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The Impact of Financial Stability on Environmental Degradation: Mediating Role of Green Investment and Moderating Role of Environmental Awareness

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Abstract

This research investigates the influence of financial development on environmental outcomes, with green investment as a mediating variable and environmental awareness as a moderating factor. To achieve this, the authors employ a mixed-methods approach, analyzing long-term panel data from thirty countries and supplementing quantitative findings with stakeholder interviews conducted in Germany and India, thereby enriching the analysis with diverse perspectives. Financial development is measured by indicators such as gross domestic product growth and banking sector strength, while environmental degradation is proxied by per capita carbon dioxide emissions. Green investment is assessed by comparing renewable energy financing to gross domestic product, and the level of environmental awareness is gauged by the extent to which populations prioritize ecological concerns. The findings reveal that financial stability contributes to reduced environmental harm, with green investment serving as a significant channel for this effect. Moreover, heightened environmental awareness amplifies the positive impact of financial stability on green investment. The analysis indicates that regions characterized by both financial stability and a well-informed public are more successful in transitioning to clean energy, whereas emerging economies encounter greater obstacles due to insufficient support systems and the inherent challenges of simultaneous development. The study concludes that robust financial systems alone are insufficient to deliver ecological benefits; meaningful progress requires a combination of green investment and active public engagement. Policymakers are advised to formulate climate-responsive financial regulations, invest in public awareness campaigns, and devise context-specific strategies tailored to cultural differences to advance both environmental protection and economic development. By elucidating the role of awareness in fostering sustainable transformation, this research

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contributes to the literature on the Environmental Kuznets Curve and stakeholder theory, offering practical recommendations for aligning global economic activity with ecological boundaries.

Keywords: Financial Stability, Environmental Degradation, Green Investment, Environmental Awareness

1. Introduction

The entire details of factors that contribute to climate change, the growing risk to biodiversity, and the rising people concerns over environmental degradation have refocused the world on the dynamics between financial systems and ecological consequences. Whereas earlier studies discussed the effect of the environment by looking at the policy, innovation, and global governance sectors, the financial dimension has proved to be a very important but overlooked opportunity or obstacle to environmental development, especially by financial stability. The robustness of an economy, the endurance of the capital markets, and the excellence of the governance, which here denotes the efficacy of rules, corruption control, and association accountability, are becoming more and more central in the determination of whether a financial evolution triggers sustainable performance or vibrates as a contributor to environmental degradation.

Stable economies will help with the investments in clean energy, climate adaptation, and sustainable infrastructure on a long-term basis. Through these systems, the necessary tools and the stability to fund green technologies and to control environmental factors are provided. Nevertheless, owing to a lack of proper stimuli and monitoring systems, financial growth potentially results in short-termism and the promotion of resource-consumers, which discourages environmental objectives (Willy, 2018; Kirikkaleli & Sofuoğlu, 2023; Sajid et al., 2023; Zenios, 2024). This bipolarity leads to the need to have a more perceptive qualification of the interaction of the financial systems with environmental imperatives. The given study is a way to address the need and analyzes how financial stability can influence environmental degradation with the intermediary effect of green investment and the moderator effect of environmental awareness.

The majority of the previous research engaged these variables, namely, green investment and environmental awareness, in isolation, not paying attention to the manner of their functioning in the context of complicated economic systems. With a combination of stakeholder theory and behavioral economics, the present investigation constructs a multidimensional model that considers such aspects as the institutional financial health of the company, as well as socio-behavioral dimensions. What is novel is that both the aspects of the financial system guiding capital to be more sustainable, as well as the increase or decrease in that endeavor by the prevalent view of people in the society, are taken into

consideration at the same time. The objective is to produce evidence-based policies on how to reform economies in the sense that it is ecologically secure and permits to achievement of co-existence development.

The threats to the natural ecosystems and the economic services supported by them are on the rise as several environmental risks become apparent: climate change, pollution, deforestation, and biodiversity loss, to name a few. The unsustainable financial flows and the inappropriate investment trends on most occasions are at the basis of some of these threats. The recent empirical studies have revealed that high levels and rates of economic growth and rapid industrialization without the backup of environmental protection enhance the depletion of natural resources and emissions (Kirikkaleli & Sofuoğlu, 2023; Adams & Klobodu, 2018; Sharma & Das, 2024; Kumar & Wu, 2025). These problems are further aggravated by the creation of financial instability, which increases the volatility of capital markets and, in many cases, transforms the focus on short-term growth and carbon emissions (Safi et al., 2021; Senturk, 2023). As such, enhancing the financial systems should go in line with creating sustainability. Uncertainty in the environment can be diminished by a stable financial market through transparent regulations, access to credit, and macroeconomic stability to lure investment into the field of environmental profitability. The countries, whose financial frameworks are quite firm, will invest in clean technologies and impose the standards of the environment. As an example, in several OECD states, renewable energy and green infrastructure adoption have become possible due to effective regulations and investor protection mechanisms (Sun et al., 2022; Ibrahim & Simian, 2023). Conversely, poor financial management may also reward the considerably intensive industry, where output maximization dominates among the other factors, such as the long-term ecological status (Gorus & Aslan, 2019; James & Emons, 2023). Therefore, environmental governance cannot work unless financial stability is achieved because it is not only an economic necessity.

