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Islamic finance and ESG: Panel analysis of sustainability in OIC countries

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ABSTRACT

This study investigates the relationship between Islamic finance development and environmental performance in ten Organisation of Islamic Cooperation (OIC) countries from 2010 to 2023, focusing on the moderating role of governance quality. Using the Environmental Performance Index (EPI) as a composite measure of sustainability, we employ fixed-effects panel regression models to test whether a higher share of Islamic finance in national banking sectors is associated with improved environmental outcomes and whether governance quality strengthens this relationship. Contrary to prevailing theoretical expectations, the results reveal a persistent and statistically significant negative association between the Islamic finance share and environmental performance across all model specifications. Governance quality shows a modest, positive direct effect on environmental performance, but fails to moderate the Islamic finance environment nexus in a statistically significant way. GDP per capita consistently negatively influences EPI scores, indicating a growth environment trade-off, while foreign direct investment remains insignificant. These findings challenge the assumption that Islamic finance is inherently aligned with environmental goals and highlight the need for targeted policy interventions, such as explicit environmental screening in Shariah governance, development of green Islamic finance products, and integrated sustainability mandates that the sector contributes meaningfully to environmental sustainability in OIC countries.

Keywords: Islamic finance, Environmental Performance Index (EPI), Governance, Organisation of Islamic Cooperation (OIC), Sustainable development

1. INTRODUCTION

The importance of sustainable development worldwide has accelerated scholars' interest in comprehending the intricate connections between financial systems and a country's environmental performance. This paradigm shift has also highlighted the importance of alternative financial frameworks, especially Islamic finance, in facilitating Environmental, Social, and Governance (ESG) goals. With the world facing unprecedented environmental problems, the Organisation of Islamic Cooperation (OIC) countries, with their population dominating a considerable amount of natural resource reserves, are rapidly becoming a key stakeholder in the discourse of sustainable development (Ul Haq et al., 2025). The meeting of the two conceptions of Islamic finance and the ESG imperatives poses a rare chance to analyze how Shariah-compliant finance systems are likely to play a significant role in environmental sustainability without altering economic growth rates. The postulated framework on how Islamic finance can influence the improvement of environmental performance is based on its embedded values, which hold the focus on social responsibility, banishment of evil deeds (haram), and enhancement of societal well-being (maslaha) (Irfany, Utami, et al., 2024). The principles are conceptually in line with ESG principles, especially environmental stewardship, and Islamic finance development could lead to a spontaneous improvement in the environmental situation. The Irrelevancy Theory has recently received support at the empirical level, whereby Paltrinieri et al. (2020) have indicated positive associations between the level of Islamic finance development and banking ESG scores across 10 countries. On the same note, Boudawara et al. (2023) offered convincing evidence that the quality of governance under the Shari law strongly improves ESG performance in Islamic banks, where the different dimensions of the impacts of ESG performance in Islamic banks influence effectiveness. However, empirical evidence provides a complicated picture of the comprehension of such connections. However, several studies have reported positive relationships between Islamic finance and sustainability (Alghafes et al., 2024; Tekin, 2025). Some findings indicate conditional relationships between such variables, where institutional and governance factors are paramount (Islam et al., 2025). Such complexity is particularly acute in the case of environmental performance, where the interplay of financial development and environmental performance is a key issue in terms of the adequacy of governance quality and the effectiveness of institutions (Bax et al., 2024; Zhang et al., 2022). The moderating effect of governance is one of the common recurring issues in various studies, as sound governance systems enhance the positive correlation between financial development and environmental performance (Z. Khan et al., 2020; Xiangling & Qamruzzaman, 2024).

The Environmental Performance Index (EPI), developed by Yale and Columbia Universities, measures nations' environmental health and ecosystem vitality across dimensions, such as air quality, biodiversity, and climate change mitigation (Wendling et al., 2020). It is widely used to study the links among environmental performance, economic growth, and financial development (Ahmad et al., 2021; Hao et al., 2021). OIC countries present a unique case because of their Islamic finance dominance, varied governance, economic diversity, environmental challenges, and large energy reserves, facing pressure to balance growth with sustainability under global agreements such as the Paris Treaty and the SDGs (Abdullah & Haron, 2022; Dai, 2024; Izhar & Munkin, 2021). Recent studies highlight governance quality as a key moderator in the finance–environment nexus (Fakhrunnas & Anto, 2025; Hadi et al., 2025).

There are some key gaps that previous literature shows, which this study will fill. First, although some studies have investigated the connection between traditional financial development and environmental performance, few have concentrated on the environmental impact of Islamic finance in terms of holistically measuring environmental performance, such as the EPI (Shahbaz et al., 2020; Shahbaz et al., 2015). Second, even though the quality of governance has been highlighted as an essential moderator in the finance-environment relationship, the channels through which governance interacts with the development of Islamic finance and affects environmental outcomes have not been adequately discussed (. A. Khan et al., 2022). Third, few studies using panel data that study such relationships within the OIC countries over long years would give us more insight into time dependence and cross-country behavior (Akande, 2022; Alabri, 2021). This study fills these gaps by investigating the relationship between the

development of Islamic finance and environmental performance in OIC countries, focusing on the influence of governance quality as a moderating factor. This study has two research questions that serve as guiding lights. Does the share of Islamic finance positively influence the environmental performance of the OIC countries? Does this mean that quality of governance reinforces or moderates the ties between Islamic finance share and environmental performance? The following is an operationalization of these research questions into hypotheses according to theoretical expectations and in light of the empirical information in the literature:

H1: Environmental performance, as measured by the Environmental Performance Index, is significantly related to the Islamic finance share.

This hypothesis is based on the theoretical logic of synergy between the principles of Islamic finance and environmental stewardship, which has now been empirically tested, finding positive links between Islamic finance development and ESG (Boudawara et al. 2023; Paltrinieri et al. 2020). Countries that are more integrated with Islamic finance are anticipated to perform better in terms of environmental concerns based on the sustainable nature of Shari'ah-compliant financial markets.

H2: Government quality significantly moderates the relationship between Islamic finance and environmental performance.

This study posits that Islamic finance's environmental impact depends heavily on institutional and governance quality, enabling effective policy implementation and coordination (Baloch et al., 2019; Rehman et al., 2022). It contributes to the sustainable finance literature by empirically linking Islamic finance development to Environmental Performance Index outcomes, offering insights into how alternative financial systems can advance sustainability goals. For OIC policymakers, the findings highlight strategies to balance economic growth with environmental commitments, leveraging Islamic finance's potential within integrated policy frameworks (Hassan et al. 2019; Sadorsky 2010). The significant population, resources, and climate stakes of OIC countries are globally relevant, guiding financial institutions, investors, and development agencies in conditions that maximize environmental gains from Islamic finance (Al-Mulali et al., 2015; Ozturk and Acaravci, 2013).

