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Provided in Cooperation with:

International Journal of Energy Economics and Policy (IJEPP)

Reference: Hoang, Dinh Cong/Tuan, Dinh Cong (2023). Evaluating the role of green financing, international trade and alternative energies on environmental performance in case of Chinese provinces : application of quantile regression approach. In: International Journal of Energy Economics and Policy 13 (2), S. 500 - 508.

<https://www.econjournals.com/index.php/ijeep/article/download/14170/7237/32671>.

doi:10.32479/ijeep.14170.

This Version is available at:

<http://hdl.handle.net/11159/630216>

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Evaluating the Role of Green Financing, International Trade and Alternative Energies on Environmental Performance in Case of Chinese Provinces: Application of Quantile Regression Approach

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Received: 31 December 2022

Accepted: 04 March 2023

DOI: <https://doi.org/10.32479/ijeep.14170>

ABSTRACT

Despite increasing recognition of the urgent need to address the impacts of climate change, the global response has been inadequate, and greenhouse gas emissions continue to rise. The role of green financing in addressing this problem is uncertain, as it remains in its early stages of development and implementation. Furthermore, the relationship between green financing, alternative energies, and environmental performance is complex and not well understood. This study examines the potential of green financing as a tool for mitigating the effects of climate change and promoting sustainable development. Assessing the effectiveness of green financing as a means of improving environmental performance, and the role of alternative energies in this relationship. This study aims to provide recommendations for policymakers, businesses, and other stakeholders on how to effectively leverage green financing to promote sustainable development and address the impacts of climate change. Using Quantile regression approach, this study finds that green finance, international trade, GDP and alternative energies are important determinants of CO₂ emissions of China. We find that green finance, and alternative energies have negative location coefficients, which imply that these factors abate CO₂ emissions. On the contrary, the location coefficient of international trade and GDP are positive, which suggest that these factors increase CO₂ emissions of China. The negative coefficient of green finance for all quantiles implies that green finance is beneficial for environmental performance of China.

Keywords: Environmental Performance, Green Finance, Alternative Energies, Quantile Regression

JEL Classifications: Q59, E60, Q20, C21

1. INTRODUCTION

Despite increasing recognition of the urgent need to address the impacts of climate change, the global response has been inadequate, and greenhouse gas emissions continue to rise. At the same time, the world's financial system has yet to fully integrate the principles of sustainability and the costs of environmental degradation into decision-making processes. This has resulted in a gap between the resources needed to transition to a low-carbon economy and the available capital. The need for effective and scalable solutions to this problem is increasingly pressing, as the impacts of climate

change become more severe and widespread. The role of green financing in addressing this problem is uncertain, as it remains in its early stages of development and implementation. Furthermore, the relationship between green financing, alternative energies, and environmental performance is complex and not well understood (Lee and Lee, 2022). This is particularly evident in China, where the government is actively promoting green financing as a means of transitioning towards greater sustainability, but faces challenges in implementing these initiatives effectively. Given these challenges, there is a need for further research to explore the potential of green financing as a tool for mitigating the impacts of climate change

and promoting sustainable development, and to better understand the relationship between green financing, alternative energies, and environmental performance (Ali et al., 2021).

Green financing refers to financial practices and investments that prioritize environmental sustainability and mitigation of climate change (Li et al., 2022b). This includes the development of green bonds and other financial instruments that incentivize environmentally responsible behavior (Meo and Abd, 2021). Green financing can play a key role in context of China, where the government has made significant investments in alternative energy and low-carbon infrastructure. China is now a leading producer of solar and wind energy, and is actively working to shift its economy towards greater sustainability through green financing initiatives (Petersen, 2009; Rasoulnezhad and Taghizadeh-Hesary, 2022).