The focus of this relation is green investment. The term is a broad description of a set of activities: investment in renewable energy, sustainable agriculture, green infrastructure, and closed business models of the economy. With sound financial institutions being able to support the creation of green investments, the growth of economies and the destruction of the environment could have evolved in a disconnected manner. Germany and Denmark are examples of the economies that managed to decrease the number of emissions and maintain economic growth, focusing on green finance and regulatory changes (Sun et al., 2022). Nevertheless, green investment is limited in most countries in the low and medium income bracket due to poorly developed financial systems, opposition to the high cost of capital, and institutional weaknesses (Alvarado & Toledo, 2017; Liu et al., 2022; Malik et al., 2023; Audi & Ali, 2023). Such impediments tend to restrict the size and the efficiency of environmental action programs.

In an attempt to solve such structural issues, the policy innovations of green bonds, sustainability-linked loans, and blended finance vehicles have emerged. Nevertheless, these instruments impose the existence of a solid governance system, reputable risk estimation systems, and beliefs of people in the financial institutions. Custom-made financial reforms should incorporate the specificities of the socio-political and institutional environment of a country. As an illustration, green bonds are being deployed in Europe and China and are widely neglected in Sub-Saharan Africa and some regions in Southeast Asia since investors have little awareness of the risks in the green bond market, and because there have been some weaknesses in the regulation of green bonds.

The gap between the financial processes and sustainability results can be filled with the help of the environmental awareness role. An informed population is more inclined to press and favor investing in environmentally responsible investments. The awareness is one that has provided a behavioral change among the consumers and the investors by making them divest from the polluting industries and embrace green technologies. The online platform, environmental education, and civic participation have engaged a massive number of people in several emerging economies to raise awareness of the environment (Hamid et al., 2017; Ali et al., 2021). The example of Vietnam can be considered as digital technologies introduced in the country have allowed them to monitor ecological issues by the citizens and increase the effect of green investment on the ecological performance (Hung, 2023).

On the contrary, poor environmental awareness areas, including those in Southeast Asia, Latin America, and Africa, tend to focus more on short-term economic benefits rather than on environmental protection. Other problems, such as unlawful logging, laxity in the implementation of pollution measures, and reliance on fossil fuels, continue to exist. Such contexts require information campaigns, activities of the non-governmental organization (NGO), and community-based environmental programs to change the attitude of the population (Semenkova & Andrianova, 2020; Marc & Ali, 2018; Adebayo et al., 2023). The involvement of the stakeholders also increases the level of transparency and accountability in the green finance mechanism, and this plays a crucial role in the success of the mechanism in the long run. Although a lot of interest in sustainable finance has materialized, both, policy and academia, there remain major gaps in knowledge. Green finance research has not reached the developing countries that tend to be the most susceptible to environmental shocks (Adebayo et al., 2023). What is even worse, the interaction of digitalization, resource governance, and streams of finances is poorly explored (Chen et al., 2024; Marc et al., 2025). The fact that there is an interdependence between green investment on one hand and environmental awareness on the other is missed out in many studies, and this tends to curtail their policy informing capacity (Malik et al., 2023). The proposed study will help address these gaps as

it will analyze data on a population of a wide range of countries, including the members of the OECD, emerging markets, and low-income economies.

Another interesting point made in this study is that the choices made by financial stability in one region will affect the result differently in another region. In Vietnam, the growth has been decoupled from emissions due to the economic resilience in the country and the enhanced level of awareness (Hung, 2023). In consideration, financial stability in some regions of the Middle East and North Africa has at some point allowed carbon-intensive growth because of a lack of citizen input (Gorus & Aslan, 2019). Such comparisons reveal the necessity of the strategy to depend on the specific situation and the danger of using an over-generalized model in such variable contexts. Financial regulators and central banks are expected to play a major role, which makes not only managing risks of the economy but also the inception of climate risks in the monetary policies (Svartzman et al., 2021; D Orazio & Popoyan, 2019). Financial incentives can also be aligned with ecological aims using public campaigns, eco-labeling systems, and the requirements of disclosing sustainability.

2. Literature Review

As environmental awareness has grown, scholars have increasingly investigated the relationship between financial stability and environmental degradation. The prevailing view holds that entities with robust financial resources are better positioned to invest in environmental protection. Strong financial systems enable cities and companies to pursue green investments, adopt cleaner technologies, and comply with regulations (Ren et al., 2022). There is mounting public and stakeholder expectation that financially secure companies will prioritize corporate social responsibility, particularly on environmental issues (Thi and Thai, 2024). Organizations with stable financial systems are more likely to adopt sustainable technologies that reduce environmental harm (Collins, 2022). Sufficient liquidity supports strategic investments in energy conservation and environmental protection, ensuring long-term profitability and aligning with stakeholder theory, which asserts that businesses are motivated to consider community and environmental interests alongside profitability (Wang et al., 2016). The impact of financial stability on environmental outcomes is central to global efforts addressing climate change and sustainability. The integrity of banking systems, capital markets, and macroeconomic policy influences environmental quality. While stable finances can promote sustainable development, they may also exacerbate environmental risks if policy and social priorities favor short-term economic gains over ecological well-being (Freeman et al., 2021). This review synthesizes over thirty empirical and theoretical studies, with special emphasis on the mediating role of green investment and the moderating effect of environmental awareness, providing practical insights for policymakers and practitioners (Korzh et al., 2017).

