ISSN: 2688-9323

The Effect of Green Finance on Carbon Emissions: Evidences from Country-level Data

Jie Mao[1], Guanxiong Shen[2,*], and Shiyu Zhang[1]

[1] School of Economics, Shanghai University, Shanghai, China

[2] Shenzhen General Institute of Architectural Design and Research Co., Ltd., Shenzhen, China

Abstract

This paper aims to examine the impact of green finance on carbon emissions by analyzing panel data from 44 countries spanning the period from 2000 to 2018. The findings demonstrate that green finance effectively contributes to the reduction of carbon emissions. Heterogeneity tests indicate that green finance is less effective in OECD countries than in non-OECD countries. Moreover, green finance is effective in mitigating carbon emissions in countries with presidential governments but not in those with parliamentary governments. Additionally, this research investigates the role of renewable energy utilization as a mediator in the relationship between green finance and carbon emission reduction. By exploring the mediating mechanism, this study provides valuable insights into how green finance leads to a decrease in carbon emissions. Overall, this paper offers a novel perspective on carbon emission reduction through the lens of green finance.

Keywords

Green Finance; Carbon Emissions; Renewable Energy.

1. Introduction

While people enjoy the material benefits brought about by economic and social development, they also confront environmental degradation as an accompanying consequence. In fact, global warming has resulted in climate change, disrupting the long-established delicate equilibrium of ecosystems and posing a growing threat to the environment upon which human survival depends. In this situation, reducing the emissions of greenhouse gases like carbon dioxide (CO2), and achieving green development has become a fundamental consensus among nations worldwide.

In light of the increasing focus on green development, the role of green finance has garnered significant attention in recent years. Despite its importance, the theoretical research exploring the relationship between green finance and green development remains limited. Key questions regarding the mechanisms through which green finance reduces greenhouse gas emissions have yet to be adequately addressed. Given the growing concerns surrounding climate change, providing scientific and rigorous answers to these questions is crucial not only for informing policy formulation but also for establishing a comprehensive theoretical framework for green finance. This study aims to bridge this knowledge gap by investigating the intricate connections between the green finance and the reduction of carbon dioxide emissions, thereby contributing to a more comprehensive understanding of the role of green finance in achieving sustainable development.

With these issues in mind, this study examines the impact of green finance on carbon emissions (carbon dioxide emissions) and investigates the underlying mechanisms using panel data from 44 countries spanning the years 2000 to 2018. Initially, we employ the number of implemented green finance policies as a proxy for the level of green finance and subsequently verify the

ISSN: 2688-9323

significant reduction in carbon emissions attributed to green finance. Heterogeneity analysis reveals that this effect is more pronounced in non-OECD nations than in OECD nations, and green finance significantly diminishes carbon emissions in countries with presidential governments but not in those with parliamentary governments. Utilizing a mediator model, we further analyze the mechanisms by which green finance reduces carbon emissions. The results indicate that the promotion of renewable energy plays a mediating role in the emission reduction effect of green finance. This underscores the importance of renewable energy as a critical conduit through which green finance drives the reduction of carbon emissions.

This study contributes to the literature in three aspects. Firstly, while previous studies predominantly explored the influence of green credits on carbon emissions, we expanded the research by investigating the impact of green finance policies. Secondly, we explore the mechanism through which green finance reduces carbon emissions, which provides a path for evaluating the effectiveness of green finance. Finally, we introduce the political economics approach in the field of emission reduction, which serves to connect political and environmental economics, contributing to the existing body of literature on carbon emission reduction and green finance.

The remainder of this article is organized as follows. Section 2 outlines the materials and methods employed in this study, encompassing a review of relevant literature, formulation of testable hypotheses, development of the empirical models, the specification of variables, and the generation of data. Section 3 presents the results of the empirical analysis. Finally, Section 4 concludes the paper by discussing the findings from the empirical analysis.

2. Materials and Methods

2.1. Literature Review

This paper is closely associated with two branches of literature. Among them, one branch of literature is about green finance, while the other branch focuses on the economic mechanisms of carbon emissions.