Green finance is increasingly being recognized as a critical tool for promoting environmental sustainability and achieving a transition to a more sustainable and resilient global economy. Green finance refers to financial activities and instruments that are used to support environmentally-friendly projects and initiatives, such as alternative energy, energy efficiency, and sustainable transportation (Huang et al., 2022). This type of finance is designed to provide incentives for businesses and individuals to adopt environmentally-friendly practices, while also generating positive financial returns. Green finance helps to channel funds to ecofriendly initiatives, reducing the reliance on conventional finance and providing a more sustainable and resilient financial system (Amanda and Carlotta, 2020). Green finance also helps to mitigate the risks associated with traditional finance, as investments in environmentally-friendly projects and initiatives are often less risky than investments in conventional projects that rely on fossil fuels and other unsustainable practices (Wang et al., 2022). In addition, green finance helps to create new markets and opportunities for investment in the transition to a more sustainable and resilient global economy, by providing capital to support innovative technologies and business models that promote environmental sustainability. For example, green finance can be used to support the development and deployment of alternative energy technologies, such as wind and solar power, and to finance energy-efficient building retrofits and sustainable transportation infrastructure (Fleming, 2020). However, despite the many benefits of green finance, there are also challenges to its implementation and scaling. For example, green finance often requires a greater degree of collaboration and coordination between different actors, such as governments, businesses, and financial institutions, as well as a shared understanding of the risks and opportunities associated with environmentally-friendly projects and initiatives. Green finance helps to channel funds to ecofriendly initiatives, reducing the reliance on conventional finance and providing a more sustainable and resilient financial system (Iqbal et al., 2021). However, there are also challenges to the implementation and scaling of green finance, and it is important for governments, businesses, and financial institutions to work together to overcome these challenges and promote the growth of green finance in order to achieve a more sustainable and resilient global economy (Taghizadeh-Hesary et al., 2022).

Green finance in China has been growing rapidly in recent years, driven by the country's commitment to mitigating the effects of climate change and transitioning to a more sustainable, low-carbon economy. The Chinese government has introduced a number of initiatives to support green finance, including tax incentives, subsidies, and mandates for banks and insurance companies to increase their investments in clean energy and other environmentally friendly projects. These efforts have led to significant growth in the green bond market, with China now accounting for over half of global green bond issuance (Jin et al., 2021; Zhang et al., 2021; Xu et al., 2022). Additionally, China's central bank has launched a green financial system, which provides a framework for linking environment with financial decision-making. Despite these developments, challenges remain, including the need to align green finance with international standards and the need to improve transparency and disclosure in the green bond market. Nevertheless, green finance in China is helpful for country's efforts to achieve a more sustainable and environmentally responsible future (Taghizadeh-Hesary et al., 2022). As of 2021, China is one of the leading nations in the development and implementation of green finance. China is the world's largest investor in alternative energy, with investment reaching \$103.1 billion in 2020. Moreover, China is the world's largest issuer of green bonds, with over \$18.4 billion in issuance in 2020. This represents a significant increase from the previous year, and underscores China's commitment to promoting green finance. The green insurance market in China is rapidly growing, with the China Insurance Regulatory Commission (CIRC) announcing plans to establish a green insurance fund worth \$15 billion. China's Belt and Road Initiative aimed at promoting economic development and integration across Asia, Europe, and Africa, is incorporating green finance principles and promoting environmentally-friendly projects and initiatives. These recent facts and statistics demonstrate China's leadership and commitment to green finance, and highlight the significant growth and potential of the green finance market in China. It is expected that green finance will play a key role in achieving a more sustainable and resilient global economy.

The objective of this study is to examine the potential of green financing as a tool for mitigating the effects of climate change and promoting sustainable development. Assessing the effectiveness of green financing as a means of improving environmental performance, and the role of alternative energies in this relationship. This study aims to provide recommendations for policymakers, businesses, and other stakeholders on how to effectively leverage green financing to promote sustainable development and address the impacts of climate change.