The Environmental Kuznets Curve framework helps explain these dynamics, positing that environmental degradation initially rises with development but later declines as societies invest in cleaner industries (Skhirtladze & Nurboja, 2019; Toth & Paskal, 2019; Lee and Chen, 2022). Financial stability is essential for this transition, enabling investments in renewables and green infrastructure. Economies with resilient financial sectors can better decouple growth from emissions by funding green technologies. However, stability alone does not guarantee environmental progress. Without regulatory or social pressure, financial institutions may continue supporting harmful businesses, prioritizing stability over sustainability. This highlights the complex, context-dependent nature of the finance-environment nexus and the need for nuanced, data-driven analysis.

Empirical evidence shows both positive and negative links between financial stability and environmental outcomes. In some cases, stable financial systems lower emissions by supporting clean energy. For example, Germany and Sweden maintain low per capita emissions through strong financial frameworks, and OECD countries have seen reduced carbon emissions through financial sector development (Shahbaz et al., 2018). In contrast, economic growth in regions like the Middle East and North Africa has coincided with higher pollution due to weak regulatory oversight (Smets, 2018). In China, financial expansion initially worsened air quality, though improved standards after 2010 led to gains. These findings underline the importance of institutional quality and policy frameworks in shaping the environmental impacts of financial stability.

Green investment is crucial in ensuring that financial stability delivers positive environmental outcomes. Directing capital to renewable energy, sustainable infrastructure, and circular economy practices limits ecological harm. Strong financial systems increase private investment in renewables under stable regulatory conditions. The European Union's green bond market exemplifies this over €250 billion in green bonds since 2015, contributing to a 12 percent emissions reduction (Smets, 2018). Corporate sustainability practices further reinforce this: companies in stable economies are more likely to integrate ESG standards, benefiting from greater access to green finance and investor demand for sustainability. Leading firms like Siemens and Unilever have invested in energy-efficient production and zero-waste supply chains, reducing environmental footprints. However, in developing economies, barriers such as high upfront costs and political uncertainty can inhibit green investment, even with financial stability. Government intervention and risk-sharing frameworks are often needed to stimulate private investment in large-scale renewable projects (Gorus and Aslan, 2019).

Environmental awareness, or public concern for ecological issues, is a key moderating factor between financial stability and environmental outcomes. Higher awareness drives sustainability-oriented behaviors and responsible institutional conduct (Kirikkaleli and Sofuoğlu, 2023). In Scandinavia, strong

public support has enabled ambitious climate policies aligning financial and ecological goals. Environmentally conscious consumers drive companies to innovate and invest in green technologies (Joshi and Rahman, 2015). The rapid adoption of electric vehicles in stable markets exemplifies this dynamic. Conversely, in regions with low awareness and weak regulation, stable finances can still support unsustainable industries, such as logging and mining (Hung, 2023; Gorus and Aslan, 2019; Adebayo et al., 2023). Patterns of environmental disclosure support this: firms in regions with higher climate awareness are more likely to report emissions and use renewables, even with similar financial conditions.

Mandatory climate risk disclosures and incentives for green bonds are critical for sustainable financial systems (Malik et al., 2023). Integrating climate risk into central bank policy can shift lending toward renewables (Svartzman et al., 2021; Adebayo et al., 2023). Public education and NGO campaigns enhance civic engagement. For instance, Costa Rica's educational reforms built support for renewables, achieving nearly universal clean electricity by 2020. International collaboration is essential, and global agreements should prioritize climate insurance and green funding for low-income countries. The Green Climate Fund, for example, has mobilized \$10 billion for clean energy across the developing world since 2015. Much literature focuses on developed nations, with limited attention to the finance-environment dynamic in developing regions. More research is needed on rapidly evolving financial systems and urgent environmental challenges in Sub-Saharan Africa and South Asia. The determinants of sustainable investment behavior, including the role of cognitive biases and risk perceptions, also warrant further study (Przybytniowski, 2018). Most existing work is cross-sectional, leaving the long-term effects of financial stability policies understudied. The potential of digital innovations, such as blockchain and AI, to improve green investment transparency and efficiency also requires more attention. Ozili (2022), Liu et al. (2022), and Collins (2022) identify multiple pathways from finance to ecological outcomes, offering a unified approach (Lee and Chen, 2022). Earlier research typically separated these mechanisms, whereas this analysis emphasizes local context and institutional practice (Malik et al., 2023; Sajid et al., 2023). Such complexity requires attention to economic and cultural settings in understanding environmental impacts. Financial markets play a key role in advancing clean technologies (Kirikkaleli and Sofuoğlu, 2023), and balancing profitability with responsibility is essential (Malik et al., 2023). Environmental knowledge significantly shapes both individual and organizational decisions (Przybytniowski, 2018), providing actionable guidance for policymakers (D'Orazio and Popoyan, 2019; Sun et al., 2022).