The term "green finance" is often interchangeably used with "sustainable finance", "environmental finance", or "eco-friendly finance". In general, to implement green finance means to use finance derivatives as tools to protect the environment and to drive the economy towards a green, sustainable, and environmentally friendly direction [1]. Green finance plays a vital role in facilitating the growth of green, ecological, and environment-friendly industries by providing financial services that direct economic resources towards these sectors. The existing research on the environmental effects of green finance primarily concentrates on the normative role of green credit in the economy. These studies illuminate the influence of green finance on the environment. For example, some of them underscore the environmental promotion benefits associated with green finance, while others discern the significance of financial liberalization and financial openness in fostering environmental enhancements [2, 3].

After the unpredicted global heatwave of 1988, the emissions of greenhouse gas like carbon dioxide have steadily become a focal point of environmental research, even giving rise to the term "carbon emissions". To address this issue, studies in the field of economics have largely adopted the approach of Grossman and Krueger to examine carbon emissions from the perspective of economic development [4]. The impact of economic development on addressing environmental challenges is substantial from various perspectives. Several studies have demonstrated that urbanization contributes to a reduction in carbon emissions [5, 6]. Optimizing the industrial structure and attracting FDI yield similar effects for an economy [7, 8]. However, certain economic activities have complex implications for the environment. For instance, global trade and the international division of labor may lead to a transfer of carbon emissions from developed countries to developing countries [9-11]. Nonetheless, technological

ISSN: 2688-9323

advancements typically play a significant role in reducing emissions. Some studies corroborate the emission-reducing impact of innovations in green technology [12]. Many other studies have also found the considerable influence of renewable energy utilization in mitigating carbon emissions.

Within the realm of economic research on carbon emissions, studies concerning green finance have garnered significant attention. This interest can be attributed to its potential to stimulate technological advancements by directing financial resources toward green industries. Such a shift has tangible implications for reducing carbon emissions. Several empirical investigations have confirmed the impact of green finance on carbon emissions reduction [13, 14]. Some studies even further substantiate this effect of green bonds [15]. Moreover, some other papers provide evidence of the efficacy of green finance policies in mitigating carbon emissions [16, 17].

These studies concerning green finance and its environmental consequences manifest certain limitations that necessitate further exploration. On one hand, the majority of extant research concentrates on green credit, with relatively limited attention to other facets. On the other hand, there is a lack of consensus regarding the mechanisms underlying the environmental impact of green finance. In summary, there has been considerable practical experience and empirical reports on green finance, but a dearth of comprehensive theoretical investigations [18].

2.2. Theoretical Analysis

In the field of sustainable development, green finance acts as a driving force for environmentally conscious development. Its primary goal is to provide financial support and incentives to promote the development of green industries, thereby fostering the growth of a sustainable economy. Green finance has a positive ecological impact by actively encouraging the allocation of resources toward environmental protection and pollution abatement, which could reduce carbon emissions.

Building upon the aforementioned analysis, we posit the following propositions:

Proposition 1: Green finance leads to a reduction in carbon emissions.

A further issue is the mechanism underlying the effect of green finance on carbon emissions. The consumption of conventional fossil fuels is the main cause of carbon emissions; thus, increasing the utilization of renewable energy is beneficial for reducing these emissions [19]. By discouraging investments in industries with high pollution and directing capital toward renewable energy sectors, green finance plays a crucial role in adjusting the energy structure of an economy. The economy's reliance on conventional fossil fuels is significantly reduced by the incorporation of "clean" energy sources like hydropower, nuclear power, and wind power, leading to a significant decrease in carbon emissions [20]. Consequently, green finance emerges as a potent instrument for fostering the development of the renewable energy sector while preserving the ecological environment.

We therefore put forth the following thesis in light of the complex interactions between green finance, carbon emissions, and the use of renewable energy sources:

Proposition 2: Green finance reduces carbon emissions by increasing the utilization of renewable energy.

2.3. Empirical Model

To verify Proposition 1, this paper employs the following baseline model to empirically examine the impact of green finance on carbon emissions:

$$CE_{it} = \beta \cdot GF_{it} + \iota \mathbf{X}_{\mathbf{it}} + \eta_i + \eta_t + \varepsilon_{it} \quad (1)$$

ISSN: 2688-9323

In equation (1), i = 1, 2 ... stands for countries, t = 1, 2 ... stands for years. Xit denotes the control variables. ηi and ηt are fixed effects of each country and year. εit is the random error term. The explained variable, CE, represents the carbon emissions of each country, while the explanatory variable, GF, measures the country's green finance.