2. LITERATURE REVIEW

There is a large body of literature examining the various factors that affect environmental performance, which encompasses a wide range of aspects, including economic, social, political, technological, and natural factors. A review of this literature highlights several key factors that are commonly seen as having the greatest impact on environmental performance (Kirikkaleli et al., 2021; Noh, 2010; Sadorsky, 2010; Chi et al., 2021; David

and Venkatachalam, 2018; Khan et al., 2021; Tolliver et al., 2019; Ali et al., 2014; Rahayu et al., 2022; Sharma et al., 2022; Mubeen et al., 2022). In recent years, the issue of environmental sustainability has gained increasing attention from policymakers, financial institutions, and the general public. The concept of green finance has emerged as a means of financing environmentally sustainable development, providing funding for clean energy, energy efficiency, and other environmentally friendly projects (Acheampong et al., 2019; Azhgaliyeva et al., 2018; Li et al., 2020; Eyraud et al., 2013; Gök, 2020; Krushelnyska, 2019; Shahbaz et al., 2013; Ji et al., 2020; Tamazian et al., 2009; Safi et al., 2021; Tamazian and Rao, 2010).

The nexus between green finance and environment has been investigated by several authors (Fleming, 2020; Amanda and Carlotta 2020; Huang et al., 2022; Iqbal et al., 2021; Jin et al., 2021; Lee and Lee, 2022; Li et al., 2022b; Meo and Abd, 2021; Petersen, 2009; Rasoulinezhad and Taghizadeh-Hesary, 2022; Wang et al., 2022; Xu et al., 2022; Zhang et al., 2021). A study by Lee and Lee (2022) found that companies that received green finance had significantly better environmental performance compared to companies that did not receive green finance. The study found that the use of green finance was positively associated with a reduction in carbon emissions and an increase in energy efficiency. Another study by Meo and Abd (2021) found that green bonds, a type of green finance, were positively associated with improved environmental performance. The study found that companies that issued green bonds had better environmental practices and were more likely to implement environmentally sustainable initiatives. Additionally, a study by Rasoulinezhad and Taghizadeh-Hesary (2022) found that companies that received green finance were more likely to adopt environmentally friendly practices, such as reducing their carbon footprint, improving their waste management systems, and investing in alternative energy. The literature reviewed suggests that green finance can have a positive impact on environmental performance. Companies that receive green finance are more likely to adopt environmentally friendly practices and have better environmental performance compared to companies that do not receive green finance. However, further research is needed to fully understand the relationship between green finance and environmental performance and to determine the most effective ways of promoting environmentally sustainable development through green finance.

Alternative energies have been widely studied in the literature as a means of improving environmental performance and mitigating the impacts of climate change. Researchers have consistently found that the increased usage of alternative energies can help to reduce CO₂ emissions (Adebayo and Kirikkaleli, 2021; Ayobamiji et al., 2022; Bamisile et al., 2021; Bekun, 2022; Charfeddine and Kahia, 2019; Ehigiamusoe and Dogan, 2022; Gielen et al., 2019; Haldar and Sethi, 2022; Qin et al., 2021; Hao et al., 2021; Hasnisah et al., 2019; Wang et al., 2020; Pata and Caglar, 2021; Sahoo and Sahoo, 2022; Sharif et al., 2020; Vo et al., 2020; Ali et al., 2021; Yuan et al., 2022; Zafar et al., 2019; Agbarha, 2022; Ahmad et al., 2022; Alnaa and Matey, 2022; Belesis et al., 2022; Faisal et al., 2022; Imasuen et al., 2022). Hao et al. (2021), for example, found that the increased use of alternative energy sources can help to

reduce emissions, which adds to air pollution and negative impacts on human health. Ayobamiji et al. (2022) found that the use of alternative energy sources can help to reduce water pollution and water usage, as alternative energy technologies do not require the large amounts of water that are needed for the production of conventional energies. Bekun (2022) found that the increased use of alternative energy sources has also been linked to the creation of green jobs and the stimulation of economic growth in communities across the world.

Al-Mulali et al. (2015), Baloch et al. (2019), Behera and Mishra (2020), Bekun et al. (2019), Khan et al. (2020), Dong et al. (2018), Lin et al. (2016), Lindenberg (2014), Murshed, (2020a), Murshed et al. (2020a), Murshed and Tanha (2020), Sarkodie et al. (2020) have found that the growth of the alternative energy sector has led to the creation of new business opportunities and jobs, particularly in the manufacturing and installation of alternative energy technologies. Sharif et al. (2020) found that the transition to alternative energy sources can help to diversify energy mixes and reduce dependence on fossil fuels, thereby improving energy security and reducing the risks associated with fluctuations in the price of oil and other fossil fuels. This can provide greater stability and predictability for both businesses and consumers.

