Research Paper

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Cite this article as: Farahi, R. (2023). The Impact of Communal Land Ownership (CLO) on Renewable Energy Development in Emerging Economies. *Journal of World Sociopolitical Studies*, *7*(1), pp. 89-114. https://doi.org/10.22059/wsps.2023.365742.1383

The Impact of Communal Land Ownership (CLO) on Renewable Energy Development in Emerging Economies*

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(Received: Aug. 23, 2022 Revised: Oct. 25, 2022 Accepted: Nov. 27, 2022)

Abstract

The main question in this paper is to what extent communal land ownership (CLO) influences the utilization of environmentally friendly resources? To find the answer to this question, this study investigates the relationship between (CLO) and the adoption of environmentally sustainable resources in 12 emerging economies from 1990 to 2019, utilizing a panel data methodology. Findings suggest that (CLO) has a positive impact on promoting green resource utilization in the long term, whereas its short-term effects on green resource consumption are not substantial. Moreover, an immediate increase in GDP exhibits a negative influence, while a long-term rise positively affects the progression of green resource consumption. The Gini coefficient adversely affects the deployment of green resources, and heightened economic uncertainty leads to a reduction in their consumption. To harness the positive effects of (CLO) on green resource utilization, emerging economies should focus on implementing sustainable development education programs (ESD), bolstering green financial inclusivity, expanding poverty alleviation policies, enhancing functional literacy, and augmenting financial diffusion.

Keywords: Communal Land Ownership, Emerging Economies, Financial Development, Green Economic Recovery, Green Energy Resources, Panel Data

JEL Classification: C23; Q01; R14l; E44

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* The author has no affiliation with any organization with a direct or indirect financial interest in the subject matter discussed in this manuscript.

Journal of **World Sociopolitical Studies**| Vol. 7| No. 1| Winter 2023| pp. 89-114
Web Page: https://wsps.ut.ac.ir//Email: wsps@ut.ac.ir
eISSN: 2588-3127 PrintISSN: 2588-3119

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1. Introduction

Over the past few decades, the issue of climate change has evolved into a contentious subject among scholars. Addressing the challenge of climate change, green economic growth has emerged as a widely debated subject and is considered as one of the most effective solutions for nations**.** The crucial term "green economic recovery", viewed through the lens of prioritizing environmental concerns in economic growth and development, presents a unique opportunity for nations to redefine economic market principles and mechanisms, energy transition strategies, access to energy resources, social responsibility, and environmental commitments. In today's world, humanity grapples with the consequences of past environmentally detrimental activities linked to economic growth, industrialization, and urbanization. The historical exploitation of natural resources has led to contemporary threats, such as climate change and global warming. The United Nations (2021) emphasizes that climate change represents the most significant threat that humanity has ever confronted. Consequently, today's society faces the responsibility of confronting these environmental threats and devising strategies to mitigate them, keeping in mind the welfare of future generations**.** Natural resources are bestowed by nature and play a critical role in maintaining the balance of oxygen in the air, providing sustenance, nurturing ecosystems, and preserving biodiversity on Earth. Addressing environmental threats and upholding the principles of green economic prosperity in the present age necessitates a heightened focus on the development of green resources. These resources, devoid of greenhouse gas emissions like those from fossil fuels, possess the potential to support communities in their developmental journey, while preserving environmental integrity**.** Furthermore, the concept of

green economic recovery demands a paradigm shift in how societies approach economic activities and growth. It calls for a transformation towards sustainable practices that embrace renewable and eco-friendly energy sources. Additionally, achieving a green economic recovery requires global collaboration, sound policies, investments in sustainable technologies, and a collective commitment to environmental stewardship. By aligning economic pursuits with environmental consciousness, societies can forge a sustainable path towards a greener and more equitable future (Haque, 2023).