Further, to test hypothesis 2, the following mediator model is used:

$$CE_{it} = \beta \cdot GF_{it} + \iota \mathbf{X_{it}} + \eta_i + \eta_t + \varepsilon_{it} \quad (2)$$

$$RE_{it} = \beta' \cdot GF_{it} + \iota' \mathbf{X_{it}} + \eta_i' + \eta_t' + \varepsilon_{it}' \quad (3)$$

$$CE_{it} = \beta'' \cdot GF_{it} + \gamma'' \cdot RE_{it} + \iota'' \mathbf{X_{it}} + \eta_i'' + \eta_t'' + \varepsilon_{it}'' \quad (4)$$

In these equations, RE is an indicator for the utilization of renewable energy. Equations (2), (3), and (4) collectively formulate a mediator effect model. A comparative analysis of the estimated coefficients β and β' enables us to ascertain whether the promotion of renewable energy serves as a channel through which green finance effectively mitigates carbon emissions.

2.4. Data and Variables

The data used in our analysis originates from two primary sources: the E-axes Forum and the WDI database. The E-axes Forum is an independent, nonprofit, and non-partisan research organization that specializes in the analysis of macroeconomic policies and sustainability. "WDI" stands for "World Development Indicators." The WDI database is operated by the World Bank, providing comprehensive country-level statistical data for countries across the world. The explanatory variables are derived from data obtained from the E-axes Forum, while all other variables are generated based on the WDI database of the World Bank.

In consideration of data availability, our analysis focuses on a sample of 44 countries spanning the years 2000 to 2018. To be precise, the 44 countries included in the sample are, in full, as follows: Australia, Austria, Belgium, Brazil, Bulgaria, Canada, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Honduras, Hungary, India, Indonesia, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Mexico, Netherlands, Norway, Paraguay, Peru, Poland, Portugal, Romania, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, the United Kingdom,

The explained variable, CE, corresponds to the carbon dioxide emissions of each country. To account for the magnitude effect, we measure carbon emissions using the natural logarithm of emissions per unit of output.

The explanatory variable, GF, denotes the intensity of green finance. To derive this measure, we compute the cumulative count of green finance policies in effect in each country, each year based on information from the E-axes Forum.

The mediator variable, RE, is the utilization of renewable energy, we use the percentage of renewable energy electricity (hydropower generation excluded) in total electricity generation to measure it. This variable serves as a measure of the extent to which renewable energy sources are used in electricity generation.

To account for the influence of socioeconomic factors other than green finance, we employ three sets of control variables in our analysis. The first group pertains to the overall development of the country, encompassing the natural logarithm of GDP per capita (GDPpc). The second set, which focuses on an economy's internal structural aspects, includes indicators like the tertiary sector's share of GDP (Structure), the annual growth rate of value added by the industrial sector (Industrial), the urbanization rate of the population (Urban), and the annual

ISSN: 2688-9323

growth rate of capital formation (Capital). The last set is about a country's openness, including the price level ratio of PPP conversion factors to market exchange rates (Price) and the ratio of total imports and exports to GDP (Open).

Table 1 reports the descriptive statistics for all variables.

Table 1. Descriptive Statistics.

Variable	N	Mean	Std. Var	Min	Max
CE	836	3.5753	0.7254	1.8076	5.7934
GF	836	1.4641	2.5426	0	15
RE	704	5.5966	7.4019	0.0000	65.4437
GDPpc	836	9.7357	1.1307	6.0965	11.7241
Structure	835	2.5633	1.1135	0.7777	7.5889
Industrial	780	2.5514	6.0258	-24.8572	74.3909
Urban	836	71.2013	14.1254	27.6670	98.0010
Capital	797	3.9490	20.1135	-137.6350	435.6160
Price	836	0.7917	0.3178	0.1510	1.6206
Open	836	94.7962	58.2380	19.5596	360.1321

3. Results

3.1. Baseline Results

Table 2. The Baseline Results.