2. LITERATURE REVIEW

2.1 Theoratical Foundations

The theory of governance provides a sharp prism to analyze how ESG principles are incorporated in Islamic financial institutions (IFIs), especially the interaction between stakeholder theory and agency theory in the process. Stakeholder theory puts IFIs in a position where they act as guardians of the well-being of society, as indicated in the Maqasid al-Shariah system, which requires measures to be taken to defend human dignity, social justice, and economic equity. In this view, the fiduciary duty of IFIs is conceptualized as stretching beyond its shareholders and that its stakeholders are other individuals and groups, such as customers, employees, communities, and the environment (Jan et al., 2022). IFIs can incorporate broadened responsibility into governance structures to make it practical by integrating financial goals with societal and environmental consequences in the long term.

On the other hand, agency theory identifies opportunities for conflicts of interest in governance setups, especially between management, Shariah supervisory boards, and stakeholders. In Islamic finance and the ESG nexus, conflicts can be observed in the choice of short-term financial returns over sustainability values or the shallow implementation of ESG practices to achieve a good image. This may include the use of strong governance practices, disclosure, and oversight by Shariah boards to prevent the integration of ESG as a mere meaningless manifestation. Their use of the quality of governance as a moderating variable shows the deposit of the institutional theory, where the coercive forces provided by the regulators, normative pressures due to professional standards, and mimetic pressures by competitors in the industry lead the IFIs to record greater sustainability performance (Alam & Miah, 2024). These theoretical perspectives combine into an understandable system for evaluating how the principles of governance in Islamic finance can be discussed to bring substantial ESG results.

2.2 Empirical Evidence

2.2.1 Islamic Finance and Environmental Performance

Empirical studies of the environmental performance of Islamic finance have reported ambivalent and resource-specific results. Solarin (2019) presents evidence in Malaysia pointing towards the fact that banking financing based on Islamic principles can help in lowering the consumption of CO2 emissions, thus showing that the structures of Shariah-compliant financing with the ability to deter speculative activities and promote asset-backed transactions may indirectly promote environmentally sustainable investments. Other reports, however, reveal more subtle or restricted effects, with the difference often attributed to the fact that Islamic finance is mainly focused on Shariah conformity over environment-related goals (Pathan et al., 2022). In OIC territories, cross-sectional dependence in multi-country panels has been approached through methodological solutions, such as the Dynamic Common Correlated Effects (DCCE) estimator, to disclose that institutional performance becomes the central factor defining environmental quality (Ali et al., 2020). Relying on countries with greater governance standards, there is a more positive relationship between the development of the Islamic financial sector and environmental performance, where poorly governed countries are prone to pursue substance adherence to green economic policies.

This is further confused by the trade-environment nexus. According to Ali (2020), a similar relationship exists regarding the concept of trade openness in OIC countries, as both positive and negative changes in environmental indicators are realized depending on parameters such as CO2 emissions or ecological footprint. Similarly, openness and environmental openness can be described as asymmetric, where environmental benefits are usually enjoyed at the upper limit of environmental openness economies (Ali et al., 2020). Another element of sustainable finance ecosystems is financial inclusion, which also illustrates the mixed degradation effects of the environment, which either reduces or worsens the degradation of the surroundings, relying upon the environmental indicator utilized (Chaudhry et al., 2022). Taken together, this piece of evidence serves as a reminder that institutional quality, disclosure practices, and the choice of environmental metrics play an essential role in examining the actual ecological impact of Islamic finance.

2.2.2 ESG Performance Drivers in Islamic Banks

Governance structures, coupled with the influence of institutional and market forces, define the ESG performance of Islamic banks. Applying stakeholder-based theories, Jan (2023) affirms that incorporating sustainability practices into Islamic corporate governance systems helps improve long-term firm performance by reconciling managerial incentives with society's larger aims. Quality of governance comes to the forefront, where the effectiveness of governance, regulatory oversight, transparency in the operations of a Shariah board, and adequate stakeholder engagement mechanisms are also associated with increased ESG performance scores (Alam & Miah, 2024). Moreover, Ardianto (2024) also revealed that the expertise, independence, and gender diversity of the Shariah Supervisory Boards are positively correlated with the scope and quality of green banking disclosures in Islamic banks in countries in the MENA region, which further confirms the value of internal regulation in determining ESG results.

Institutional theory provides more explanatory insight, pointing to the forces that include coercive pressures exerted by regulators, normative pressures created by industry-wide standards, and mimetic forces being competitors forcing ESG adoption by Islamic banks. Performance is also boosted by its combination with ESG frameworks (Mohd Zain et al., 2024) owing to sustainability engraved in Islamic finance, ethical, and growth mandates. In the context of competitive markets, Shariah-compliant banking institutions that balance the disciplines of Shariah governance with ESG practices can realize reputational and financial gains that will ensure that ethically conscious investors and morally responsible clients gain access to them to place their funds under stewardship (Islam et al., 2025).

Recent advancements in Islamic finance ESG have demonstrated a marked shift toward more robust econometric and sustainability assessment methodologies. Dynamic panel estimators, particularly

the system GMM, have addressed endogeneity and heterogeneity in cross-country OIC analyses (Kashi et al., 2024). Innovative time-series approaches, such as the quantile autoregressive distributed lag (QARDL) model, enable the capture of asymmetric environmental effects across different quantiles of trade openness and financial development (Irfany, Syam, et al., 2024), while cross-sectional augmented ARDL (CS-ARDL) techniques enhance the measurement of sectoral linkages and cross-country spillover effects (Vo et al., 2022). To reinforce causal inference, matching techniques, such as propensity score matching matched with difference-in-differences (PSM-DiD), have been utilized to analyze the effects of sustainability governance structures (i.e., board-level sustainability committees) on ESG performance to the best of our knowledge (Pane & Nainggolan, 2024; Tumewang et al., 2025).

Considerable heterogeneity remains in the OIC in terms of environmental sustainability performance. Studies confirm asymmetric trade environment relationships, with certain countries such as Malaysia, Jordan, UAE, and Qatar showing negative links between trade openness and CO_2 emissions but positive effects on ecological footprint (Ali et al., 2021). Financial inclusion environment dynamics are similarly heterogeneous, varying by income level: higher-income OIC countries tend to exhibit positive correlations between financial inclusion and greenhouse gas emissions, but negative correlations with the ecological footprint (Chaudhry et al., 2022). The integration of UN Sustainable Development Goals (SDGs) into Islamic banking reporting remains uneven, with higher disclosure levels for SDG-9, SDG-17, SDG-11, and SDG-1; however, overall reporting performance is still developing (Jan et al., 2022).