Sustainable or environmentally friendly vegetable sources can be used in economically disturbed sectors such as electricity production, and their use does not harm the environment, unlike non-sustainable sources that are the main source of climate change and environmental pollution. Green resources can naturally replenish themselves, and they do not emit any carbon dioxide to atmosphere. According to the 17 defined sustainable development goals by the United Nations in 2015, development of green resources can directly and indirectly affect SDG (Sustainable Development Goal)#1 (No poverty), SDG#3 (Good health and well-being), SDG#6 (Clean water and sanitation), SDG#7 (Affordable and clean energy), SDG#10 (Reduced inequalities), and SDG#11 (Sustainable cities and communities). Wu et al. (2023) mention that green resources utilization expansion can assist countries to gain sustainable development. In addition, resource transformation from black to green ones can cause social prosperity and social well-being. Although the development of the use of green energies is not easy, and despite continuous planning and international commitments such as the Paris Agreement of 2015, many countries neither have a complete and comprehensive

understanding of the process, nor know how to develop green energies, which results in programs that are almost ineffective in implementation. A vest number of scholars have determined various factors affecting (e.g., FDI inflows, investment climate, sustainable literacy, green technological progress) the promotion of green resources deployment (e.g., Wang et al. 2022; Han et al. 2022); however, the issue of Communal Land Ownership (CLO) and green resources association has not been widely researched by scholars.

CLO represents a form of property ownership in which a specific property is not exclusively owned by a single individual. The concept of communal ownership finds its roots in the Marxist school of thought and socialist economic principles. This form of ownership fosters increased social interactions, cohesion, and trust among individuals. Moreover, a series of owners can collaboratively reach a consensus and formulate team strategies for progress. Scholars such as Pi and Zhang (2018) argue that the prevalence of private ownership, as opposed to communal ownership, has contributed to social divisions, poverty, and income inequality, highlighting a contemporary societal issue centered around the expansion of private ownership. Li et al. (2023) contend that communal ownership fosters synergy and unity, envisioning communal ownership as a catalyst for solidarity, commitment, and enhanced literacy in natural resource efficiency, sustainable development, and the pursuit of green resources. Conversely, in private property, individual interests take precedence, making it more challenging to cultivate social commitment to environmental issues, a process that may evolve over an extended period. Wily (2018) notes that CLO was once a prevalent form of property management, but legal land reforms in the 1980s shifted focus towards privatization and ownership liberalization.

In this paper, we model the deployment of green resources and consider CLO as the main explanatory variable. Additionally, several control variables have been carefully selected to account for potential influencing factors. The control variables encompass Gross Domestic Product (economic mass), Gini index (a measure of income inequality), financial market size, and economic uncertainty. Since the CLO almost does not exist in advanced economies, our sample comprises therefore emerging economies, especially from Asia and Latin America (the sample countries in this paper are Brazil, Chile, China, Colombia, India, Indonesia, Mexico, Peru, the Philippines, Sri Lanka, Thailand, and Vietnam). Emerging economies have a great potential to take the path of transition towards developed level. In this way, fostering economic flourishing, expansion of financial markets, resource abundance and adequate labor force are the major drivers of shifting from a developing country to a developed one. Furthermore, since emerging economies have significant potential to have rapid economic growth, their contributions to carbon dioxide emissions are meaningful. Therefore, the deployment of green resources for emerging economies is vital. According to IEA (2022), China and India as two critical emerging economies that have emitted more than 11.9 and 2.5 $GtCO_2$ in 2021.

This paper introduces several significant contributions to the existing body of research. Firstly, it innovatively models the deployment of green resources in emerging countries, assessing the influence of various variables, including CLO, on the utilization of green resources. This approach enables a comprehensive understanding of the dynamics involved in the sustainable use of resources. Secondly, the paper incorporates CLO data for a range of emerging economies into the econometric model. To the best of

the author's knowledge, this marks the first research in which the correlation between CLO and green resources is explored using panel data from emerging economies**.**

The paper follows a structured organization consisting of six sections. In Section 2, an extensive review of related literature is presented, encompassing various strands of research and studies that contribute to the context of the paper. Section 3 proceeds to establish the theoretical foundation, providing the necessary background theories that underpin the subsequent analysis**.** Section 4 is dedicated to elucidating the data sources and detailing the steps taken for estimation, offering a clear insight into the methodologies and procedures employed. Moving forward, Section 5 focuses on an in-depth discussion of the empirical findings derived from the analysis, providing a comprehensive understanding of the results and their implications**.** Lastly, Section 6 encapsulates the paper, presenting succinct conclusions drawn from the research and offering insightful policy recommendations that emerge from the analysis.