Explained Variable	*CE*	*CE*	*CE*	*CE*
	(1)	(2)	(3)	(4)
GF	-0.0166*	-0.0334***	-0.0274***	-0.0277***
	(0.0086)	(0.0071)	(0.0068)	(0.0063)
GDPpc		-0.5945***	-0.6019***	-0.5605***
		(0.0687)	(0.0472)	(0.0787)
Structure			-0.0275	-0.0206
			(0.0243)	(0.0223)
Industrial			0.0006	0.0006
			(0.0010)	(0.0009)
Urban			0.0181***	0.0164***
			(0.0046)	(0.0045)
Capital			0.0001	0.0002
			(0.0001)	(0.0001)
Price				-0.1517
				(0.1596)
Open				-0.0007
				(0.0006)
Constant	3.5996***	9.4120***	8.2550***	8.1327***
	(0.0126)	(0.6728)	(0.4656)	(0.6603)
Fixed Effect for Country	Yes	Yes	Yes	Yes
Fixed Effect for Year	Yes	Yes	Yes	Yes
N	836	836	759	759
Adjusted R-square	0.9596	0.9830	0.9880	0.9881

Note: Asterisks denote p-value < .10 (∗), < .05 (∗∗), or < .01 (∗∗∗).

Table 2 presents the empirical results from the baseline model. In Column (1), we control only for country and year fixed effects. In Column (2), we introduce the control variable GDPpc in

ISSN: 2688-9323

addition to the fixed effects. Column (3) further expands by incorporating control variables related to internal structural factors on top of those in Column (2). Column (4) provides a comprehensive regression outcome, encompassing all control variables.

As shown in Column (1), the coefficient estimate for green finance (GF) exhibits a significant negative correlation with carbon emissions (CE). This relationship remains significant as we introduce additional control variables, with the coefficient estimates for GF displaying statistical significance at the 1% confidence level. These findings imply that green finance has a substantial impact on reducing carbon emissions. Importantly, variations in control variables do not diminish the significance of GF's estimations. This underscores the effectiveness of green finance in facilitating reductions in carbon emissions and suggests that the observed results are not driven by factors such as economic development, internal structural changes, or the country's level of openness. In summary, these results demonstrate the crucial role of green finance in mitigating carbon emissions.

Furthermore, the regression outcomes hold economic significance. As per the results in Column (4), the adoption of a new green finance policy is associated with a substantial reduction of 2.77 percent in a country's carbon emissions. This implies that green finance contributes significantly to carbon emission reduction, thereby fostering sustainable environmental outcomes.

The baseline findings corroborate Proposition 1, asserting that green finance effectively promotes the reduction of carbon emissions.

3.2. Robustness Test

To validate the robustness of our baseline empirical findings, we conduct a series of robustness tests.

Recognizing that nitric oxide is a greenhouse gas, albeit less extensively monitored compared to carbon dioxide, we substitute the explained variable in the empirical model with nitric oxide emissions (NE). This adjustment aims to address potential reverse causality stemming from heightened public concern regarding carbon dioxide emissions. The outcome is presented in Column (1) of Table 3. The coefficient for GF remains significantly negative, underscoring the efficacy of green finance in reducing nitric oxide emissions. This result reinforces the robustness of our baseline model, emphasizing the role of green finance not only in carbon emission reduction but also in discouraging emissions of other greenhouse gases other than carbon dioxide.

Considering that the implementation of green finance policies doesn't necessarily imply an enhancement of green finance, we introduce two additional explanatory variables with narrower scopes. One represents the count of green finance policies related to financing (Direct GF), and the other accounts for those concerning monetary markets and other financial matters (Indirect GF). This adjustment allows us to investigate whether distinct types of green finance policies exhibit varying degrees of significance. The findings are reported in Columns (2) and (3) of Table 3, where both Direct GF and Indirect GF coefficients are significantly negative. These results demonstrate that different categories of green policies have similar effects on reducing carbon emissions, thereby affirming that the baseline results indeed capture the influence of green finance on carbon emissions.

Another concern regarding green finance policies is the potential endogeneity issue, as their enactment and implementation may result from social awareness of climate problems caused by carbon emissions. This reciprocal causation could introduce endogeneity and distort regression outcomes. To address this concern, we introduce the validation of the Kyoto Protocol in each country as an instrumental variable for GF. Following previous studies, we manually collect information about the timing of each country's Kyoto Protocol signing and generate a corresponding indicator variable (KP) [21]. For each country and year, KP = 1 if the

ISSN: 2688-9323

country has signed the Kyoto Protocol; otherwise, KP = 0. The results are presented in Column (4) of Table 3, where the instrumental variable regression still yields a significantly negative coefficient. This outcome effectively mitigates the possibility that the baseline results are driven by endogeneity.