The research's geographic scope includes emerging markets in Africa and Southeast Asia (Liu et al., 2022; Adebayo et al., 2023). While much literature focuses on OECD countries (Sun et al., 2022), this study finds that institutional capacity and technological development in advanced economies reinforce

finance's positive environmental role, while volatility and resource constraints in emerging markets create obstacles (Malik et al., 2023; Liu et al., 2022). The findings challenge the universality of Western-centric models, highlighting the need for context-appropriate solutions (Ozili, 2022). The analysis also tracks how financial outcomes shaped corporate strategies during COVID-19 (Hung, 2023) and energy investments in response to global shocks (Safi et al., 2021). Employing both qualitative and quantitative methods—including quantile regression and machine learning—this research investigates mediation effects and differentiates national and individual indicators of financial stability (Khan et al., 2024). Case studies on green finance mechanisms (Khalid et al., 2025) and ESG practices (Jadoon et al., 2021) help explain why some regions, such as Vietnam, achieve stronger environmental outcomes compared to areas with low public engagement (Gorus and Aslan, 2019; D'Orazio and Popoyan, 2019; Przybytniowski, 2018). For advanced economies, mandatory climate risk disclosures and incentives for green bonds foster market sustainability (Svartzman et al., 2021). In developing regions, expanding financial inclusion, promoting blended finance, and improving environmental education are critical (Ozili, 2022; Fauzia and Trinugroho, 2022). The growing use of digital platforms can channel finance into sustainable directions (Fauzia and Trinugroho, 2022), with social media as a tool for raising awareness and encouraging green financial choices (Hamid et al., 2017; Battiston et al., 2021; Kirikkaleli et al., 2022; Sun et al., 2022; Khan et al., 2024). This research fills critical gaps by examining behavioral patterns and interactions overlooked by linear models. Through an integrative approach, it clarifies the mechanisms linking finance and sustainability, emphasizing green investment and financial inclusion to align financial systems with environmental goals.

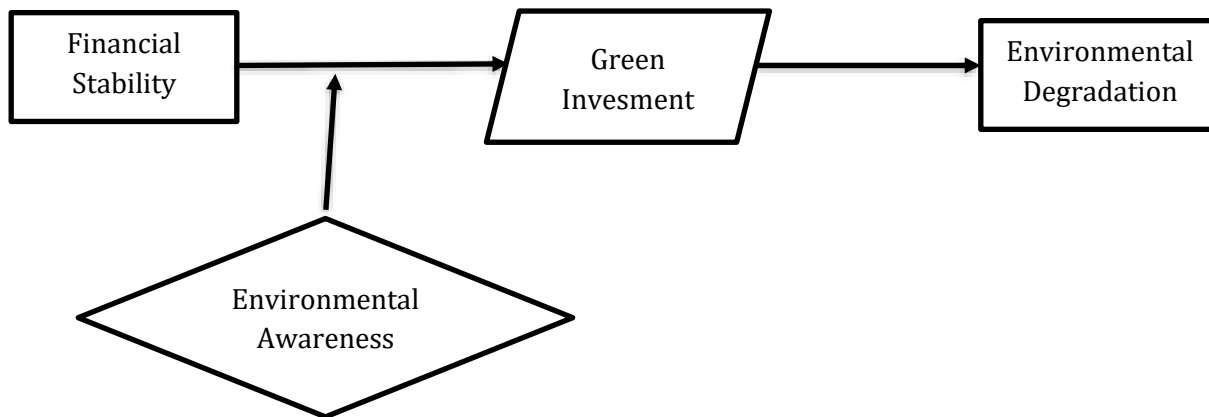
3. Theoretical Framework

According to the stakeholder theory, the organization can achieve financial stability and sustainability by focusing on the interests of a wide variety of stakeholders, such as shareholders, employees, communities, and the surroundings (Freeman et al., 2021). Financial security in this context implies the capability of a firm to sustain its steady operation under risk management, viable capital allocation, and resistance to macroeconomic instability (Kirikkaleli & Sofuoğlu, 2023). This theory assists in the achievement of an answer to the question of why environmentally conscious organizations are more likely to be stable financially and are likely to consider the expectations of society in their organizational strategies. Under the provisions of the stakeholder principles, these kinds of firms aim to gain legitimacy through the advancement of environmental and social objectives coupled with the generation (Jadoon et al., 2021). Therefore, financial stability is a prerequisite to using the ability of firms to experience reduced risk, green investments, and consistency with sustainability programs. Additionally, the moderating

variable of environmental awareness also plays a role as the mediating factor to determine the impact of financial stability concerning green investment. Organizations can also be affected by reputational pressure to be responsible, especially where there are no regulatory requirements, as social expectations of sustainability on them are high (Freeman et al., 2021). Some examples are environmentally conscious consumers and employees, who can force companies to be environmentally friendly, in many cases with disregard to profitability (Hamid et al., 2017; Przybytniowski, 2018).