2. Literature Review

In this section, we seek to explore the linkage between green resource deployment and CLO for the case of emerging economies. To this end, the following three groups of earlier literature will be expressed:

In prior research, several scholars have delved into the concepts of sustainable development and green recovery. Barbier (2020) contends that the COVID-19 outbreak presented countries with an opportunity to amplify their pursuit of sustainable development goals (SDGs) and implement a green recovery roadmap in the post-

pandemic era. Chen et al. (2020) assert that economic growth recovery in the post-COVID-19 era should align with environmental concerns. Sustainable recovery involves strategies and plans aimed at fostering economic prosperity with reduced environmental impacts. Galanakis et al. (2022) assessed the impacts of bioeconomy on economic resilience and security, revealing that bioeconomy can enhance access to food and freshwater, reduce waste generation, and promote economic circular mechanisms, ensuring economic security and resilience in a country. Tan et al. (2022) highlight the challenges of achieving green recovery, emphasizing the necessity for the expansion of green financing markets, transparent green regulations, and impactful government support for SMEs to foster green performances. Wang (2023) outlines the framework of green recovery as an efficient strategy for achieving zero carbon transition and sustainable development goals, acknowledging, however, that barriers to realizing green recovery are multidimensional and encompass social, political, cultural, and economic aspects. Analyzing European Union data, Zachariadis et al. (2023) confirm that sustainable recovery does not impede economic prosperity; instead, countries, through a green economic structure, can experience growth in various economic sectors, leading to social welfare and well-being.

The second cluster of studies encompasses a body of literature that delves into the deployment of green resources across diverse countries. In their examination of the electricity generation sector, Han et al. (2020) assert that renewable resources serve as efficient inputs for sustainable electricity generation, further motivating environmental protection and fostering economic sustainability. Sun et al. (2023) narrow their focus to the E7 economies from 2010

to 2021, utilizing the generalized method of moments (GMM) for analysis. Their findings underscore that the deployment of green resources contributes to green growth, emphasizing the necessity for governments to formulate clear plans aimed at enhancing green foreign direct investment (FDI) and developing green finance markets to attract private capital for environmentally friendly projects. Exploring the impact of green resources on energy poverty in South Korea from 1991 to 2021, Zhao et al. (2023) utilize the Autoregressive Distributed Lag (ARDL) model, confirming that green resources can mitigate energy poverty through factors such as financial inclusion, enhanced accessibility and affordability of electricity, and improved living conditions for all social classes. In a recent investigation, Shang et al. (2023) delve into the roles of renewable and fossil fuels consumption in influencing the green growth of Asian economies from 2000 to 2021. Their study concludes that the acceleration of green resource deployment can be facilitated by the expansion of green financial markets, and the flourishing of economic sectors can be influenced by the spillover effects of green resource utilization. Examining the efficiency of countries' roadmaps concerning CO2 reduction and sustainable development, Zhang et al. (2023) demonstrate that both short and long-term impacts of natural green resources on green recovery are positive and significant. These studies collectively provide valuable insights into the multifaceted dimensions of green resource deployment across different nations.

The next group of earlier studies has concentrated on the concept of communal ownership. For example, Lawson- Remer (2013) studied the relationship between communal ownership and social welfare in Fiji. The research highlighted the fact that the communal ownership can make capital accumulation, leading to

higher income level, social prosperity, and economic flourishing. Kang et al. (2018) concentrated on Chinese data and discussed the CLO characteristics. They found that a clear CLO regulation and risks management are two crucial factors for making the CLO efficient and with plenty of interests for owners. In another study, Vives (2020) theoretically expressed the association between communal ownership, market mechanism and innovation advancement. He concluded that the communal ownership has several advantages and can promote market power and innovation through social integrity and literacy. Hennig et al. (2022) evaluated 14372 observations of firms from 2008 to 2017, and asserted that communal ownership can be profitable for owners from two contexts of information-based economy and competition-based economy. Wang et al. (2023) did a survey analysis to find the differences between collective and individual ownerships in Australia. The findings confirmed that the communal ownership provides social commitment and integrity for decision and economic interactions.