In summary, the test results confirm the robustness of the baseline findings.

Table 3. The Result of Robustness Test.

Explained Variable	*NE*	*CE*	*CE*	*CE*
Model	OLS	OLS	OLS	IV
	(1)	(2)	(3)	(4)
GF	-0.0082*			-0.0803*
	(0.0047)			(0.0412)
Direct GF		-0.0364***		
		(0.0114)		
Indirect GF			-0.0571***	
			(0.0123)	
Control variables	Yes	Yes	Yes	Yes
Fixed Effect for Country	Yes	Yes	Yes	Yes
Fixed Effect for Year	Yes	Yes	Yes	Yes
N	751	759	759	759
Adjusted R-square	0.9930	0.9873	0.9883	/

Note: Asterisks denote p-value < .10 (∗), < .05 (∗∗), or < .01 (∗∗∗). All control variables and fixed effects are incorporated in every regression analysis. Column (4) presents the results of the instrumental variable model, wherein the instrument variable used is an indicator of whether the country signed the Kyoto Protocol in the respective year.

3.3. Heterogeneity Test

To investigate the varying impact of green finance policies across countries with distinct characteristics, we conduct heterogeneity tests by segmenting the full sample based on various criteria.

We initially examine the disparities arising from overall development. The 44 countries are divided into two groups: 32 OECD countries and 12 non-OECD countries. Subsequently, we perform empirical tests on these two groups, and the outcomes are presented in Columns (1) and (2) of Table 4. As demonstrated, green finance exhibits a significantly negative impact on carbon emissions in both OECD and non-OECD countries. Furthermore, a comparison of the results reveals that the effect of green finance is more economically significant in non-OECD countries. This finding suggests that the environmental impact of green finance is more pronounced in less developed nations.

Another crucial factor is the political system. Our sample comprises 12 countries with presidential systems and 18 countries with parliamentary systems. Columns (3) and (4) of Table 4 present the results of the empirical tests conducted on each group. Notably, the effect of green finance is statistically significant only in the group of countries with presidential systems. These results can be explained by the variations in administrative efficiency. In comparison to countries with parliamentary systems, those with presidential systems often exhibit a more compact and succinct government structure. Moreover, presidential systems usually allow presidents to execute their powers without obtaining sufficient support from legislators [22], enhancing the administrative efficiency of countries with this kind of system. This efficiency is advantageous for translating green finance policies into actionable measures, thereby yielding significant outcomes.

ISSN: 2688-9323

In summary, green finance demonstrates less effectiveness in OECD countries compared to non-OECD countries. Moreover, it is found to be effective in mitigating carbon emissions in countries with presidential governments but not in those with parliamentary governments.

Table 4. The Result of Heterogeneity Test.

Group	OECD Countries	Non-OECD Countries	Presidential Countries	Parliamentary Countries
Explained Variable	*CE*	*CE*	*CE*	*CE*
	(1)	(2)	(3)	(4)
GF	-0.0189***	-0.0556**	-0.0241*	-0.0293
	(0.0049)	(0.0198)	(0.0125)	(0.0245)
Control variables	Yes	Yes	Yes	Yes
Fixed Effect for Country	Yes	Yes	Yes	Yes
Fixed Effect for Year	Yes	Yes	Yes	Yes
N	550	209	209	323
Adjusted R-square	0.9905	0.9807	0.9735	0.9909

Note: Asterisks denote p-value < .10 (∗), < .05 (∗∗), or < .01 (∗∗∗). All control variables and fixed effects are incorporated in every regression analysis. The results presented in Columns (1), (2), (3), and (4) pertain to separate samples of OECD countries, non-OECD countries, countries with a presidential system, and countries with a parliamentary system, respectively.

3.4. Mechanism Analysis

The baseline findings from our analysis reveal a substantial impact of green finance on reducing carbon emissions. However, to comprehensively grasp the underlying mechanisms through which green finance achieves this reduction, further investigation is needed. To delve into these mechanisms, we employ a mediator model that introduces the utilization of renewable energy as an intermediary factor. This approach allows us to uncover the intricate pathways through which green finance contributes to carbon emission reduction. The results of these tests are presented in Table 5.