Overall, the literature suggests that green finance and alternative energies can have positive impact on environmental performance, with the potential to drive significant progress towards a more sustainable future. While there may be challenges associated with the deployment of alternative energies, such as the need for significant investment and the development of supporting infrastructure, these challenges are outweighed by the significant environmental and economic benefits that alternative energies can provide.

3. METHODOLOGY

3.1. Theoretical Framework

The relationship between green financing, GDP, international trade, and alternative energies, on the one hand, and environmental performance, on the other hand, can be explained through the following mechanisms:

Green Financing: Green financing can be used to finance environmentally friendly projects, such as alternative energy and low carbon infrastructure, that can reduce environmental degradation and improve environmental performance.

GDP: A higher level of GDP can result in increased economic activity and higher levels of energy consumption, which can lead to increased environmental degradation. On the other hand, economic growth can also provide the resources necessary to invest in environmental protection and sustainable development, thereby improving environmental performance.

International trade: International trade can affect environmental performance through the transfer of environmental technologies and the integration of environmental regulations. The import

of environmentally friendly products and the export of environmentally damaging products can also have an impact on environmental performance.

Alternative energies: Increased alternative energies can reduce the dependence on fossil fuels and thereby reduce greenhouse gas emissions and other forms of environmental degradation.

These relationships can be analyzed through econometric techniques, such as regression analysis, to estimate the magnitude of the effects of green financing, GDP, international trade, and alternative energies on environmental performance in China's provinces. The results of this analysis can inform policies aimed at promoting sustainable development and improving environmental performance in the provinces of China.

3.2. Model

The regression model to examine the impact of green financing, GDP, international trade, alternative energies on environmental performance for provincial data in China could take the following form:

$$CO2_{it} = \alpha_0 + \alpha_1 GF_{it} + \alpha_2 GDP_{it} + \alpha_3 REC_{it} + \alpha_4 IT_{it} + \mu_{it} \quad (1)$$

where, CO_2 represents carbon emissions. A proxy used for environmental performance of a given province. GF is the level of green financing in a given province, measured as a proportion of total financing or a dollar value. GDP is the gross domestic product of a given province, measured in nominal terms. IT is the level of international trade in a given province, measured as a proportion of total trade or a dollar value. AE is the level of alternative energies in a given province. The independent variables are green financing, GDP, international trade, and alternative energies, respectively), and ϵ is the error term representing the unexplained variation in environmental performance. In this model, the coefficients β_i^s are the estimated effects of green financing, GDP, and alternative energies on environmental performance, respectively. Positive coefficients would designate a beneficial impact of independent variable on environmental performance, while negative coefficients would indicate a negative relationship. The regression analysis is conducted using the provincial data for China, and the results of the regression is used to estimate the effects of green financing, GDP, international trade, and alternative energies on environmental performance. The results could be used to make policy recommendations for improving environmental performance in the provinces of China.

3.3. Analytical Techniques

Following Ali and Malik (2020), Westerlund test is used to check the cointegration amongst green financing, GDP, international trade, alternative energies, and environmental performance. This study uses Quantile regression approach to examine the relationship between green financing, GDP, international trade, alternative energies, and environmental performance across different quantiles of the data distribution, in order to better understand the heterogeneity of this relationship. The results from these econometric techniques are used to estimate a model of the

relationship between green financing, GDP, international trade, alternative energies, and environmental performance in China's provinces, and to analyze the results of this model to draw insights and policy recommendations. Finally, the validity of the results is tested through BSQR approach, which ensure generalizability of the findings.