The exploration of existing literature underscores a discernible research gap pertaining to the intersection of CLO and the promotion of green resources within emerging economies. While some reviewers argue that property management and green energy management represent distinct fields, this research maintains that their correlation is a crucial area of investigation. Acknowledging the generalization of the approach, it is important to note that this study aims to delve into the specific nuances of CLO and its relationship with the sustainable development of green resources in emerging economies. Despite previous research on CLO and environmental issues, there remains a need for a more focused examination of CLO's role in advancing green resources within the context of emerging economies. This study aims to address this gap

by providing a thorough and nuanced analysis, contributing to a more comprehensive understanding of the subject matter.

3. Theoretical Background

CLO exerts a multifaceted influence on the development of green resources through various interconnected channels. A pivotal transmission channel lies in the generation of economic growth arising from communal land development, thereby fostering increased investments aimed at expanding the utilization of green resources. The CLO cultivates collective wisdom, shared commitment, and mutual benefits, leading to heightened productivity of production inputs and enhanced economic prosperity (Gunderson et al., 2018; Szarzec et al., 2021). Another significant channel involves the reduction of societal poverty gaps. The proliferation of joint CLO contributes to the equitable distribution of profits and income among owners, consequently narrowing income disparities. Consequently, the development of CLO is anticipated to mitigate income inequality and alleviate poverty within the society (Wang et al., 2022), creating a conducive environment for the growth of green resource consumption.

Furthermore, the existence of collective wisdom in decision-making processes associated with CLO becomes a catalyst for increased attention to innovation and the development of green technologies within the agricultural production sector (Li et al., 2023). Innovation and the advancement of green technologies are fundamental prerequisites for the expanded consumption of green resources within an economy. Additionally, CLO prompts the necessity for a broader financial market due to increased societal participation in the production sector and enhanced economic profitability (Ji et al., 2020). A more extensive financial market

within the economy creates opportunities for the development of the green financial market, subsequently facilitating the increased utilization of green resources. The CLO, by stimulating the need for a broader financial market, not only fosters economic profitability, but also offers the potential for advancing the green financial market, thus paving the way for the enhanced utilization of green resources.

4. Research Methodology and Data Collection

4. 1. Data Description

The primary objective of this study is to quantify the impact of CLO on the utilization of green resources in 12 emerging economies situated across Asia and Latin America. The countries under examination include Brazil, Chile, China, Colombia, India, Indonesia, Mexico, Peru, the Philippines, Sri Lanka, Thailand, and Vietnam, spanning the time frame from 1990 to 2019 (It should be noted that this timeframe is selected based on data availability). To conduct a complete analysis, a comprehensive dataset comprising 360 observations (12 countries over 30 years) has been meticulously compiled. The dependent variable in this research focuses on the deployment of renewable energy, derived from the BP Statistical Review of World Energy (2022). To measure the influence of CLO, represented as the ratio of CLO to total land area, it is utilized as the primary explanatory variable. In addition, several carefully chosen control variables are incorporated to consider potential influencing factors. These control variables include Gross Domestic Product (representing economic mass), the Gini index (indicating income inequality), financial market size, and economic uncertainty. The selection of these control variables is driven by the transmission channels identified in the preceding

section. For a more detailed understanding, Table 1 provides an overview of these variables, enhancing reference and clarity**.**

Table 1. Data Description of the Selected Variables

Variables	Abbreviation of the variable	Units of measurement	Origin of data
Green energy utilization	RED	Exajoules	British Petroleum
Communal land ownership	CLO	Ratio of total land area	National Census of countries
Gross Domestic Product	ECMA	US dollars	World Bank
Gini Index	GINI	Index	World Bank
financial market size	FINMS	Million US dollars	Local official websites
Economic Uncertainty	ECUNC	Index	www.economicuncertainty.com

Source: Author

CLO is anticipated to positively influence the advancement of renewable resources within emerging economies. Private ownership development signifies heightened societal awareness regarding environmental concerns and an increased willingness to mitigate detrimental environmental impacts. The influence of GDP growth can be both positive and negative. A substantial emphasis on sustainable economic growth within a country's overall economic progression offers prospects for the development of sustainable resource initiatives. Conversely, if sustainable growth is not prioritized, any surge in domestic production could escalate the consumption of non-renewable natural resources**.**

The Gini index, representing fair income distribution within a society, is anticipated to exhibit a negative coefficient. This implies

that the progression of renewable resources is likely to occur when income distribution is more equitable, signified by a reduction in the Gini coefficient. The magnitude of financial markets is expected to have a beneficial impact on the proliferation of renewable resource utilization in emerging Asian and Latin American economies. Broader financial markets within a nation tend to facilitate capital accumulation, accelerating the endorsement of eco-friendly projects**.**

Conversely, economic uncertainty is projected to adversely affect renewable resource development. Any upswing in economic uncertainty increases operational, financial, and investment risks, thereby reduces the involvement of private sector investors in environmentally sustainable projects.