In Table 5, Column (1) displays the result of the baseline model, which is identical to that in Column (4) of Table 2. Column (2) presents the results of the first stage of the mediator model, where the mediator RE is employed as the explained variable. In Column (2), the regression results for GF are significantly positive, indicating that green finance effectively promotes the utilization of renewable energy. Column (3) reports the outcome of the second stage of the mediator model, wherein RE is the explanatory variable. In Column (3), the regression results for RE are significantly negative, signifying that the heightened use of renewable energy effectively reduces carbon emissions. Column (4) exhibits the results of the final stage of the mediator model, where RE is incorporated into the baseline model as an additional explanatory variable. Notably, in Column (4) both the original explanatory variable GF and the mediator RE demonstrate significantly negative coefficient estimates. This provides evidence that both green finance and the increased utilization of renewable energy play important roles in reducing carbon emissions. Furthermore, by comparing the results in Columns (1), (3), and (4), it becomes apparent that the change in the coefficient of GF is relatively greater than that of RE, suggesting that the effect of green finance is partially "absorbed" by the utilization of renewable energy and that the utilization of renewable energy is more "closely associated" with the generation of carbon emissions than green finance.

In conclusion, the findings presented in Table 5 validate Proposition 2, which posits that green finance reduces carbon emissions by promoting the utilization of renewable energy.

ISSN: 2688-9323

Table 5. The Result of Mechanism Analysis.

Explained Variable	*CE*	*RE*	*CE*	*CE*
	(1)	(2)	(3)	(4)
GF	-0.0277***	1.2352***		-0.0204***
	(0.0063)	(0.2731)		(0.0066)
RE			-0.0081***	-0.0062***
			(0.0020)	(0.0020)
Control variables	Yes	Yes	Yes	Yes
Fixed Effect for Country	Yes	Yes	Yes	Yes
Fixed Effect for Year	Yes	Yes	Yes	Yes
N	759	640	640	640
Adjusted R-square	0.9881	0.8243	0.9899	0.9905

Note: Asterisks denote p-value < .10 (∗), < .05 (∗∗), or < .01 (∗∗∗). All control variables and fixed effects are incorporated in every regression analysis.

4. Discussion

This paper aims to examine the influence of green finance on carbon emissions. Using panel data from 44 countries, the empirical analysis demonstrates that green finance significantly contributes to the reduction of carbon emissions. To ensure the robustness of our findings, we conduct a series of robustness tests, incorporating alternative explained variables, explanatory variables, and an instrumental variable model.

Furthermore, we explore the heterogeneity of these effects and uncover that green finance exerts a more pronounced impact on carbon emission reduction in non-OECD countries when compared to OECD countries. Additionally, our results reveal that green finance effectively reduces carbon emissions in countries with presidential systems but not in those with parliamentary systems.

To investigate the underlying mechanisms, we employ a mediator model, revealing that green finance facilitates carbon emission reduction by promoting the utilization of renewable energy. These findings provide valuable insights into the intricate workings of green finance policies in mitigating carbon emissions.

This study contributes to the existing literature by deepening the understanding of the role of green finance in carbon emissions reduction, thereby expanding the breadth and depth of green finance research. These insights lay a solid foundation for the formulation and implementation of policies with practical significance in promoting sustainable green development.

Acknowledgments

Innovation Fund for Prestigious Universities in Shanghai.

References

[1] Sandor, R. L. How I Saw It: Analysis and Commentary on Environmental Finance (1999–2005); World Scientific Publishing Company: London, The United Kingdom, 2016.

[2] Labatt, S.; White, R. R. Environmental Finance: A Guide to Environmental Risk Assessment and Financial Products; John Wiley & Sons: New York, The United States, 2002.

[3] Tamazian, A.; Chousa, J. P.; Vadlamannati, K. C. Does Higher Economic and Financial Development Lead to Environmental Degradation: Evidence from BRIC Countries. Energy Policy, Vol. 37(2009), p.246-253.

[4] Grossman G.M.; Krueger A.B. Environmental Impacts of a North American Free Trade Agreement. NBER Working Paper 1991.

