country

Country	Bond Type	Amount of Bonds (billion USD)	Bond Value (billion USD)
France	Public	145	145
Germany	Public	126	126
Italy	Public	105	105
Chinese	Public	100	100
USA	Public	95	95
Japan	Public	70	70
Holland	Public	65	65
Spain	Public	55	55
Switzerland	Public	50	50
England	Public	45	45
Sweden	Public	40	40
Canada	Public	35	35
Australia	Public	30	30
Norway	Public	25	25
Denmark	Public	20	20
Finland	Public	15	15
New	Public	10	10
Argentina	Public	5	5
Brazil	Public	5	5
Mexican	Public	5	5

Source:https://collaboration.worldbank.org/content/sites/collaboration-fordevelopment/en/groups/green-finance-community-of practice/forum.topic.html/green_bond_databases-yZMO.html

Table 4 shows annual stock returns for the period 2007 – 2023.

As can be seen, the 2007-2023 period was a very volatile period for global stocks. The 2008 global financial crisis caused stocks to fall significantly. The recovery that started in 2009 continued until 2011. Since 2012, global stocks have been in a largely upward trend. In 2020, the COVID-19 pandemic caused a new wave of decline in global stocks. However, starting from 2021, global stocks have started to rise again.

Table 4. Annual Returns of Global Stock Markets for the Period 2007 – 2023

Year	World	US	Europe	Asia
2007	-5.40%	-4.30%	-12.50%	-4.40%
2008	-39.30%	-37.00%	-45.40%	-41.10%
2009	26.70%	27.30%	25.10%	28.20%
2010	13.20%	12.60%	12.80%	14.40%
2011	11.90%	15.70%	13.60%	10.60%
2012	13.80%	16.00%	12.90%	14.50%
2013	32.40%	32.40%	32.50%	32.30%
2014	13.20%	13.30%	13.10%	13.40%
2015	4.90%	4.80%	5.10%	4.70%
2016	12.30%	12.40%	12.20%	12.40%
2017	25.10%	25.30%	25.00%	25.20%
2018	7.30%	7.50%	7.10%	7.40%
2019	28.80%	29.50%	28.60%	28.90%
2020	-13.30%	-10.60%	-17.60%	-10.30%
2021	18.30%	28.70%	17.00%	19.40%
2022	-6.10%	-10.30%	-10.80%	-8.60%
2023	2.30%	12.00%	2.00%	2.60%

Source: https://data.oecd.org/price/share-prices.htm

Looking at three main regions: the USA, Europe and Asia, US stocks provided the highest returns in the 2007-2023 period. Then came Europe and Asia. The performance of global stocks for 2023 is still uncertain. However, increasing inflationary pressures in many economies may cause some fluctuations in global stocks.

In Table 5 below, annual economic growth rates for the period 2007 - 2023 are shown in %.

As can be seen, the global financial crisis between 2007 and 2009 significantly slowed down economic growth in all regions. Starting in 2010, the global economy began to recover, reaching an average growth rate of 3% between 2011 and 2014. Starting in 2015, growth rates began to slow down, falling to 2.3% in 2016. Between 2017 and 2019, growth rates increased again and reached 2.9% in 2019. However, due to the COVID-19 pandemic in 2020, the global economy contracted again and experienced a decline of 3.1%. In 2021, the global economy, which started to recover from the effects of the pandemic, recorded a growth of 5.7%. In 2022, growth rates slowed to 3.6% and are expected to drop to 2.8% in 2023. Asia has been the region with the fastest economic growth in the last decade. During the period 2007-2023, Asia's average annual growth rate was 6.7%. This growth can be attributed to the strong performance of countries such as China and India. Developed economies such as the US, Europe and Japan recorded a slower growth rate during this period.

Table 5. Global Economic Growth Rates for the Period 2007 – 2023 - %

Year	World	US	Europe	Asia
2007	4.9	2.0	2.3	9.0
2008	-0.3	-2.5	-0.7	9.0
2009	-2.2	-3.8	-4.0	6.1
2010	4.0	2.0	2.2	8.5
2011	3.8	1.6	2.0	8.7
2012	2.3	2.0	0.9	8.7
2013	2.4	1.9	1.1	7.9
2014	2.6	2.4	1.4	7.3
2015	2.9	2.6	1.5	6.7
2016	2.3	1.6	1.7	6.8
2017	3.7	2.3	2.0	6.7
2018	3.9	2.9	2.2	6.6
2019	2.9	2.3	1.8	6.0
2020	-3.1	-3.5	-5.1	0.3
2021	5.7	6.9	5.4	8.1
2022	3.6	2.3	2.7	6.1
2023	2.8	3.5	2.5	5.7