2.2.3 Governance Mechanisms and Risk Management

Corporate governance structures in Islamic banks serve as critical determinants of sustainability performance, and institutional design influences the extent and quality of ESG integration. Kashi (2024) finds that establishing dedicated sustainability committees and experience in sustainability disclosures significantly enhances ESG performance across key Islamic finance jurisdictions. Similarly, Tumewang (2025) notes that external assurance mechanisms amplify the credibility and effectiveness of sustainability reporting in the banking sectors of emerging economies. Interestingly, the empirical results deviate from agency theory expectations. Board activity, measured by meeting frequency, negatively affects sustainability performance, suggesting that overemphasising formal oversight may crowd out strategic sustainability initiatives (Kashi et al., 2024). Furthermore, Ardianto (2024) showed that SSB size and composition directly impact green banking disclosures, indicating that governance quality can influence both environmental transparency and risk management practices.

2.2.4 Institutional Environment Effects

The institutional environment exerts a powerful moderating influence on Islamic banks' ESG performance. While governance quality at the national level, encompassing regulatory efficiency, political stability, and corruption control, can strengthen the ESG–financial performance nexus (Luo et al., 2024, 2024), the current sector-specific regulatory guidelines appear insufficient to drive significant sustainability gains (Kashi et al., 2024). Indeed, adherence to sustainable finance networks and global reporting standards is yet to demonstrate a statistically significant impact in some jurisdictions, underscoring the need for more robust policy interventions tailored to the Islamic finance context. These findings resonate with broader environmental economics research, highlighting that institutional quality is a critical determinant of environmental and social outcomes in OIC countries(Ali et al., 2020, 2021, 2022; Chaudhry et al., 2022). Thus, strengthening institutional capacity could enhance both the legitimacy and effectiveness of ESG integration within Islamic banking systems.

3. METHOD

This study employs a balanced panel data framework encompassing ten member states of the Organisation of Islamic Cooperation (OIC) from 2010 to 2023. The selected countries–Indonesia,

Malaysia, Pakistan, Bangladesh, Saudi Arabia, the United Arab Emirates, Egypt, Jordan, Nigeria, and Turkey–were chosen based on data availability and macroeconomic significance in the Islamic finance sector. The temporal span captures the post-global financial crisis recovery phase, acceleration of Islamic finance markets, and increasing policy salience of environmental sustainability.

The dataset was constructed entirely from secondary publicly available sources (Table 1).

Table 1. Description of Variables

Variable	*Definition*	*Source*
EPI Score	Environmental Performance Index, a proxy for ESG performance	Yale EPI Database
Islamic Finance Share (%)	Share of Islamic banking assets in total banking sector assets	Islamic Financial Services Board (IFSB) Annual Stability Reports
Governance	Composite average of Rule of Law, Control of Corruption, and Voice & Accountability indices	World Governance Indicators (WGI)
GDP per Capita	GDP per capita in current USD	World Bank, World Development Indicators (WDI)
FDI	Foreign direct investment inflows as % of GDP	World Bank, World Development Indicators (WDI)

3.1 Measurement of Main Variables

The dependent variable is Environmental Performance (EPI score), operationalized using the Environmental Performance Index, which aggregates environmental health and ecosystem vitality metrics (Wendling et al., 2020). EPI is a widely adopted composite indicator for national-level sustainability assessments, covering dimensions such as air quality, biodiversity conservation, and climate change mitigation, making it appropriate for examining the broad environmental implications of financial development (Ahmad et al., 2021; Khafidh et al., 2025). The primary independent variable, Islamic Finance Share (isl_fin_share), measures the proportion of Islamic banking assets relative to total banking sector assets. This metric is a standard proxy for the level of Islamic financial development (Boudawara et al., 2023; Paltrinieri et al., 2020). The moderating variable Governance is a composite index constructed as the average of three World Governance Indicator (WGI) dimensions: Rule of Law, Control of Corruption, and Voice & Accountability. This formulation aligns with the governance, finance, and sustainability literature, where institutional quality is considered a structural determinant of environmental and financial outcomes (Z. Khan et al., 2020; Xiangling & Qamruzzaman, 2024, 2024).

To test the hypothesized relationships, we estimated three panel regression models to test the direct and moderated effects of Islamic finance development on environmental performance:

Baseline model (Model 1):

$$EPI\text{it} = \beta 0 + \beta 1 isl\_fin\_share\text{it} + \beta 2 gdp\_pc\text{it} + \beta 3 fdi\text{it} + \mu i + \lambda t + \varepsilon it$$

With Governance (Model 2):

$$EPI\text{it} = \beta 0 + \beta 1 isl\_fin\_share\text{it} + \beta 2 gdp\_pc\text{it} + \beta 3 governance\text{it} + \beta 4 fdi_{it} + \mu i + \lambda t + \varepsilon it$$

With Interaction Term (Model 3):

$$EPI\,\text{it} = \beta 0 + \beta 1 isl\_fin\_share\,\text{it} + \beta 2 gdp\_pc\,\text{it} + \beta 3 islXgov_{it} + \beta 3 governance\,\text{it} + \beta 4 fdi_{it} + \mu i + \lambda t + \varepsilon it$$

Here, EPI_{it} represents the environmental performance Index as a proxy for ESG for firm i in year t. In contrast, $isl\_fin\_shar, gdp\_pc\text{it}, and\ fdi\text{it}$ captures islamic finance per share, gdp per capita and foreign direct investment, and $Controls$ it includes firm-specific control variables, and $\mu i\ and\ \lambda t$ represent firm and year fixed effects, respectively, and εit is the error term.

The interaction term islXgov captures the moderation effect of governance quality on the relationship between Islamic finance development and environmental performance. A positive and significant coefficient on islXgov would indicate that stronger governance amplifies the positive contribution of Islamic finance to environmental outcomes (Baloch et al., 2019; Rehman et al., 2022). Two control variables are included to mitigate omitted variable bias. First is GDP per capita (gdp_pc) in current USD, representing economic development level; second is foreign Direct Investment (FDI) inflows as a percentage of GDP, capturing the role of international capital flows. This study employs a within-country fixed effects (FE) estimation framework to control for unobserved heterogeneity across countries that may otherwise bias the estimated relationship between Islamic finance development and environmental performance. The FE approach removes the influence of time-invariant country-specific characteristics such as geographic location, cultural norms, or legal traditions, ensuring that estimated coefficients capture within-country variation over time rather than cross-sectional differences (Wooldridge, 2010).

To further enhance inference reliability, we cluster standard errors at the country level, addressing potential serial correlation and heteroskedasticity in the error terms (Cameron & Miller, 2015). This choice is consistent with contemporary panel econometric practice, particularly when the number of cross-sectional units is small relative to periods, as in our balanced panel data.