4. 2. Research Methodology

In this study, we utilize a quantitative approach grounded in the panel data methodology. Quantitative data necessitate actual values for variables, enabling the analysis of relationships by organizing dependent and independent variables. Moreover, in quantitative analysis, the panel data approach involves considering a group of countries that share common characteristics.

To determine the coefficients of the independent variables in the empirical model, we conduct a variance inflation factor (VIF) analysis to identify and address potential multicollinearity concerns. Additionally, we subject the panel of emerging economies to a cross-sectional dependency (CD) test, employing Pesaran's (2004) equation, to uncover any interdependence within the series.

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}(\rho_{ij})\right) \quad (1)$$

If the presence of cross-sectional dependency (CD) is verified, the study applies the CIPS (Pesaran, 2007) to assess the stationarity of variables. In the subsequent stage, Westerlund's (2007) methodology is employed to examine the long-run relationship between the variables. The estimation of coefficients is carried out using the Autoregressive Distributed Lag (ARDL) within the pooled mean group (PMG) framework. Finally, a robustness check is conducted to affirm the reliability of the preceding results.

5. Analysis of Processed Data

In this section, we delve into the empirical evidence and its representation. Initially, before proceeding to estimation, we conduct an analysis using the variance inflation factor (VIF) to assess the presence of multicollinearity. The results of this assessment are documented in Table 2, affirming that the empirical model does not suffer from multicollinearity issues.

Table 2[1]. Results of the VIF Technique

Variable	Variance Inflation Test Value
RED	1.664
CLO	4.393
ECMA	3.896
GINI	3.184
FINMS	4.079
ECUNC	4.123

Source: Author

Another important issue for having reliable panel data estimation is to explore whether the cross section units in the panel of countries

1. Note: RED, CLO, ECMA, GINI, FINMS, and ECUNC represent renewable energy deployment, communal land ownership, gross domestic product, Gini index, financial market size, and economic uncertainty index, respectively.

have cross-sectional dependency. To this end, the approach of Pesaran (2004) is employed. Table 3 lists the results of the CD test. It can be concluded that the CD association exists in the panel of countries. Therefore, to discover the level of stationary of the variables, the common panel unit root tests are not appropriate.

Table 3[1]. Pesaran (2004)'s CD Test Results

Variable	Stat.	P-value
GRGROW	22.582	0.000
RED	37.112	0.000
CLO	51.042	0.000
ECMA	48.659	0.000
GINI	32.669	0..000
FINMS	47.032	0.000
ECUNC	39.618	0.000

Source: Author

Based on the cross-sectional dependency (CD) results, we proceed with the CIPS panel unit root test (Pesaran, 2007), which accommodates cross-sectional dependency in the model. This test aims to determine the stationary level of the series.

Table 4. CIPS Stationary Test

Variable	At level		At 1st difference	
	Stat.	Prob.	Stat.	Prob.
RED	-0.053	0.693	-4.355	0.000
CLO	-3.853	0.034	-9.231	0.000
ECMA	-0.903	0.312	-5.088	0.000
GINI	-1.005	0.769	-6.330	0.000
FINMS	-4.954	0.043	-10.549	0.000
ECUNC	-0.067	0.613	-4.305	0.000

Source: Author

1. Note: RED, CLO, ECMA, GINI, FINMS, and ECUNC represent renewable energy deployment, communal land ownership, gross domestic product, Gini index, financial market size, and economic uncertainty index, respectively.