The equation for conditional quantile is as follows:

$$CO2_{it}(\tau | \gamma_i, \delta_i, X_{i,t}) = \varphi_i + \lambda_{1,\tau} GF_{i,t} + \lambda_{2,\tau} GDP_{i,t} + \lambda_{3,\tau} REC_{i,t} + \lambda_{4,\tau} IT_{i,t} + \nu_{\tau,i,t} \quad (2)$$

Separate quantiles are given as:

$$Q_{0.25}(CO2) = \beta_{0.25} + \beta_{1,0.25} GF_{i,t} + \beta_{2,0.25} GDP_{i,t} + \beta_{3,0.25} REC_{i,t} + \beta_{4,0.25} IT_{i,t} + \nu_{0.25,i,t} \quad (2a)$$

$$Q_{0.50}(CO2) = \beta_{0.50} + \beta_{1,0.50} GF_{i,t} + \beta_{2,0.50} GDP_{i,t} + \beta_{3,0.50} REC_{i,t} + \beta_{4,0.50} IT_{i,t} + \nu_{0.50,i,t} \quad (2b)$$

$$Q_{0.75}(CO2) = \beta_{0.75} + \beta_{1,0.75} GF_{i,t} + \beta_{2,0.75} GDP_{i,t} + \beta_{3,0.75} REC_{i,t} + \beta_{4,0.75} IT_{i,t} + \nu_{0.75,i,t} \quad (2c)$$

$$Q_{0.90}(CO2) = \beta_{0.90} + \beta_{1,0.90} GF_{i,t} + \beta_{2,0.90} GDP_{i,t} + \beta_{3,0.90} REC_{i,t} + \beta_{4,0.90} IT_{i,t} + \nu_{0.90,i,t} \quad (2d)$$

4. RESULTS

Before estimating the empirical model, this study employs Westerlund test to check the cointegration among variables of model 1. The results of the Westerlund test are reported in Table 1. It is evident that GLOB, FDI, CO2e, EI and IQ all appear to have a long-term effect on G.G.

The quantile regression's estimates are presented in Table 2. The findings point to the fact green finance, International Trade, GDP and AE are important determinants of CO_2 emissions of China. We find that GF, and AE abate CO_2 emissions. On the contrary, the location coefficient of IT and GDP are positive, which suggest that these factors increase CO_2 emissions of China. The negative coefficient of green finance for all quantiles implies that green finance is useful for ecological performance of China. These results support the earlier findings of Fleming (2020), Amanda and Carlotta (2020), Huang et al. (2022). The negative coefficient of AE for all quantiles implies that an increase in AE abate CO_2 emissions in China. These results support the earlier findings of Adebayo and Kirikkaleli(2021), Ayobamiji et al. (2022), Bamsile et al. (2021), Bekun (2022), Qin et al. (2021), Hao et al. (2021),

Table 1: Cointegration test

Statistics	Value
Gt	-5.523***
Ga	-19.428***
Pt	-10.428***
Pa	-19.791***

***Significant at 1% level

Table 2: Results of method of moments quantile regression

Variable	Location	Scale	Quantiles			
			Q _{0.45}	Q _{0.50}	Q _{0.25}	Q _{0.20}
GDP	0.141*** [0.011]	0.050** [0.011]	0.141*** [0.015]	0.112*** [0.014]	0.121*** [0.052]	0.405*** [0.041]
GF	-0.015** [0.015]	-0.014 [0.011]	-0.012** [0.002]	-0.011** [0.015]	-0.051** [0.011]	-0.051** [0.012]
REC	-0.015*** [0.005]	-0.011*** [0.052]	-0.011*** [0.005]	-0.042*** [0.005]	-0.041*** [0.002]	-0.012*** [0.011]
INT	0.045*** [0.041]	0.081** [0.011]	0.041*** [0.044]	0.015*** [0.014]	0.011*** [0.012]	0.042*** [0.011]
Drift	15.125*** [0.242]	1.215*** [0.415]	15.111*** [0.515]	15.051*** [0.254]	11.150*** [1.522]	12.111*** [1.055]

*, **, and *** indicate P<0.10, P<0.05, and P<0.01, respectively

Hasnisah et al. (2019), Wang et al. (2020); Li et al. (2022); Nurhadi et al. (2022) and Quddus et al. (2022). The positive coefficient of international trade for all quantiles imply that an increase in IT increases CO₂ emissions in China. The negative coefficient of AE for all quantiles implies that an increase in AE abate CO₂ emissions in China. These results support the earlier findings of Ali et al. (2021).