4. RESULT AND DISCUSSION

4.1 Result

Table 2 presents the descriptive statistics for the study variables. The mean EPI score is 47.99, ranging from 23.10 to 74.23, indicating substantial variation in environmental performance across OIC countries. The average Islamic finance share is 16.39% of total banking assets, with considerable dispersion, reflecting heterogeneous Islamic finance development. GDP per capita averages USD 14,796.61, but the extensive range signals notable income disparities. FDI inflows average 1.93% of GDP, with negative and high positive values observed. Governance quality shows a negative mean (–1.215), highlighting generally weak institutional performance, while the interaction term (islXgov) exhibits high variability, suggesting diverse combined effects of Islamic finance and governance.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
isl fin share	140	16.392	16.506	.45	77.2
epi score	140	47.987	12.869	23.1	74.23
gdp pc	140	14796.606	16146.346	757.385	52034.476
fdi	140	1.934	1.451	-.205	6.222
governance	140	-1.215	1.204	-3.082	.955
islXgov	140	-15.109	27.279	-104.313	30.699

Table 3 presents the correlations among all study variables. The interaction term islXgov is negatively correlated with Islamic finance share (–0.608) but positively correlated with governance (0.497), GDP per capita (0.071), and FDI (0.492), indicating that higher governance quality and economic openness tend to coincide with more substantial combined effects of Islamic finance and governance. Islamic finance share shows moderate positive correlations with governance (0.244) and GDP per capita (0.292), suggesting that more developed Islamic finance sectors are often found in higher-income and better-governed economies. Governance is positively associated with GDP per capita (0.322) and FDI (0.640), reflecting the well-established link between institutional quality, economic prosperity, and foreign investment. All correlation coefficients are below the conventional multicollinearity threshold ($|r| < 0.80$), confirming that multicollinearity is unlikely to bias the regression estimates.

Table 3: Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) islXgov	1.000				
(2) isl_fin_share	-0.608	1.000			
(3) governance	0.497	0.244	1.000		
(4) gdp_pc	0.071	0.292	0.322	1.000	
(5) fdi	0.492	-0.000	0.640	0.248	1.000

Table 4 reports the baseline fixed-effects regression results examining the impact of Islamic finance development on environmental performance. The coefficient for Islamic finance share is negative and statistically significant ($\beta = -0.619$, $p < 0.05$), indicating that higher Islamic finance penetration is associated with lower EPI scores without governance controls. This suggests that, on average, expansion of Islamic finance alone may not directly enhance environmental outcomes without supportive institutional frameworks. GDP per capita also shows a negative and significant effect ($\beta = -0.001$, $p < 0.05$), implying that increases in income per capita are linked to marginal declines in environmental performance, possibly reflecting growth–environment trade-offs in the sampled OIC economies. FDI inflows exhibit a negative but statistically insignificant association ($\beta = -0.231$, $p = 0.672$), suggesting no discernible independent effect on environmental performance in this specification. The model explains approximately 20.2% of the within-country variation in EPI scores ($R^2 = 0.202$), with an overall F-test confirming joint significance of the predictors ($F = 7.975$, $p = 0.010$).

Table 4: Regression results

epi_score	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
isl_fin_share	-.619	.262	-2.37	.042	-1.211	-.028	**
gdp_pc	-.001	0	-3.12	.012	-.002	0	**
fdi	-.231	.528	-0.44	.672	-1.426	.963	
Constant	73.876	5.835	12.66	0	60.676	87.076	***

Mean dependent var	47.987	SD dependent var	12.869
R-squared	0.202	Number of obs	140
F-test	7.975	Prob > F	0.010
Akaike crit. (AIC)	1018.427	Bayesian crit. (BIC)	1027.252

**** p<.01, ** p<.05, * p<.1*

Table 5 presents the regression results incorporating governance quality into the baseline specification. The coefficient on Islamic finance share remains negative and statistically significant ($\beta = -0.701$, $p < 0.05$), indicating that higher Islamic finance penetration is associated with lower environmental performance scores even after accounting for governance. This suggests that Islamic finance development on its own may not automatically translate into environmental gains in the current institutional contexts of the sampled OIC countries and could reflect market expansions that prioritise financial rather than sustainability objectives. The coefficient on governance is positive ($\beta = 4.958$) but statistically insignificant ($p = 0.149$), suggesting that variations in governance quality, while directionally aligned with improved EPI outcomes, do not exert a substantial direct effect in this model. This may indicate that governance quality's influence on environmental performance is more conditional, potentially operating through interactive or mediating mechanisms rather than a straightforward direct channel.

GDP per capita again shows a negative and highly significant association ($\beta = -0.001$, $p < 0.01$), reinforcing the evidence of a growth–environment trade-off within the sample. FDI inflows remain negative and statistically insignificant ($\beta = -0.324$, $p = 0.574$), implying no consistent independent role of foreign investment in shaping environmental performance in these economies. The inclusion of governance improves the model's explanatory power slightly ($R^2 = 0.226$ compared to 0.202 in the

baseline), and the joint significance of the predictors is supported by the F-test (F = 10.790, p = 0.002). While governance alone does not exert a significant direct impact, its potential role as a moderator remains a key hypothesis to be tested through interaction terms in the subsequent model.

Table 5. Regression results

epi_score	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
governance	4.958	3.138	1.58	.149	-2.141	12.056	
isl_fin_share	-.701	.23	-3.04	.014	-1.223	-.18	**
gdp_pc	-.001	0	-3.52	.006	-.002	0	***
fdi	-.324	.557	-0.58	.574	-1.583	.935	
Constant	82.772	6.217	13.31	0	68.709	96.835	***

Mean dependent var	47.987	SD dependent var	12.869
R-squared	0.226	Number of obs	140
F-test	10.790	Prob > F	0.002
Akaike crit. (AIC)	1016.203	Bayesian crit. (BIC)	1027.970

**** p<.01, ** p<.05, * p<.1*

Table 6 reports the results for the full specification, incorporating the interaction term (islXgov) to test the moderating role of governance quality in the relationship between Islamic finance development and environmental performance. The coefficient on the interaction term is negative but statistically insignificant (β = –0.041, p = 0.817), indicating no evidence that governance quality systematically alters the effect of Islamic finance share on EPI scores within the sampled OIC countries. This suggests that, contrary to the moderation hypothesis, governance does not currently strengthen the environmental impact of Islamic finance development in a measurable way. The direct effect of governance remains positive and is marginally significant at the 10% level (β = 5.562, p = 0.079), implying that improvements in institutional quality may independently contribute to better environmental performance, albeit modestly. Islamic finance share continues to exhibit a negative and statistically significant coefficient (β = –0.722, p < 0.05), consistent with earlier models, suggesting that without targeted sustainability integration, the expansion of Islamic finance may not inherently promote environmental goals. GDP per capita again shows a negative and statistically significant association (β = –0.001, p < 0.01), reaffirming the growth–environment trade-off within the sample. FDI inflows remain negative and insignificant (β = –0.270, p = 0.704), suggesting limited direct influence on environmental outcomes.