Following the outcomes from the CIPS (Cross-sectionally IPS) approach, it is observed that FINMS and CLO variables exhibit stationarity at level (I (0)), while the remaining variables achieve stationarity after first differencing. The next crucial step involves conducting a panel co-integration test to investigate the existence of a long-term relationship among the chosen variables. Given the presence of cross-sectional dependency (CD) in the panel, it is essential to employ the second-generation co-integration tests. In this regard, we utilize the Westerlund (2007) approach and present the results in Table 5. The findings conclusively affirm the presence of a co-integration relationship among the selected series.

Table 5. Results of the Westerlund (2007)'s Approach

Stat.	Value	Z-value	P-value	Robust p-value
G_t	-2.754	-4.055	0.003	0.013
G_a	-10.103	-1.794	0.043	0.029
P_t	-8.449	-2.329	0.019	0.086
P_a	-8.211	-2.804	0.003	0.031

Source: Author

Since there is a mix of order of integration (I (0 and 1)), the ARDL estimation approach is appropriate for our empirical model evaluation. Furthermore, the Pooled Mean Group (PMG) is selected as the method of estimation. Table 6 expresses the estimation results of the ARDL-PMG approach:

Table 6[1]. Empirical Estimation Results

-	Variables	Results	
		Coefficient	P-value
Long-run estimation	CLO	0.011	0.048
	ECMA	-0.124	0.004
	GINI	-0.095	0.051
	FINMS	0.223	0.073
	ECUNC	-0.774	0.012
Short-run estimation	D(CLO)	0.054	0.648
	D (ECMA)	0.611	0.001
	D (GINI)	-0.132	0.036
	D (FINMS)	0.103	0.001
	D (ECUNC)	-0.812	0.041
	ECT	-0.077	0.012
	Intercept	-0.694	0.001

Source: Author

The results from estimating the coefficients reveal that CLO in emerging economies does not exert a significant influence in the short term; however, in the long term, it propels an increase in the consumption of green resources by 0.11%. This positive impact of collective land ownership on the deployment of green resources aligns with previous research by Vives (2020), Hennig et al. (2022), and Wang et al. (2023), confirming that communal ownership fosters integrity, responsibility, and economic prosperity**.** Furthermore, our research is in line with Shang et al. (2023), Sun et al. (2023), Zhao et al. (2023), and Han et al. (2020) who argue that green deployment is a complex approach that needs to be amplified by factors such as land, labor and capitals.

The economic size, measured by GDP, manifests divergent effects in the short and long run. A 1% increase in GDP leads to a

1. Note: CLO, ECMA, GINI, FINMS, and ECUNC represent communal land ownership, gross domestic product, Gini index, financial market size, and economic uncertainty index, respectively.

0.61% rise in the consumption of green resources in the short term, but a 0.12% decrease in the long term for emerging economies. The Gini coefficient demonstrates an inverse relationship with green resource consumption, emphasizing that reducing income inequality and promoting economic fairness in income distribution significantly drive the consumption of green resources in the studied nations. This finding aligns with Zhao et al. (2022), underlining the way in which poverty eradication propels green prosperity**.**

The magnitude of financial markets positively influences green resource consumption in emerging economies. A 1% growth in the financial market size corresponds to a 0.10% increase in the short term and a 0.22% increase in the long term in the utilization of green resources in the studied countries. Conversely, economic uncertainty poses a significant impediment to the development of green resource consumption in emerging nations. The results highlight that economic uncertainty adversely affects the expansion of green resource consumption, both in the short and long term. Essentially, economic market uncertainty signifies instability and market fluctuations, eroding investor confidence and subsequently diminishing investment in environmentally friendly projects**.**

To validate the robustness of our empirical estimations, a comprehensive robustness check is performed by altering the dependent variable. In this regard, we replace renewable resource deployment with the hydropower variable and re-estimate the coefficients using the ARDL-PMG technique. The results presented in Table 7 align with the earlier findings in Table 6, confirming the consistency and reliability of our empirical evidence.