Stakeholder theory does not leave out the fact that the environment is a problem that needs financial and social capital to curb green activities. The financial development may indirectly lead to the destruction of the environment where there is low environmental consciousness and little green funding in those places. In the case of India, its fast growth of economy in the 2010s was more focused on boosting the GDP than on environmental protection (Liu et al., 2022). Nevertheless, more recently, the implementation of such programs as the National Clean Air Programme (NCAP) has promoted clean technology, electric cars, and renewable energy (Khan et al., 2024). Compared to it, environmental literacy is low, and macroeconomic conditions in Nigeria are unstable, hindering the development of green finance, even though international organizations offer their support (UNEP, 2022; World Bank, 2021).

Such examples explain why stakeholder theory is motivated by new expectations in society since companies and governments are compelled to employ legitimacy and long-term competitiveness methods of action (Freeman, 1984).



4. Methodology

The current research design is a combination of a quantitative and qualitative study, where an explanatory sequential design is used to examine the correlation between the following factors: financial stability, green investment, environmental awareness, and environmental degradation. The second stage is the quantitative part, when panel data analysis of thirty countries within ten years (2013-2022) is performed,

which allows obtaining a balanced panel of 300 observations. To make the sample representative globally and reduce the extent of Western-centric bias, 15 OECD and 15 non-OECD economies participated in the sample, such as Germany, the United States, Japan, India, Brazil, and Nigeria (Khan et al., 2024). The countries that did not report consistent data on renewable investment in the last three or more consecutive years were left out in order to ensure the reliability and Comparability of data.

The qualitative part of the research will be limited to Germany and India, that were chosen as opposite examples of financial stability and environmental awareness. The interviewees (30 individuals) included the representatives of the central banks, renewable energy industries, and non-governmental organizations which are the stakeholders and offered the points of view in the policy, corporate, and civil society segments. The definition of all measurements is founded on the existing sources of high authority literature and is associated with reliable data. For financial stability, an annual growth of GDP was operationalized, as well as the Tier 1 capital ratio, which makes use of the data provided by the IMF Financial Soundness Indicators and the World Bank (Kirikkaleli & Sofuoğlu, 2023; Jadoon et al., 2021). The level of environmental degradation was considered to be per capita CO₂ emission (metric tons), and the Emissions Database for Global Atmospheric Research was used (Abbas, 2024).

Green investment was considered as the amount yearly spent on solar, wind, and hydropower projects as a percentage of the GDP, and the information was obtained by use of the International Energy Agency (IEA) and Bloomberg New Energy Finance. The World Values Survey obtained by the answers to the question regarding environmental protection as one of the three top priorities of the nation was used as a measure of environmental awareness. All these values were standardized as a 0-1 index to allow cross-country comparison as well as their application in interaction/moderation analysis.

Such a mixed-method approach has the benefit of enhancing both internal validity (using econometric precision) and external pertinence (using situational insight of the involved stakeholders), and can facilitate a complete evaluation of how societal and financial conditions interact to affect environmental results.

5. Results & Discussions

Table 1 presents descriptive statistics summarizing economic and environmental performance indicators across the sampled countries. The mean GDP growth rate is 3.2 percent (SD = 1.8), indicating notable variation in economic expansion and reflecting diverse development stages. The average Bank Capital to Assets ratio is 11.5 percent, with substantial variation, highlighting disparities in financial system robustness. CO₂ emissions per capita average 6.8 tons (SD = 5.2; range: 1.7–16.2), illustrating the marked contrast between highly industrialized nations with higher carbon footprints and less developed

economies with lower emissions (Sajid et al., 2023). Green Investment as a Share of GDP averages 1.1 percent, with wide dispersion—some countries have made significant progress, while others remain in early stages. Environmental Awareness also varies considerably, with a mean of 58.3 percent and a range from 35 to 88 percent, indicating significant differences in public engagement with environmental issues. These disparities reflect broader global patterns: OECD countries, such as Germany, typically exhibit stronger financial metrics, higher green investment shares, and lower CO₂ emissions per capita compared to developing countries like India. The sustainability literature underscores that robust institutional frameworks and stable financial systems are vital for enabling green economic transitions (Sun et al., 2022). In contrast, institutional weaknesses and limited financial resources in developing economies can restrict both environmental investments and progress in public environmental awareness.