The model's explanatory power (R^2 = 0.226) is unchanged from Model 2, and the joint F-test indicates overall model significance (F = 8.454, p = 0.004). These results highlight that while governance may have a positive independent association with environmental performance, its role as a moderator in the Islamic finance environment nexus appears limited in OIC countries' current institutional and policy context.

Table 6. Regression results

epi_score	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
islXgov	-.041	.174	-0.24	.817	-.435	.353	
governance	5.562	2.808	1.98	.079	-.79	11.915	*
isl_fin_share	-.722	.275	-2.63	.027	-1.343	-.1	**
gdp_pc	-.001	0	-3.40	.008	-.002	0	***
fdi	-.27	.688	-0.39	.704	-1.826	1.286	
Constant	82.805	6.143	13.48	0	68.908	96.701	***

Mean dependent var	47.987	SD dependent var	12.869
R-squared	0.226	Number of obs	140
F-test	8.454	Prob > F	0.004
Akaike crit. (AIC)	1018.064	Bayesian crit. (BIC)	1032.773

**** p<.01, ** p<.05, * p<.1*

The time-series plots show considerable cross-country heterogeneity in the relationship between Islamic finance share and EPI scores from 2010 to 2023. While some countries (e.g., Malaysia, Indonesia) exhibit periods where a higher Islamic finance share coincides with improved environmental performance, others (e.g., Pakistan, Nigeria) display a declining or fluctuating pattern, suggesting the relationship is context dependent. See Figure 1

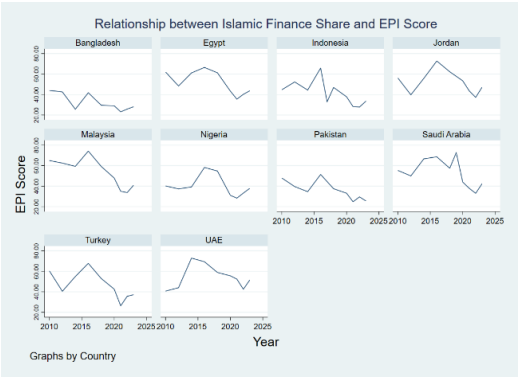

Figure 1. Relationship between Islamic Finance Share and EPI Score by Country

Saudi Arabia dominates the sample with the highest mean Islamic finance share (nearly 60%), followed by Malaysia and the UAE. Several countries, including Egypt, Nigeria, and Turkey, have relatively low averages, highlighting significant disparities in Islamic finance sector development across OIC members (Figure 2)

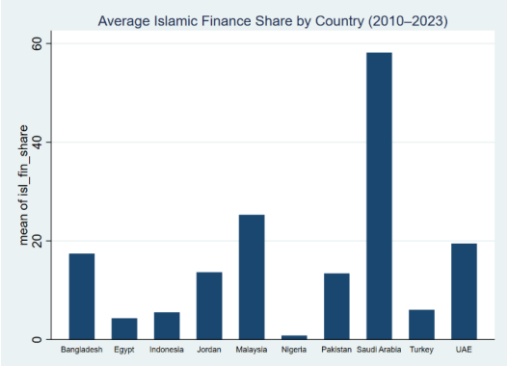

Figure 2. Average Islamic Finance Share by Country (2010–2023)

The scatter plot reveals no clear linear association between Islamic finance share and EPI scores across the sample. High EPI scores are observed at both low and moderate Islamic finance shares. In contrast, very high shares are often associated with moderate environmental performance, supporting the regression finding of a weak or negative unconditional relationship (Figure 3).

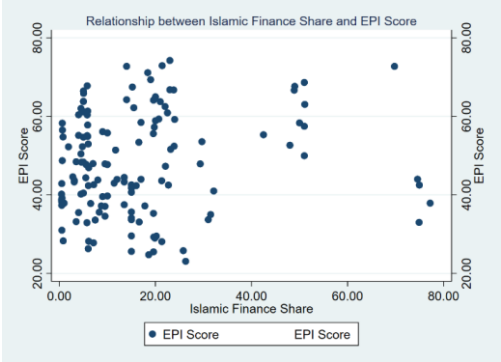

Figure 3. *Scatter Plot: Islamic Finance Share vs. EPI Score*

4.2 Discussion

This study set out to examine whether the development of Islamic finance contributes to environmental performance in OIC countries and whether governance quality strengthens this relationship. The results reveal three key findings: (i) Islamic finance share is negatively and significantly associated with environmental performance in all models, (ii) governance quality has a weak but positive independent effect, and (iii) the interaction between governance and Islamic finance share is statistically insignificant, suggesting no moderation effect in the current institutional context. The persistent negative association between Islamic finance share and EPI scores suggests that Islamic finance growth, as currently structured in OIC countries, is not inherently aligned with environmental goals. While Shariah principles emphasise social responsibility and avoidance of harmful activities (Irfany, Utami, et al., 2024), Islamic financial products may focus on conventional profitability and risk-return considerations without explicitly integrating environmental criteria. This finding supports earlier work (Alghafes et al., 2024; Islam et al., 2025) cautioning that financial sector expansion, absent targeted sustainability mandates, can have neutral or even adverse environmental effects. The positive but statistically weak direct effect of governance suggests that institutional quality plays an important, albeit limited, role in shaping environmental outcomes. Good governance, measured here through the rule of law, control of corruption, and voice and accountability, has been shown in prior studies (Z. Khan et al., 2020; Xiangling & Qamruzzaman, 2024) to enhance environmental protection through effective policy implementation and enforcement. However, in many OIC countries, governance systems may lack the regulatory capacity, enforcement mechanisms, or policy alignment to translate financial development into environmental benefits systematically.