National Income (proxied by GDP) has a positive impact on the CO₂ emissions of China. These results support the earlier findings of Ali et al. (2021), Dong et al. (2018), Murshed (2020a), Fleming (2020), Wang et al. (2020) and Qin et al. (2021).

For robustness check, this study uses BSQR approach. The results of BSQR approach, presented in Table 3, are consistent with the estimates of MMQR approach. It is evident that green finance, and AE negatively affect CO₂ emissions in China. Moreover, international trade and GDP positively affect CO₂e emissions.

5. DISCUSSION

Green finance has the ability to reduce greenhouse gas emissions, conserve energy and resources, and improve environmental quality. By providing funding for these projects, green finance can help to reduce the financial barriers that often prevent companies and individuals from making the transition to more sustainable practices. Furthermore, the growth of green finance can help to spur technological innovation and the development of new, more efficient and environmentally friendly technologies, which can in turn help to further reduce emissions and drive progress towards a more sustainable future. Moreover, the green finance initiatives and regulations put in place by the Chinese government have the potential to create new business opportunities, attract investment and spur economic growth, creating new jobs and stimulating local economies. In addition, the integration of ESG considerations into financial decision-making can lead to a more responsible and sustainable approach to investment, and help to ensure that financial capital is being used in a way that is aligned with long-term environmental goals. Additionally, green finance can help to raise public awareness and understanding of environmental issues and the role of finance in supporting sustainable development. This can in turn help to build public support for more aggressive climate policies, encouraging further investment in the green economy

Table 3: Robustness test (BSQR)

Variable	Quantiles			
	Q _{0.33}	Q _{0.30}	Q _{0.33}	Q _{0.40}
GDP	0.038***	0.238***	0.283***	0.158***
GF	-0.005***	-0.003	-0.043***	-0.013***
REC	-0.009**	-0.068**	-0.063***	-0.038***
INT	0.031***	0.183***	0.132***	0.353***
Drift	18.033***	13.563***	18.883***	18.838***

*, **, and *** indicate P<0.10, P<0.05, and P<0.01, respectively

and fostering a greater sense of environmental responsibility among individuals and organizations. Overall, the positive impact of green finance on the environmental performance of China is multi-faceted, and has the potential to drive significant progress towards a more sustainable future.

The growth of the alternative energy sector in China has also created new business opportunities, generated jobs and stimulated economic growth in communities across the country. This has the potential to drive investment in clean energy technologies and support the development of new, more efficient and environmentally friendly products, which can in turn help to further reduce emissions and drive progress towards a more sustainable future. Moreover, the transition to alternative energies can help to diversify China's energy mix. This can improve energy security by stabilizing the prices of oil and other fossil fuels, providing greater stability and predictability for both businesses and consumers. Moreover, alternative energies can help to address the challenge of energy access, particularly in rural and remote areas, where access to electricity and other forms of energy remains limited. By providing clean, reliable energy sources, alternative energy can help to support sustainable development for millions of people. Overall, alternative energies have the potential to drive significant progress towards a more sustainable future. By investing in clean energy and reducing its dependence on fossil fuels, China is positioning itself as a leader in the environmental evolution, sustainable future, and helping to set an example for other countries to follow.