Table 7[1]. Robustness Check (Changing the Dependent Variable)

-	Variables	Results	
		Coefficient	P-value
Long-run estimation	CLO	0.043	0.003
	ECMA	-0.092	0.012
	GINI	-0.112	0.073
	FINMS	0.593	0.019
	ECUNC	-0.332	0.005
Short-run estimation	D(CLO)	0.011	0.291
	D (ECMA)	0.419	0.073
	D (GINI)	-0.098	0.018
	D (FINMS)	0.232	0.049
	D (ECUNC)	-0.119	0.008
	ECT	-0.019	0.031
	Intercept	-0.519	0.034

Source: Author

6. Research Conclusion and Policy Implications

The quest for sustainable development goals, intertwined with a focus on fostering economic growth within a robust environmental framework has sparked considerable debate in recent years. Many contend that achieving green economic prosperity constitutes a complex challenge influenced by a myriad of factors. A notable void in the existing literature is identified upon examining the relationship between CLO and green economic prosperity, particularly in emerging economies. This study aims to fill this gap by exploring the correlation between CLO and the utilization of green resources across 12 emerging economies spanning the years 1990 to 2020, employing a panel data technique**.**

1. Note: CLO, ECMA, GINI, FINMS, and ECUNC represent communal land ownership, gross domestic product, Gini index, financial market size, and economic uncertainty index, respectively.

The study's findings reveal several key insights. Firstly, CLO exhibits a positive impact on the development of green resource consumption in emerging economies, predominantly in the long run. In the short term, the effect of CLO on green resource consumption is deemed insignificant, likely due to the time required for landowners to align their decision-making and intellectual synergy concerning sustainable development. Practical and intellectual collaboration among landowners regarding green energy becomes more plausible in the long term**.**

Concerning GDP, its impact varies between the short and long term. In the short term, an increase in GDP negatively affects the consumption of green resources, possibly due to heightened investment in fossil fuel-dependent industries, integral to the economic growth of emerging economies. Conversely, in the long term, as income levels of individuals and businesses rise, environmental responsibility becomes more feasible and substantial in terms of implementation**.**

Poverty alleviation emerges as a pivotal factor in advancing the consumption of green resources in both short and long term for emerging economies. Reducing poverty and ensuring equitable income distribution facilitate greater social inclusion, encouraging more individuals to participate in economic and social activities, ultimately supporting the investment and consumption of green resources**.**

The growth of financial markets proves crucial in fortifying the economic foundation to propel environmentally friendly projects. Advancements in financial markets enable greater participation by households and private sector investors in green projects, contributing to capital accumulation and subsequent investment in sustainable initiatives**.**

Economic risk, an essential facet of uncertainty and instability, warrants heightened attention in emerging economies. An escalation in economic uncertainty leads to a decline in the consumption of green resources, as heightened risk prompts investors to adopt a more cautious approach, potentially refraining from engaging in economic projects within a high-risk environment.

The study highlights critical policy implications aimed at advancing green resource consumption and harnessing the potential of CLO in emerging economies. While the immediate impact of CLO on green energy consumption may not be pronounced, government intervention is deemed crucial to catalyze this effect. The implementation of UNESCO's Education for Sustainable Development (ESD) program emerges as a key strategy to enhance sustainable literacy among communal landowners. This empowerment equips them for informed decision-making in the realm of sustainable development.

To further stimulate the adoption of green initiatives, targeted policies are recommended, particularly those promoting green financial inclusion, especially among communities with CLO. These measures can effectively broaden access to financing for green projects, fostering adoption across diverse social strata. The formulation of a comprehensive poverty alleviation policy is deemed essential, addressing income inequality through the integration of green electricity, enhanced literacy programs, financial support for underprivileged communities, and improved financial diffusion. Moreover, supporting innovation and optimizing land use in the agricultural sector are identified as crucial components to enhance the role of CLO in sustainable development. Embracing these multifaceted policies provides a

framework, through which emerging economies can leverage collective wisdom towards a more sustainable and environmentally conscious future.

The outcomes of this study significantly enhance existing literature on CLO and sustainable development. Nevertheless, future researchers could enhance the practical applicability of their econometric investigations by conducting analyses at the country level, tailoring results to specific national contexts. Additionally, it is recommended to explore the influence of the COVID-19 pandemic on the correlation between CLO and the consumption of green resources in emerging economies. Addressing research limitations, such as data unavailability will be crucial for more comprehensive insights. Considering the use of multi-criteria decision-making methods and expert opinion analysis would offer a valuable avenue for comparing quantitative and qualitative findings on the relationship between CLO and green resource consumption.

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