Contrary to H2, the moderation effect of governance quality on the Islamic finance–environment nexus is not statistically significant. Several explanations are possible. First, the operational linkages between Islamic finance and environmental projects remain underdeveloped without green product innovation or environmental compliance requirements, and governance quality has little leverage to influence outcomes. Second, governance improvements in the sampled countries may be too incremental to generate a measurable interaction effect during the study period. Third, structural factors such as energy dependence, industrial composition, and political priorities may override any potential synergy between finance and governance. The negative and significant effect of GDP per capita across all models reinforces the idea of a growth environment trade-off in resource-based and industrialising economies (Sadorsky, 2010; Tamazian et al., 2009). Higher income growth in these contexts often stems from sectors with substantial environmental footprints, such as fossil fuels, heavy industry, or infrastructure development. This may offset environmental gains unless strong sustainability safeguards are in place. FDI inflows do not show a significant effect, indicating that foreign investment in OIC countries is not necessarily directed toward environmentally sustainable sectors. This finding aligns with concerns that, without green screening mechanisms, foreign capital can flow into high-emission or environmentally damaging industries (Baloch et al., 2019). The descriptive and visual analyses further contextualise these results. Figure 1 shows that in some countries, such as Malaysia and Indonesia, higher Islamic finance shares occasionally coincide with environmental improvements, suggesting that policy or market factors at the national level can align finance with sustainability. Conversely, in countries like Nigeria and Pakistan, high or fluctuating Islamic finance shares are accompanied by stagnant or declining environmental performance. Figure 3 confirmed no clear unconditional relationship between Islamic finance share and EPI scores, reinforcing the regression findings. The evidence points to a critical conclusion: Islamic finance alone cannot drive environmental performance in the OIC context unless explicitly integrated with sustainability-oriented governance, policy frameworks, and product innovation. The absence of a strong moderation effect from governance implies that institutional improvements must be accompanied by deliberate regulatory linkages such as green sukuk standards, environmental screening for financing, and Shariah boards incorporating sustainability criteria to translate financial development into measurable ecological gains.

The findings of this study carry essential policy and theoretical implications. From a policy perspective, they underscore the need for closer alignment between Islamic finance development and

environmental objectives in OIC countries. Regulatory authorities should integrate explicit environmental criteria into Shariah governance frameworks, ensuring financing decisions exclude environmentally harmful activities and prioritising projects with demonstrable sustainability benefits. Expanding the scope of green Islamic finance instruments such as green sukuk and sustainability-linked Shariah-compliant products could help mobilise capital toward renewable energy, low-carbon infrastructure, and climate adaptation initiatives. However, stronger regulatory capacity and enforcement mechanisms must support such financial innovations to guarantee that stated environmental commitments are implemented. In addition, foreign direct investment policies should be revised to require environmental impact assessments, ensuring that inflows contribute to, rather than undermine, environmental performance. Cross-sector collaboration between financial regulators, environmental agencies, and Islamic finance institutions is essential to creating a unified policy environment aligned with Shariah principles and international sustainability goals, including the UN SDGs and the Paris Agreement. Theoretically, the study challenges the prevailing assumption in the literature that Islamic finance inherently promotes environmental sustainability. The persistent negative association between Islamic finance share and EPI scores suggests that financial sector growth can occur independently of or even counter environmental improvement without targeted policy frameworks. Furthermore, the absence of a significant moderating role for governance quality indicates that institutional improvements alone are insufficient to enhance the environmental benefits of Islamic finance, calling into question models that treat governance as a universal amplifier in the finance–sustainability relationship. The consistent negative relationship between GDP per capita and environmental performance further highlights the structural constraints that resource-dependent and industrialising economies face, where economic expansion often carries significant ecological costs. Focusing on the OIC context, this study contributes to a deeper understanding of how institutional, financial, and policy factors jointly shape the Islamic finance–environment nexus in emerging markets.

5. CONCLUSION AND RECOMMENDATION

This study provides empirical evidence that challenges the assumed intrinsic synergy between Islamic finance and environmental sustainability. Across multiple model specifications, the share of Islamic finance within the banking sector is negatively associated with environmental performance, suggesting that sector expansion, as practised in OIC countries, does not automatically translate into ecological benefits. While showing a weak positive independent effect, governance quality does not significantly moderate this relationship, indicating that institutional improvements alone are insufficient without explicit environmental integration into financial practices. The persistent negative GDP-environment association underscores a structural growth–environment trade-off, particularly in resource-dependent and industrialising economies, where economic expansion often entails environmental degradation. The insignificance of foreign direct investment further suggests that capital inflows may not contribute to sustainability objectives without green screening mechanisms.

These findings have three key implications. First, policymakers should integrate explicit environmental criteria into Shariah governance frameworks, ensuring that financing decisions exclude environmentally harmful activities and prioritise sustainability-aligned projects. Second, Islamic finance institutions should be incentivised to expand green financial instruments such as green sukuk and sustainability-linked financing that directly channel capital into climate-resilient and low-carbon sectors. Third, cross-sector policy coordination is necessary to align financial regulation, environmental standards, and development strategies to achieve both Shariah-compliant and globally recognised sustainability goals. By reframing Islamic finance not as inherently "green" but as a potentially powerful tool when guided by deliberate environmental mandates, this study contributes to a more critical understanding of the Islamic finance environment nexus. It provides a foundation for designing institutional and policy frameworks that deliver tangible ecological outcomes in the OIC context. Future research could incorporate more detailed environmental metrics, broader institutional and social variables, and longer time horizons to

better capture the multifaceted links between Islamic finance, governance, and environmental sustainability.

Ethical Approval
This research did not require ethical approval.

Informed Consent Statement
This research did not require informed consent.

Authors' Contributions
MMAK led the conceptualization of the study, designed the empirical framework, developed the econometric models, and supervised the overall research process. As the corresponding author, he managed the manuscript submission and revision process. AM contributed to the formulation of the theoretical foundation, literature review, and construction of the governance and sustainability variables. She also drafted the discussion and policy implications sections and contributed to refining the manuscript to meet academic and journal standards

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No potential conflict of interest was reported by the author(s).

Data Availability Statement
The data presented in this study are available on request from the corresponding author due to privacy reasons.

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REFERENCES

Abdullah, N. A. I. N., & Haron, R. (2022). ESG reporting practices among Islamic banks: A global perspective. *IIUM Law Journal*, *30*(S2), 01–36. https://doi.org/10.31436/iiumlj.v30iS2.755

Ahmad, M., Jiang, P., Murshed, M., Shehzad, K., Akram, R., Cui, L., & Khan, Z. (2021). Modelling the dynamic linkages between eco-innovation, urbanization, economic growth and ecological footprints for G7 countries: Does financial globalization matter? *Sustainable Cities and Society*, *70*, 102881.