[5] Yao, X.; Kou, D.; Shao, S.; Li, X.; Wang, W.; Zhang, C. Can Urbanization Process and Carbon Emission Abatement Be Harmonious? New Evidence from China. Environmental Impact Assessment Review, Vol. 71(2018), p.70-83.

[6] Munir, K.; Ameer, A. Effect of Economic Growth, Trade Openness, Urbanization, And Technology on Environment of Asian Emerging Economies. Management of Environmental Quality: An International Journal, Vol. 29(2018), p.1123-1134.

[7] Neequaye, N. A.; Oladi, R. Environment, Growth, and FDI Revisited. International Review of Economics & Finance, Vol. 39(2015), p.47-56.

[8] Li, Z.; Shao, S.; Shi, X.; Sun, Y.; Zhang, X. Structural Transformation of Manufacturing, Natural Resource Dependence, And Carbon Emissions Reduction: Evidence of A Threshold Effect from China. Journal of Cleaner Production, Vol. 206(2019), p.920-927.

[9] Jebli, M. B.; Youssef, S. B.; Ozturk, I. Testing Environmental Kuznets Curve Hypothesis: The Role of Renewable and Non-renewable Energy Consumption and Trade in OECD Countries. Ecological Indicators, Vol. 60(2016), p.824-831.

[10] Ertugrul, H. M.; Cetin, M.; Seker, F.; Dogan, E. The Impact of Trade Openness on Global Carbon Dioxide Emissions: Evidence from The Top Ten Emitters Among Developing Countries. Ecological Indicators, Vol. 67(2016), p.543-555.

[11] Halicioglu, F.; Ketenci, N. The Impact of International Trade on Environmental Quality: The Case of Transition Countries. Energy, Vol. 109(2016), p.1130-1138.

[12] Du, K.; Li, P.; Yan, Z. Do Green Technology Innovations Contribute to Carbon Dioxide Emission Reduction? Empirical Evidence from Patent Data. Technological Forecasting and Social Change, Vol. 146(2019), p.297-303.

[13] Meo, M. S.; Abd Karim, M. Z. The Role of Green Finance in Reducing CO2 Emissions: An Empirical Analysis. Borsa Istanbul Review, Vol. 22(2022), p.169-178.

[14] Lin, Z.; Liao, X.; Yang, Y. China's Experience in Developing Green Finance to Reduce Carbon Emissions: From Spatial Econometric Model Evidence. Environmental Science and Pollution Research, Vol. 30(2023), p.15531-15547.

[15] Rasoulinezhad, E.; Taghizadeh-Hesary, F. Role Of Green Finance in Improving Energy Efficiency and Renewable Energy Development. Energy Efficiency, Vol. 15(2022), 14.

[16] Muganyi, T.; Yan, L.; Sun, H. P. Green Finance, Fintech and Environmental Protection: Evidence from China. Environmental Science and Ecotechnology, Vol. 7(2021), 100107.

[17] D'Orazio, P.; Dirks, M. W. Exploring the Effects of Climate-Related Financial Policies on Carbon Emissions in G20 Countries: A Panel Quantile Regression Approach. Environmental Science and Pollution Research, Vol. 29(2021) p.1-25.

[18] Berensmann, K.; Volz, U., Alloisio, I.; Bak, C., Bhattacharya, A.; Leipold, G.; Schindler, H.; MacDonald, L.; Tian, H.; Yang, Q. Fostering Sustainable Global Growth Through Green Finance–What Role for The G20. T20 Task Force on Climate Policy and Finance, 2017.

[19] Adams, S.; Nsiah, C. Reducing Carbon Dioxide Emissions; Does Renewable Energy Matter?. Science of the Total Environment, Vol. 693(2019), 133288.

[20] Bilgili, F.; Koçak, E.; Bulut, Ü. The Dynamic Impact of Renewable Energy Consumption on CO2 Emissions: A Revisited Environmental Kuznets Curve Approach. Renewable and Sustainable Energy Reviews, Vol. 54(2016), p.838-845.

[21] Grubb, M.; Vrolijk, C.; Brack, D. Routledge Revivals: Kyoto Protocol (1999): A Guide and Assessment; Routledge: London, The United Kingdom, 2018.

[22] Persson, T. Do Political Institutions Shape Economic Policy?. Econometrica, Vol. 70(2002), p.883-905.