International trade can have negative implications for the environmental performance of China, as the country has experienced significant economic growth in recent decades, driven in large part by its integration into the global economy. This leads to an increase in energy consumption, resource

extraction, and industrial production, leading to a significant increase in greenhouse gas emissions, air and water pollution, and other environmental impacts. Additionally, the nature of international trade can exacerbate environmental problems in China. For example, the production of goods for export often involves the assignment of highly polluting trades from advanced nations to emerging nations, such as China. This can result in the concentration of environmental degradation in certain regions and communities, leading to local environmental problems and social and health impacts. Furthermore, the pressure to produce goods more cheaply and quickly can lead to a neglect of environmental regulations, resulting in substandard environmental performance and a lack of accountability for environmental impacts. This can be particularly problematic in the case of cross-border trade, where it can be difficult to enforce environmental regulations and ensure that companies are operating in a sustainable manner. Moreover, international trade can also lead to the displacement of local industries and jobs, as foreign companies seek to take advantage of lower labor and production costs. This can result in economic hardship for communities and increased social and economic inequality, which can have negative impacts on environmental performance, as communities are less likely to prioritize environmental protection in the face of economic insecurity. Overall, while international trade has brought significant economic benefits to China, it has also had negative implications for the country's environmental performance, and it will be important for the government and businesses to address these challenges and find ways to promote sustainable development in the context of increasing global trade and economic integration.

Economic growth is often associated with resource extraction, and industrial production, leading to a significant increase in greenhouse gas emissions, air and water pollution, and other environmental impacts. Additionally, the pursuit of GDP growth can lead to a neglect of environmental regulations and a disregard for the long-term sustainability of natural resources. Companies and individuals may prioritize short-term economic gains over environmental protection, leading to practices that harm the environment and undermine the long-term health and productivity of ecosystems. Moreover, the focus on GDP growth can lead to unequal distribution of the benefits of economic development, as some regions and communities are left behind in the pursuit of economic growth. This can result in increased social and economic inequality, which can have negative impacts on environmental performance, as communities are less likely to prioritize environmental protection in the face of economic insecurity. Furthermore, the unsustainable consumption patterns associated with high levels of GDP growth can also have a negative impact on the environment, as increasing demand for goods and services leads to increased resource consumption and waste generation. This can result in significant environmental problems, including soil degradation, water scarcity, and the loss of biodiversity. Overall, while GDP growth has brought significant economic benefits to China, it has also had negative implications for the country's environmental performance, and it will be important for the government and businesses to address these challenges and find ways to promote environmentally responsible and economically equitable development.

6. CONCLUSION

The role of green financing in addressing this problem is uncertain, as it remains in its early stages of development and implementation. Furthermore, the nexus between green finance and environment is complex and not well understood. This study examines the potential of green financing as a tool for mitigating the effects of climate change. Assessing the effectiveness of green financing as a means of improving environmental performance, and the role of alternative energies in this relationship. This study aims to provide recommendations for policymakers, businesses, and other stakeholders on how to effectively leverage green financing to promote sustainable development and address the impacts of climate change. Using Quantile regression approach, this study finds that green finance, international trade, GDP and alternative energies are important determinants of CO₂ emissions of China. We find that green finance, and alternative energies have negative location coefficients, which imply that these factors abate CO₂ emissions. On the contrary, the location coefficient of international trade and GDP are positive, which suggest that these factors increase CO₂ emissions of China. The negative coefficient of green finance for all quantiles implies that green finance is helpful for environment of China. We conclude that the positive influence of green finance on CO₂ emissions of China is multifaceted, and has the potential to drive significant progress towards a more sustainable future.

The policy implications of the themes of climate change and its implications, green financing, and the role of alternative energies in the association among green financing and CO₂ emissions, as well as the specific case of green financing in China, might include:

- Encouraging the development and implementation of policies that prioritize the mitigation of the impacts of climate change.
- Promoting the growth of the green finance market, including green bonds which incentivize environmentally responsible behavior.
- Supporting the growth of alternative energies, including through investment in alternative energy technologies and infrastructure.
- Encouraging the integration of environmental considerations into financial decision-making processes, including through the disclosure of environmental risks and the consideration of the cost of environmental degradation in financial evaluations.
- Promoting international cooperation on green financing, including through the sharing of best practices and the development of common standards and guidelines.
- Encouraging the development of sustainable investment funds and other investment vehicles that prioritize environmental sustainability.
- Providing support for research and development into new technologies and business models that promote the mitigation of the impacts of climate change.

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