Akande, A. E. (2022). *Firms' Dynamics of ESG and Islamic Finance-Liquidity, Solvency and Macroeconomic Externalities: A Case Study of OIC Countries* [Master's Thesis, Hamad Bin Khalifa University (Qatar)]. https://search.proquest.com/openview/802388ee385e5d0a483b9325bccad2ad/1?pq-origsite=gscholar&cbl=2026366&diss=y

Alabri, N. S. O. (2021). *The Impact Institutional Ownership on the Firms' Performance: Evidence from Organization of Islamic Cooperation (OIC) Countries* [Master's Thesis, Hamad Bin Khalifa University (Qatar)]. https://search.proquest.com/openview/c4f39c85c8d75de0f309c86d3f0b85cd/1?pq-origsite=gscholar&cbl=2026366&diss=y

Alam, M. K., & Miah, M. S. (2024). Do Islamic banks use institutional theory in the light of Shariah governance? Empirical evidence from a Muslim dominant country. *Heliyon*, *10*(2). https://www.cell.com/heliyon/fulltext/S2405-8440(24)00283-4

Alghafes, R., Karim, S., Aliani, K., Qureishi, N., & Alkayed, L. (2024). Influence of key ESG factors on Islamic banks' financial performance: Evidence from GCC countries. *International Review of Economics & Finance*, *96*, 103629.

Ali, S., Yusop, Z., Kaliappan, S. R., & Chin, L. (2020). Dynamic common correlated effects of trade openness, FDI, and institutional performance on environmental quality: Evidence from OIC countries. *Environmental Science and Pollution Research*, *27*(11), 11671–11682. https://doi.org/10.1007/s11356-020-07768-7

Ali, S., Yusop, Z., Kaliappan, S. R., & Chin, L. (2021). Trade-environment nexus in OIC countries: Fresh insights from environmental Kuznets curve using GHG emissions and ecological footprint. *Environmental Science and Pollution Research*, *28*(4), 4531–4548. https://doi.org/10.1007/s11356-020-10845-6

Ali, S., Yusop, Z., & Meo, M. S. (2022). Asymmetric openness-environment nexus in most open OIC countries: New evidence from quantile-on-quantile (QQ) estimation. *Environmental Science and Pollution Research*, *29*(18), 26352–26370. https://doi.org/10.1007/s11356-021-17473-8

Al-Mulali, U., Ozturk, I., & Lean, H. H. (2015). The influence of economic growth, urbanization, trade openness, financial development, and renewable energy on pollution in Europe. *Natural Hazards*, *79*(1), 621–644. https://doi.org/10.1007/s11069-015-1865-9

Ardianto, A., Cahyono, S., Noman, A. H., & Sulaiman, N. A. (2024). Sharia-supervisory board's characteristics and green banking disclosure: Exploring from Islamic banking in MENA countries. *International Journal of Ethics and Systems*. https://www.emerald.com/insight/content/doi/10.1108/ijoes-06-2024-0171/full/html

Baloch, M. A., Mahmood, N., & Zhang, J. W. (2019). Effect of natural resources, renewable energy and economic development on CO2 emissions in BRICS countries. *Science of the Total Environment*, *678*, 632–638.

Bax, K., Broccardo, E., & Paterlini, S. (2024). Environmental, social, and governance factor and financial returns: What is the relationship? Investigating environmental, social, and governance factor models. *Current Opinion in Environmental Sustainability*, *66*, 101398.

Boudawara, Y., Toumi, K., Wannes, A., & Hussainey, K. (2023). Shari'ah governance quality and environmental, social and governance performance in Islamic banks. A cross-country evidence. *Journal of Applied Accounting Research*, *24*(5), 1004–1026.

Cameron, A. C., & Miller, D. L. (2015). A practitioner's guide to cluster-robust inference. *Journal of Human Resources*, *50*(2), 317–372.

Chaudhry, I. S., Yusop, Z., & Habibullah, M. S. (2022). Financial inclusion-environmental degradation nexus in OIC countries: New evidence from environmental Kuznets curve using DCCE approach. *Environmental Science and Pollution Research*, *29*(4), 5360–5377. https://doi.org/10.1007/s11356-021-15941-9

Dai, Y. (2024). Sustainable investing and islamic finance: Evidence from the organisation of islamic cooperation (OIC) countries. *ISRA International Journal of Islamic Finance*, *16*(1), 41–56.

Fakhrunnas, F., & Anto, M. H. (2025). Environmental commitment and Islamic bank performance: Does management quality matter? *Asian Journal of Islamic Management (AJIM)*, 58–70.

Hadi, A., Yunani, A., Swandari, F., Hayat, A., & Maharani, D. (2025). Integrating ESG into Islamic Investment: A Scoping Review of Challenges and Opportunities. *Asian Journal of Management, Entrepreneurship and Social Science*, *5*(02), 879–905.

Hao, L.-N., Umar, M., Khan, Z., & Ali, W. (2021). Green growth and low carbon emission in G7 countries: How critical the network of environmental taxes, renewable energy and human capital is? *Science of the Total Environment*, *752*, 141853.

Hassan, S. T., Xia, E., Khan, N. H., & Shah, S. M. A. (2019). Economic growth, natural resources, and ecological footprints: Evidence from Pakistan. *Environmental Science and Pollution Research*, *26*(3), 2929–2938. https://doi.org/10.1007/s11356-018-3803-3

Irfany, M. I., Syam, M. I. N., & Haq, D. A. (2024). The impact of Islamic finance on carbon emissions: Lessons from OIC countries. *International Journal of Energy Economics and Policy*, *14*(3), 198–205.

Irfany, M. I., Utami, A. D., Lubis, D., Ramadhini, F., Suwari, L. F., Maula, N. R., & Haq, D. A. (2024). Islamic finance and environmental sustainability: Empirical insight from OIC countries. *International Journal of Energy Economics and Policy*, *14*(6), 707–715.

Islam, M. U., Abdul Hamid, B., & Shahid, M. N. (2025). ESG activities and bank performance with the moderating influence of competition and regulatory quality: A study in the organization of Islamic countries. *International Journal of Islamic and Middle Eastern Finance and Management*, *18*(2), 441–466.

Izhar, H., & Munkin, M. (2021). Islamic Finance and SDG 10: Evidence from Selected OIC Countries. In M. K. Hassan, M. Saraç, & A. Khan (Eds.), *Islamic Finance and Sustainable Development* (pp. 127–149). Springer International Publishing. https://doi.org/10.1007/978-3-030-76016-8_7

Jan, A. A., Lai, F.-W., Asif, M., Akhtar, S., & Ullah, S. (2023). Embedding sustainability into bank strategy: Implications for sustainable development goals reporting. *International Journal of Sustainable Development & World Ecology*, *30*(3), 229–243. https://doi.org/10.1080/13504509.2022.2134230

Jan, A. A., Lai, F.-W., Draz, M. U., Tahir, M., Ali, S. E. A., Zahid, M., & Shad, M. K. (2022). Integrating sustainability practices into islamic corporate governance for sustainable firm performance: From the lens of agency and stakeholder theories. *Quality & Quantity*, *56*(5), 2989–3012. https://doi.org/10.1007/s11135-021-01261-0

Kashi, A., Laallam, A., Nomran, N. M., Abumughli, A. A., & Al-Binali, T. (2024). Do institutional environment and corporate governance structures determine Islamic Banks' sustainability performance? Evidence across key jurisdictions in Islamic finance industry. *Borsa Istanbul Review*, *24*(6), 1088–1100. https://doi.org/10.1016/j.bir.2024.06.005

Khafidh, M., Jajang, J., & Junejo, S. (2025). The Nexus of Environmental Performance and Economic Growth: A Panel Analysis from Organization of Islamic Cooperation Countries. *Muslim Business and Economics Review*, *4*(1), 109–124. https://doi.org/10.56529/mber.v4i1.432

Khan, M. A., Riaz, H., Ahmed, M., & Saeed, A. (2022). Does green finance really deliver what is expected? An empirical perspective. *Borsa Istanbul Review*, *22*(3), 586–593.