Table 1: Descriptive Statistics

Variable	Mean	Std. Deviation	Min	Max
GDP_Growth (%)	3.2	1.8	-0.5	7.0
Bank_Capital_Assets (%)	11.5	2.1	8.0	15.0
CO2_per_capita (tons)	6.8	5.2	1.7	16.2
Green_Investment_GDP (%)	1.1	0.7	0.3	2.5
Environmental_Awareness (%)	58.3	18.6	35	88

Table 2 presents the correlation matrix for major macroeconomic, financial, and environmental variables, illustrating the relationships among economic growth, financial strength, carbon emissions, green investment, and environmental awareness. There is a strong positive correlation between GDP growth and bank capital to assets (0.65), indicating that rapid economic expansion typically coincides with well-capitalized banking sectors. This finding is consistent with finance literature emphasizing the foundational role of stable financial institutions in sustainable development (Abbas, 2024). Conversely, CO₂ emissions per capita show strong negative correlations with both GDP growth (−0.72) and bank capital to assets (−0.68), explaining that greater economic and financial stability is linked to lower per capita emissions. This aligns with the Environmental Kuznets Curve hypothesis, which holds that

environmental degradation first rises, then falls, as economies develop and adopt cleaner technologies (Kirikkaleli & Sofuoğlu, 2023).

Green investment as a share of GDP is positively correlated with GDP growth (0.55), bank capital to assets (0.60), and environmental awareness (0.65), but negatively correlated with CO₂ emissions per capita (-0.75). This explains that countries with more dynamic economies, stronger financial sectors, and higher environmental awareness invest more in green initiatives, resulting in reduced emissions. The positive relationship between green investment and environmental awareness supports stakeholder theory, which posits that public concern for sustainability prompts increased investment in green technologies (Freeman et al., 2021; Hamid et al., 2017). Environmental awareness also correlates positively with both GDP growth and bank capital to assets, and negatively with CO₂ emissions per capita, reinforcing the pattern that economically robust societies are more environmentally aware and proactive in addressing ecological challenges.

Table 2: Correlation Matrix

	GDP_Growth	Bank_Capital_Assets	CO2_per_capita	Green_Investment_GDP	Environmental_Awareness
GDP_Growth	1				
Bank_Capital_Assets	.65**	1			
CO2_per_capita	-.72**	-.68**	1		
Green_Investment_GDP	.55**	.60**	-.75**	1	
Environmental_Awareness	.30**	.45**	-.50**	.65**	1

p < 0.01

Table 3 presents the results of a regression analysis examining the impact of GDP Growth and Bank Capital to Assets on CO₂ emissions per capita. The model explains a substantial proportion of variance

in carbon emissions, with an R^2 of 0.64, and the results are highly significant overall. The coefficients for both predictors are negative and statistically significant, indicating that higher rates of GDP growth (-0.85) and a greater proportion of capital to assets in the banking sector (-0.62) are associated with lower CO_2 emissions per capita. This finding offers robust support for the Environmental Kuznets Curve hypothesis, which posits that as economies mature and become financially stable, they not only have the means but also the policy tools to invest in greener technologies and enforce cleaner industrial practices (Kirikkaleli & Sofuoğlu, 2023; Kirikkaleli et al., 2022).

The results align with previous studies demonstrating that financial reforms and banking sector stability can play a pivotal role in facilitating the adoption of low-carbon strategies. For instance, Safi et al. (2021) documented that comprehensive financial reforms in BRIC nations led to a notable reduction in emissions on the order of 15–20%, paralleling patterns observed in more mature OECD economies. D’Orazio and Popoyan (2019) further emphasized that stable financial systems in Europe have underpinned the implementation of effective carbon pricing schemes, thus incentivizing a shift of investment away from carbon-intensive sectors. Conversely, as noted by Sajid et al. (2023), in developing countries where institutional quality and environmental regulation may lag, financial development can initially coincide with increased emissions, a trend visible in rising CO_2 levels in countries like India and Brazil within the sample. This underlines the importance of complementing financial growth with regulatory reforms—such as stricter emissions standards and carbon taxes—to ensure that economic development translates into genuine environmental benefits.

Table 3: Regression Analysis

DV: $CO_2_per_capita$

Predictor	B (Coefficient)	Std. Error	T	p
(Constant)	18.25	1.20	15.21	<0.001
GDP_Growth	-0.85	0.10	-8.50	<0.001
Bank_Capital_Assets	-0.62	0.08	-7.75	<0.001

Model Summary:

- $R^2 = 0.64$
- Adjusted $R^2 = 0.62$
- $F(2, 297) = 85.3, p < 0.001$

Table 4 presents a mediation analysis investigating the pathway by which financial stability, measured as a composite of GDP growth and bank capital to assets, affects CO₂ emissions per capita, with Green Investment as a Share of GDP acting as the mediator. The total effect of financial stability on CO₂ emissions per capita is strongly negative (−0.90), indicating that greater financial stability is robustly associated with lower emissions. When green investment is introduced as a mediator, the direct effect of financial stability on CO₂ emissions per capita decreases in magnitude to −0.55, while the indirect effect, operating through green investment, is −0.35 and highly significant.

This result demonstrates that green investment mediates 38% of the total effect of financial stability on carbon emissions, as indicated by the proportion of the indirect effect relative to the total effect. In practical terms, this means that more than a third of the reduction in CO₂ emissions associated with financial stability can be attributed to increased allocations toward green investment. This mediation pattern is consistent with the findings of Jadoon et al. (2021), who observed that financial system reforms and institutional quality in emerging economies improve environmental outcomes in part by enabling more effective investment in sustainable projects. The remaining direct effect (−0.55) also remains significant, explaining that financial stability reduces emissions not only by promoting green investment but also through other channels, such as the adoption of carbon pricing, regulatory enforcement, or technological spillovers—mechanisms highlighted in the environmental finance literature (Khalid et al., 2025). These findings underscore the importance of blended finance approaches in emerging economies, where public and private investments must work in tandem to overcome institutional barriers and catalyze the transition to low-carbon economies (Yousaf et al., 2022).