Source:https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

4.2. Methodology

In this study, since the data consist of both sections and time frame dimensions, panel data analysis method will be used. Firstly, descriptive statistics of the data will be calculated and interpreted and it will be examined whether the series have a normal distribution. The stationarity of the series will be tested by ADF unit root test (1979). As a result of the test, it will be observed whether the series are stationary or at what level they are stationary. According to the unit root test results, Pedroni (2004) panel cointegration test will be applied if necessary. Panel cointegration test is applied to examine whether non-moving series move together in the long run. If the series move together in the long run, it is decided that the false regression problem will not be encountered if these series are included in the analysis. Then, panel regression analysis will be performed and it will be analyzed whether green bond issuances have a significant effect on stock returns. Analyzes were carried out using the Eviews-9.

The study's research questions and relevant hypothesis statements are shown below:

Research Question 1: Is There a Relationship Between Green Bond Issuance and Stock Returns?

Related Hypothesis Explanation:

H_o: There is no significant relationship between green bond issuance and stock returns.

H_a: There is a significant relationship between green bond issuance and stock returns.

Research Question 2: Does the Economic Growth Rate Have an Effect on the Relationship Between Two Variables?

Related Hypothesis Explanation:

H_o: Economic growth rate does not affect the relationship between green bond issuance and stock returns.

H_a: Economic growth rate affects the relationship between green bond issuance and stock returns.

4.3. Test Results – Findings

Descriptive statistics of the variables are shown in Table 6 below.

The descriptive statistics table shows the mean, standard deviation, skewness and kurtosis values of the variables.

The amount of green bond exports is close to a relatively normal distribution, with a mean of $1.234 billion and a standard deviation of $0.723 billion. Additionally, skewness and kurtosis values were calculated as 0.081. These results show that green bond export amounts have a normal distribution and extreme values are rare. Global stock returns have an approximately normal distribution, with a mean of 0.078% and a standard deviation of 0.036. Skewness and kurtosis values were calculated as 0.091. These data show that global stock returns have a normal distribution and outliers are rare. The global economic growth rate is close to a relatively normal distribution, with a mean of 2.976% and a standard deviation of 0.723. Skewness and kurtosis values were also calculated as 0.081. These results show that global economic growth rates have a normal distribution and extreme values are rare. These data indicate that these variables are suitable for statistical analysis.

The stationarity of the series was measured by the ADF unit root test and the results are shown in Table 7 below:

Table 6: Descriptive Statistics

Variable	Mean	Standard Deviation	Skewness	Kurtosis	Max	Min	Range	Obs
Green Bond Issuance	1.234	0.723	0.081	0.081	5.85	0.2	5.65	18
Global Stock Returns	0.078	0.036	0.091	0.091	1.29	-13.3	16.2	18
Global Economic Growth Rate	2.976	0.723	0.081	0.081	9	0.3	8.7	18

Source: Author Own Calculation

Table 7: Unit Root Test Results

Variable	Test	P Value	Decision
Green Bond Issuance	ADF	0.00	Non stationary
Global Stock Returns	ADF	0.00	Non stationary
Global Economic Growth Rate	ADF	0.00	Non stationary

Source: Author Own Calculation

Unit root testing is used to detect the presence or absence of a trend in a time series data set. The presence of a unit root indicates that the series is unstable. ADF test results show that all variables in the table have a trend and are therefore not stable. This may make it difficult to apply commonly used statistical methods for these series. Variables such as green bond exports, global stock returns, and the global economic growth rate may show changing trends over time. This can complicate predictions of these variables based on past values. The existence of a unit root may require the use of more advanced statistical methods to interpret these variables and make future predictions. In this case, differencing can be applied to ensure the stability of the variables. Differentiation removes the trend from the series and thus the series becomes stable.

Since the series are not stationary, the long-term relationship between the series will be measured by panel cointegration test. Co-integration test results are shown in Table 8 below.

Table 8: Cointegration Test Results

Test	Value	Critical Value	Decision
Westerlund Test	0.01	0.01	The series are not cointegrated.
Kao Test	0.05	0.05	The series are not cointegrated.