Khan, Z., Hussain, M., Shahbaz, M., Yang, S., & Jiao, Z. (2020). Natural resource abundance, technological innovation, and human capital nexus with financial development: A case study of China. *Resources Policy*, *65*, 101585. https://doi.org/10.1016/j.resourpol.2020.101585

Luo, Z., Li, Y., Nguyen, L. T., Jo, I., & Zhao, J. (2024). The moderating role of country governance in the link between ESG and financial performance: A study of listed companies in 58 countries. *Sustainability*, *16*(13), 5410. https://doi.org/10.3390/su16135410

Mohd Zain, F. A., Muhamad, S. F., Abdullah, H., Sheikh Ahmad Tajuddin, S. A. F., & Wan Abdullah, W. A. (2024). Integrating environmental, social and governance (ESG) principles with Maqasid al-Shariah: A blueprint for sustainable takaful operations. *International Journal of Islamic and Middle Eastern Finance and Management*, *17*(3), 461–484. https://doi.org/10.1108/IMEFM-11-2023-0422

Nasreen, S., Mahalik, M. K., Shahbaz, M., & Abbas, Q. (2020). How do financial globalization, institutions and economic growth impact financial sector development in European countries? *Research in International Business and Finance*, *54*, 101247. https://doi.org/10.1016/j.ribaf.2020.101247

Ozturk, I., & Acaravci, A. (2013). The long-run and causal analysis of energy, growth, openness and financial development on carbon emissions in Turkey. *Energy Economics*, *36*, 262–267. https://doi.org/10.1016/j.eneco.2012.08.025

Paltrinieri, A., Dreassi, A., Migliavacca, M., & Piserà, S. (2020). Islamic finance development and banking ESG scores: Evidence from a cross-country analysis. *Research in International Business and Finance*, *51*, 101100. https://doi.org/10.1016/j.ribaf.2019.101100

Pane, J. F. R., & Nainggolan, Y. A. (2024). Board Characteristics And ESG Performance: An Empirical Study Of Public Companies In Indonesia. *Syntax Literate; Jurnal Ilmiah Indonesia*, *9*(11), 6217–6234. https://doi.org/10.36418/syntax-literate.v9i11.16921

Pathan, M. S. K., Ahmed, M., & Khoso, A. A. (2022). Islamic banking under vision of green finance: The case of development, ecosystem and prospects. *International Research Journal of Management and Social Sciences*, *3*(1), 193–210. https://doi.org/10.5281/zenodo.10286958

Rehman, A., Ma, H., Ozturk, I., & Ulucak, R. (2022). Sustainable development and pollution: The effects of CO2 emission on population growth, food production, economic development, and energy consumption in Pakistan. *Environmental Science and Pollution Research*, *29*(12), 17319–17330. https://doi.org/10.1007/s11356-021-16998-2

Sadorsky, P. (2010). The impact of financial development on energy consumption in emerging economies. *Energy Policy*, *38*(5), 2528–2535.

Shahbaz, M., Nasreen, S., Abbas, F., & Anis, O. (2015). Does foreign direct investment impede environmental quality in high-, middle-, and low-income countries? *Energy Economics*, *51*, 275–287.

Solarin, S. A. (2019). Modelling the relationship between financing by Islamic banking system and environmental quality: Evidence from bootstrap autoregressive distributive lag with Fourier terms. *Quality & Quantity*, *53*(6), 2867–2884. https://doi.org/10.1007/s11135-019-00904-7

Tamazian, A., Chousa, J. P., & Vadlamannati, K. C. (2009). Does higher economic and financial development lead to environmental degradation: Evidence from BRIC countries. *Energy Policy*, *37*(1), 246–253.

Tekin, H. (2025). Financial inclusion and sustainable development of banks: The place of organization of Islamic cooperation (OIC) in emerging markets. *Journal of Economic Studies*, *52*(1), 161–178.

Tumewang, Y. K., Almarayeh, T., & Alharasis, E. (2025). Sustainability Committee, External Assurance, and ESG Performance: Empirical Evidence From Banking Industry in Emerging Economies. *Corporate Social Responsibility and Environmental Management*, *32*(2), 2728–2745. https://doi.org/10.1002/csr.3095

Ul Haq, I., Huo, C., & Saba, I. (2025). Economic growth and sustainable development: Evidence from OIC countries. *International Journal of Islamic and Middle Eastern Finance and Management*, *18*(1), 1–22.

Vo, D. H., Ho, C. M., Le, Q. T. T., & Vo, A. T. (2022). Revisiting the energy-growth-environment nexus in the OECD countries: An application of the CS-ARDL approach. *Energy, Sustainability and Society*, *12*(1), 47. https://doi.org/10.1186/s13705-022-00375-z

Wendling, Z. A., Emerson, J. W., de Sherbinin, A., Esty, D. C., Hoving, K., & Ospina, C. (2020). Environmental Performance Index (Yale Center for Environmental Law & Policy). *Yale University*.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press. https://books.google.com/books?hl=en&lr=&id=hSs3AgAAQBAJ&oi=fnd&pg=PP1&dq=Wooldridge,+2010&ots=VZQUkuVZSn&sig=XsdOxIkMYRr_-YoptkYCQQEmohg

Xiangling, L. I. U., & Qamruzzaman, M. (2024). The role of ICT investment, digital financial inclusion, and environmental tax in promoting sustainable energy development in the MENA region: Evidences with Dynamic Common Correlated Effects (DCE) and instrumental variable-adjusted DCE. *Plos One*, *19*(5), e0301838.

Zhang, Y., Khan, I., & Zafar, M. W. (2022). Assessing environmental quality through natural resources, energy resources, and tax revenues. *Environmental Science and Pollution Research*, *29*(59), 89029–89044. https://doi.org/10.1007/s11356-022-22005-z