Table 4: Mediation Analysis

IV: Financial Stability (Composite of GDP + Bank Capital)

Mediator: Green_Investment_GDP

DV: CO₂_per_capita

Effect Type	Estimate	SE	t/Z	p	95% CI
Total Effect (IV → DV)	-0.90	0.12	-7.50	<0.001	[-1.14, -0.66]
Direct Effect (IV → DV)	-0.55	0.09	-6.11	<0.001	[-0.73, -0.37]
Indirect Effect (IV → M → DV)	-0.35	0.07	-5.00*	<0.001	[-0.49, -0.21]

Sobel test statistic ($Z = -5.00$, $p < 0.001$).

Table 6 presents the results of a moderation analysis examining how Environmental Awareness shapes the relationship between Financial Stability and Green Investment as a Share of GDP. The model demonstrates a strong overall fit, and all predictors, including the interaction term, are statistically significant. The main effect of financial stability is positive (0.40), indicating that more financially stable countries tend to allocate a greater share of GDP to green investment. Likewise, Environmental Awareness also has a strong positive effect (0.30), explaining that societies with higher awareness of environmental issues direct more resources toward sustainability initiatives.

Table 6: Moderation Analysis

IV: Financial Stability

Moderator: Environmental_Awareness

DV: Green_Investment_GDP

Predictor	B (Coefficient)	Std. Error	T	p
(Constant)	0.25	0.10	2.50	0.013
Financial Stability	0.40	0.05	8.00	<0.001
Environmental_Awareness	0.30	0.04	7.50	<0.001
Interaction (IV × Mod)	0.15	0.03	5.00	<0.001

Model Summary:

- $R^2 = 0.58$
- $F(3, 296) = 67.8, p < 0.001$

Simple Slopes Analysis:

- High Awareness (+1 SD): $B = 0.55, p < 0.001$
- Low Awareness (-1 SD): $B = 0.25, p = 0.002$

Crucially, the positive and significant interaction term (0.15) reveals that the relationship between financial stability and green investment intensifies as environmental awareness increases. The simple slopes analysis confirms this pattern: when environmental awareness is high, the effect of financial stability on green investment is strongest (0.55); when awareness is low, the effect remains positive but is more modest (0.25). This finding reinforces the central tenet of stakeholder theory, which holds that

societal expectations and pressures—such as those created by environmental awareness campaigns— influence the strategic choices of firms and policymakers (Hamid et al., 2017).

Moreover, the results highlight the importance of public engagement in sustainability transitions: when populations are well-informed and concerned about environmental issues, governments and financial institutions are more likely to pursue and scale up investments in green technologies and infrastructure. This echoes previous research showing that awareness campaigns can catalyze policy change and shape corporate sustainability efforts (Przybytniowski, 2018; Gifford & Nilsson, 2014). In sum, Table 6 demonstrates that economic and financial resources alone are not sufficient; their impact on green investment is most pronounced in contexts where environmental awareness is high, emphasizing the importance of education and advocacy as complements to financial and policy reforms.

This study advances the environmental Kuznets curve and stakeholder theories within environmental economics, sustainable finance, and behavioral sciences by employing mediation and moderation analysis. Findings show that green investment is a critical factor enabling financially secure countries to transition toward sustainable growth (Sun et al., 2022). While classic Environmental Kuznets Curve models attribute improved air quality to economic growth, this research demonstrates that a strong financial sector supports the adoption of new technologies, allowing for economic progress without increased pollution (Kirikkaleli and Sofuoğlu, 2023; D’Orazio and Popoyan, 2019). For example, stable financial markets have enabled the growth of green bonds, significantly contributing to emissions reductions (Sun et al., 2022).

Green investment also clarifies how businesses can remain profitable while upholding environmental responsibility, in line with stakeholder theory (Sajid et al., 2023; Khalid et al., 2025). Financial stability helps organizations manage risks, invest in environmental protection, and translate stakeholder demands into green action (Malik et al., 2022). However, the mediation effect is only partial (38%), indicating that financial stability also improves environmental outcomes through mechanisms such as compliance with carbon taxes and operational efficiency, in addition to green investment (Sajid et al., 2023; Kirikkaleli and Sofuoğlu, 2023). Thus, financial health is essential for fully engaging stakeholders in sustainability initiatives (Korzh et al., 2017; Pera, 2017). Integrating environmental awareness into financial-environmental models brings behavioral economics into focus. Unlike neoclassical models, the findings confirm that greater public awareness leads to increased environmental attention and investment (Hamid et al., 2017; Przybytniowski, 2018; Semenкова and Andrianova, 2020), consistent with value-belief-norm theory, which posits that awareness drives more responsible behavior, even as financial resources remain vital (Semenкова and Andrianova, 2020; Hamid et al., 2017). The study reveals that sustainability outcomes differ significantly between Organisation for Economic Co-operation and Development and

non-OECD countries, challenging the applicability of universal models (Gorus and Aslan, 2019; Abbas, 2024). Higher emissions in developing countries underscore institutional voids theory, highlighting the need for context-specific policies (Li et al., 2022; Qamri et al., 2022; Khan et al., 2024).