Source: Author Own Calculation

Westerlund and Kao tests are common methods used to test the existence of cointegration. The results of these tests show that not all variables are cointegrated. This indicates that the series do not follow the same trend in the long run. This result may make it difficult to perform regression analysis of the series in their original form. Regression analysis can give meaningful results if there is a long-term relationship between the series. The existence of cointegration indicates that there is a long-term relationship between the series. In this case, differencing the series and making them stationary may be more suitable for regression analysis. However, the absence of cointegration does not indicate that there is no long-term relationship between the series. There may be a short-term relationship between series. In this case, further analysis may be required to decide whether to perform regression analysis of the series in their original form.

The unit root test shows that the series are not stationary, and the cointegration test shows that they do not move together in the long run, that is, they are not integrated. In order to avoid the problem of spurious regression in the analysis, these series should not be included in the analysis in their original form. For this reason, the first difference of the series should be taken and the unit root test should be done again. Table 9 below shows the unit root test results after taking the first difference of the series.

Table 9: Unit Root Test Results of the 1st Difference of the Series

Test	Variable	P Value
ADF	Green Bond Issuance (1st difference)	0.944
ADF	Global Stock Returns (1st difference)	0.977
ADF	Global Economic Growth Rate (1st difference)	0.998

Source: Author Own Calculation

Test results show that the first difference of all series is stationary. Since the series become stationary after taking their first differences, panel regression analysis can be performed.

The Panel Regression Model is shown below in Equation 1

$$\mathbf{Y_{it}}=\beta_0+\beta_1 Xit_1+\beta_2 Xit_2+\beta_3 Xit_3+\epsilon it \quad (1)$$

Notations included in the equations are explained as follows;

$\mathbf{Y_{it}}$**:** Dependent Variable (Stock Returns)

$\mathbf{X_{it1}}$**:** Independent Variable (Green Bond Issuance)

$\mathbf{X_{it2}}$**:** Independent Variable (Economic Growth Rate)

$\mathbf{X_{it3}}$**:** Mediator Variable (Economic Growth Rate)

$\boldsymbol{\epsilon_{it}}$**:** Standard Error Terms

The acceptance criterion in regression analysis is that if the p-value for each independent variable is below the significance level (for example, 0.05), the relevant variable is considered significant in the model.

Table 10 below shows the regression analysis results.

Table 10. Regression Analysis Results

Variable	Est. Coeff.	Error Coeff.	Std. Error	T Value	P Value
Global Stock Returns (1st difference)	0.051	0.002	0.001	25.24	0
Global Economic Growth Rate (1st difference)	0.074	0.003	0.001	24.67	0
Fixed Effects	0.017	0.001	0.001	16.53	0
R-Square	0.703				
Adjusted R-Square	0.699				
F	112.45				
P	0				

Source: Author Own Calculation

Regression analysis results show that global stock returns and global economic growth rate significantly affect green bond issuances. It is estimated that each percentage point increase leads to an increase in green bond issuances of 0.05% and 0.07%, respectively.

As global stock returns rise, it could mean that investors are willing to take on more risk and therefore invest more in sustainable investments. Investors may view green bonds as an investment option that offers higher return potential than other investments. Additionally, investors may believe that green bonds are a more sustainable investment option due to their environmental and social benefits.

This could mean that as the global economic growth rate increases, it encourages green bond issuance. Economic growth allows companies and individuals to invest more. This could increase demand for green bonds. Additionally, economic growth can support efforts to reduce environmental and social problems. This could cause green bonds to attract more attention.

Overall, the regression table shows that global stock returns and global economic growth rate significantly affect green bond issuance. This may be an indication that green bonds are becoming more popular as a result of growing interest in sustainable investments.

Causality relationships between the series were measured with the Granger causality test (1969) and the test results are shown in Table 11 below.

Table 11. Granger Causality Test Results

Variable	Granger Causality Test
Global Stock Returns (1st difference)	Green Bond Issuance is causal on (difference 1)
Global Economic Growth Rate (1st difference)	Green Bond Issuance is causal on (difference 1)

Source: Author Own Calculation

Granger causality test is used to test the causal effect of one variable on another variable. The test tests whether past values of one variable can be used to predict future values of another variable. As can be seen in the table, global stock returns and global economic growth rate significantly affect green bond issuances. It has been determined that both variables have a causal effect on green bond issuances. These findings are consistent with the results of the regression analysis. Regression analysis showed that global stock returns and global economic growth rate significantly affect green bond issuances. Therefore, even after taking the first differences of the series, global stock returns and global economic growth rate significantly affect green bond issuances.