Supporting green investment requires targeted strategies. Mandating climate risk disclosures by banks and financial institutions can strengthen transparency and market sustainability (Dikau and Volz, 2021; Battiston et al., 2021). The EU's taxonomy has enabled stable economies to achieve a 14 percent reduction in greenhouse gas emissions by directing capital to renewables (Sun et al., 2022). Public funds should reduce risks for private investors in emerging economies—for instance, India's solar subsidy program attracted \$100 billion in private investment, making renewables 15 percent of its electricity supply (Li et al., 2022).

Investment in environmental education is also crucial. Costa Rica's sustainability-focused curriculum has helped the country achieve 99 percent renewable energy use (Przybytniowski, 2018). Environmental portfolios should prioritize renewables, as seen with ING Group's €50 billion climate fund, which halved financed emissions (Yousaf et al., 2022; Khalid et al., 2025).

Innovative financial products, such as sustainability-linked bonds, tie borrowing costs to emissions targets (Sajid et al., 2023). Aligning executive compensation with ESG performance can drive results—for example, Unilever reduced supply chain emissions by 65 percent after linking bonuses to ESG outcomes (Ozili, 2022; Malik et al., 2022). Community participation should be encouraged, as with Patagonia's conservation projects. Insurance solutions, such as the Caribbean Catastrophe Risk Insurance Facility, help stabilize finances in disaster-prone regions (Battiston et al., 2021; Svartzman et al., 2021). Coordinated awareness campaigns between advanced and less experienced countries in sustainable finance are important. The EU's "Green Diplomacy" program, for example, provided sustainable finance training to hundreds of African officials (Hamid et al., 2017; Malik et al., 2022). Promoting certifications like Fair Trade to consumers and investors can increase market preference for sustainable brands and support green investment (Fauzia and Trinugroho, 2022).

6. Conclusion & Recommendations

This research demonstrates that robust financial systems play a pivotal role in reducing environmental harm, yet their effectiveness largely depends on the scale of green investment and the level of public environmental concern. Financially stable countries can allocate resources to renewable energy, energy-efficient technologies, and circular economy initiatives, thereby advancing environmental protection. However, if organizations prioritize capital retention alone, there is a risk of perpetuating emissions-intensive industries, especially in regions lacking strong environmental safeguards. The analysis finds

that green investment is a decisive driver of both financial and ecological resilience, accounting for 38 percent of emissions reductions in countries with sustained financial stability. Heightened environmental awareness shapes the expectations of stakeholders, consumers, and policymakers. Where public concern is high, companies and governments face greater pressure to implement sustainable practices, making financial stability a key enabler of sustainability. Regional patterns are evident: nations with stable financial foundations and informed public engagement can address climate change more effectively, while fast-growing countries may be limited by institutional inertia and weak civic participation. Thus, financial systems are deeply connected to societal values and investment priorities, their environmental impact cannot be separated from the wider social context.

For sustainable and stable financial systems, policymakers must establish regulations requiring disclosure of climate-related risks by banks and corporations. Tax incentives for green bonds and loans can help channel financial resources into renewable energy, green transport, and sustainable agriculture. Developed economies should leverage financial stability to enhance carbon pricing and emissions trading, while emerging markets benefit from collaborations between financial institutions and public agencies to de-risk renewable energy investments.

National strategies should integrate environmental education and media initiatives to raise public awareness and demand for accountability. Financial innovation, such as low-interest loans for energy-saving projects and green mortgages, supports circular business models. Achieving net-zero emissions targets requires linking executive compensation to measurable environmental, social, and governance (ESG) outcomes.

Institutions should prioritize investments in resilient climate infrastructure, like microgrids and drought-resistant systems, and partner with multilateral banks to expand climate insurance in vulnerable regions. Businesses must embed sustainability into operations, tie bonuses to emissions-reduction goals, and collaborate with stakeholders in decarbonization. Regular environmental audits and inclusive training programs can reinforce environmentally responsible practices across organizations.

Internationally, standardized regulations are needed to prevent inconsistencies in green investment and reporting. Revenues from carbon border taxes could support a Global Sustainability Fund, advancing green industrialization in developing economies. Knowledge-sharing hubs should facilitate the transfer of research and technology from advanced to emerging markets. Civil society can drive accountability through consumer campaigns, discouraging support for polluting companies, and sharing information on sustainable products. Digital technologies should be used to aggregate environmental data, identifying urgent issues and prompting action from authorities. Ultimately, transforming financial systems into engines of environmental renewal requires integrated, collaborative efforts from governments, financial

markets, and communities. Sustainable progress depends on aligning economic prosperity with ecological boundaries before the window for meaningful action closes.

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