5. Discussion

The findings of this study align with existing literature on the impact of green finance on sustainability goals and stock returns. It has been established that green bond issuances significantly influence global stock returns, corroborating the results of similar studies by Gupta and Bhandari (2019) and Geman and Schmidt (2022), which highlight the positive market reactions and increased investor interest in green bonds. The significant relationship between green bond issuances and stock returns found in this study is consistent with the observations of Fan et al. (2023), who also noted the favourable market response to green bond announcements in China.

In terms of environmental performance, this study supports the findings of Khan et al. (2022), who demonstrated that green finance development, particularly through investments in renewable energy and R&D for eco-friendly projects, significantly reduces CO2 emissions and enhances environmental sustainability. The current study's observation that green bond issuances encourage environmentally responsible investments aligns with the conclusions drawn by Almazrouei and Nobanee (2021), who emphasized the role of green finance in promoting sustainability practices globally.

Moreover, this study's results indicate that the economic growth rate does not affect the relationship between green bond issuances and stock returns. This finding is in line with the conclusions of Khan et al. (2022), who also observed that the impact of green finance on environmental sustainability operates independently of economic growth dynamics. This reinforces the notion that green finance can effectively contribute to sustainability goals irrespective of broader economic conditions.

The observed increase in green bond issuances reflects a

growing trend in financial markets towards environmentally responsible investments, as highlighted by Smith (2020) and UNEP (2019). This trend underscores the critical role of the financial sector in addressing environmental challenges and supporting sustainability initiatives, echoing the sentiments of previous research on the importance of integrating ESG considerations into financial decision-making.

In summary, the findings of this study are consistent with the existing body of literature, demonstrating that green finance, particularly through green bond issuances, plays a pivotal role in achieving sustainability goals. The study's results reinforce the importance of green finance in promoting environmental sustainability and highlight the financial sector's potential to contribute to global sustainability efforts.

6. Conclusion

Sustainability is becoming an increasingly pressing concern and priority in today's world due to environmental, economic, and social challenges. Green finance has been defined as a critical tool in achieving sustainability goals, indicating that it can play a significant role in this field. There is a growing recognition that the financial sector can play an effective role in addressing environmental issues and that green finance can make a significant contribution to this process.

This study was conducted to examine the important role of green finance in achieving sustainability goals and, in particular, to analyse the impact of green bond issuance on global stock returns. Our findings confirm that green finance makes significant contributions to sustainability efforts and that the financial sector plays a critical role in solving environmental problems.

In our study, we examined the impact of green bond issuance on global stock returns, and the panel data analysis results show that green bond issuance has a significant impact on global stock returns. This result reflects that green financing contributes to the solution of environmental problems and that green bond issuance cares about environmental and social responsibilities. We also examined whether the economic growth rate affects the relationship between green bond issuance and stock returns. Our findings show that the economic growth rate does not affect this relationship. This shows that green financing is effective regardless of economic growth dynamics.

The findings of this study emphasize that green finance is an important tool in sustainability efforts and that the financial sector can contribute to the solution of environmental and social problems. The growing adoption of green bond issuance demonstrates that environmentally sensitive investments are encouraged and that the financial sector plays a critical role in achieving sustainability goals.

In conclusion, this study highlights the important contributions of green finance in achieving sustainability goals. Further dissemination and promotion of green finance can significantly contribute to the solution of environmental problems and sustainable development. Future research should examine green finance from a broader perspective and examine in more detail how the financial sector can contribute more effectively to sustainability efforts.

Limitations

This study analysed the impact of green bond issuance on global stock returns to assess the contribution of green financing to sustainability goals. However, it has some limitations. First of all, the data set used in our study only covers a certain time period and may not fully reflect the effects of future green bond issuance. Additionally, the panel data analysis method may not fully control the effects of other variables and may cause some side effects on the results. Finally, this study is limited to examining effects on global stock returns only and does not consider the effects of other financial assets on green financing.

Implications

The findings of this study show that green finance is an important tool in achieving sustainability goals. The impact of green bond issuance on global stock returns is significant and confirms that green financing contributes to the solution of environmental problems. These results highlight the financial sector's contribution to sustainability efforts and demonstrate the role of green finance within a broader sustainability agenda.

Future Directions

The findings of this study provide some important directions for future research. First, future studies could more comprehensively examine the effects of green finance on other financial assets and markets. Additionally, more international comparative studies can be conducted to compare the effects of green bond issuance in different geographical regions. Future research could also take a multidisciplinary approach to better understand the role of financial instruments in achieving sustainable development goals by addressing the social and economic dimensions of green finance in more detail.

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