Islamic Financial Development, Country Risk, and Human Development: Do They Shape Income Inequality in OIC Countries?

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Abstract

Income inequality remains a persistent development issue across member countries of the Organization of Islamic Cooperation (OIC), irrespective of their income level. The Islamic financial system, built upon Shariah principles of fairness, risk-sharing, and ethical finance, offers a viable alternative to conventional systems in addressing inequality. This study investigates the long-run effects of Islamic financial development, human development, and country risk on income inequality in OIC countries and empirically tests the Islamic Financial Kuznets Curve (IFKC) hypothesis. Using balanced panel data from 13 OIC member states over the period 2013–2023, the analysis applies Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS). The results confirm that Islamic financial development significantly reduces income inequality and follows a non-linear (inverted U-shaped) relationship, validating the IFKC hypothesis. Human development exhibits a mixed effect: while DOLS and non-linear models suggest an equalizing impact, FMOLS results indicate that early gains may benefit elite groups disproportionately, reflecting institutional asymmetries. Country risk consistently exacerbates inequality across all models. Moreover, interaction effects reveal that institutional quality moderates the relationship between human development, country risk, and inequality. In some cases, even stronger institutions may fail to ensure equity when they lack inclusivity. These findings highlight the importance of aligning Islamic financial expansion with inclusive governance and social development policies. For policymakers across OIC member states, this implies that sustainable and inclusive growth can only be achieved when financial deepening is integrated with advancements in human development and institutional reform.

1. Introduction

Poverty, inequality, and social vulnerability continue to afflict many member states of the Organization of Islamic Cooperation (OIC), despite efforts aimed at enhancing economic growth and stability. These countries face a unique combination of challenges, including structural economic imbalances, institutional fragility, and uneven development outcomes. Recent data reveals the depth of these issues: Burkina Faso's poverty rate has climbed to over than 40% (World Bank, 2024), Jordan's unemployment rate reached 21% in 2024, and more than 17 million people in Yemen suffer from acute food insecurity, primarily driven by prolonged conflict and systemic instability (Economic Research Forum, 2025; World Bank, 2024).

At the global level, too, disparities in wealth distribution are stark. Gunawan (2024) reports that the wealthiest 10% of people control approximately 76% of global wealth, whereas the bottom 50% possess only 2%. Within members of the OIC, this inequality is even more pronounced, with the richest 10% of the population earning between 52% and 65% of total income, compared to just 5% to 20% for the lower half of the population. These imbalances pose a direct threat to the achievement of sustainable development, especially in regards to poverty alleviation, inclusive employment, and reduced inequality.

The persistent nature of these disparities has exposed the limitations of conventional economic systems in achieving equitable outcomes. As a result, there is a growing interest in exploring alternative financial models that are grounded not only in efficiency but also in ethical and redistributive principles. Islamic finance, with its foundation in maqasid al-shari'ah, offers such a model. It promotes inclusive development through mechanisms that are interest-free, asset-backed, and rooted in risk-sharing, thereby enabling more equitable access to finance. Instruments such as zakat, waqf, and profit-loss sharing contracts like mudharabah and musyarakah serve not only economic functions but also social ones, aiming to enhance justice and reduce inequality (Asrari & Wau, 2023; Kamalu & Ibrahim, 2021; Mohamad *et al*., 2020).

Emerging empirical research indicates that the relationship between Islamic financial development and income inequality may not follow a linear pattern, with variations contingent on factors such as institutional quality, economic structure, and exposure to external shocks (Delener, 1994; Fakhrunnas & Anto, 2023; Mushtaq *et al*., 2024; Ullah *et al*., 2021). This complexity is encapsulated in the Islamic Financial Kuznets Curve (IFKC), which adapts the classical Kuznets hypothesis to

the context of Islamic finance. According to this framework, Islamic finance can initially reduce inequality by expanding access to financial services. However, once a certain threshold is reached, further financial growth may disproportionately benefit capital-rich groups, thereby exacerbating inequality. This phenomenon is akin to the 'finance curse' observed in resource-dependent economies (Khatatbeh *et al.*, 2022; Seresht *et al.*, 2023).

In addition to financial development, human development plays a crucial role in shaping income distribution. The United Nations Development Programme's (UNDP) Human Development Index (HDI) incorporates education, health, and living standards as a comprehensive measure of welfare that extends beyond gross domestic product per capita, and research increasingly shows that higher levels of human development correlate with reductions in income inequality. Enhancements in education and healthcare expand employment opportunities and foster social mobility (Herlambang & Rachmawati 2023; Putri & Wulandari 2022; Zusanti *et al*. 2020). However, the distributive impact of human development may differ depending on institutional capacity and labor market inclusivity, positioning it as a critical moderating factor in the relationship between inequality and finance.

Country risk, which is the risk of investing or lending in a particular country and encompasses economic, political, and financial risk dimensions, has similarly emerged as a structural factor influencing inequality. Recent studies emphasize that countries experiencing higher levels of country risk often face greater income disparities, as macroeconomic instability, weak institutions, and political uncertainty tend to disproportionately affect lower-income households while benefiting capital holders (Chong & Gradstein, 2007; Lee & Lee, 2018; Tebaldi & Mohan, 2010). The integration of country risk into inequality models is increasingly relevant, particularly in emerging and developing economies where policy uncertainty, conflict, and fragile governance can undermine redistributive efforts and financial inclusion.

Despite the growing relevance of Islamic finance, the literature remains limited in several respects. Prior research has predominantly focused on conventional financial systems, often neglecting the ethical and redistributive mechanisms embedded in Islamic finance (Clarke *et al.*, 2006; Law *et al.*, 2014; Sehrawat & Giri, 2015). Moreover, there is a lack of empirical attention to the mediating roles of human development and country risk, which are especially pertinent in the context of OIC countries where institutional weaknesses and developmental asymmetries are common. These factors are critical in shaping the effectiveness of financial

systems and their capacity to deliver equitable outcomes.

Addressing these gaps, this study investigates the long-run relationship between Islamic financial development and income inequality in OIC countries, incorporating the mediating effects of human development and country risk. The study adopts advanced panel estimation techniques, specifically Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS), which are well suited for handling non-linear dynamics, cross-sectional dependence, and heterogeneity among countries. In doing so, this research offers a novel empirical test of the IFKC hypothesis within a framework that explicitly considers both structural and ethical dimensions of financial development.

The findings of this study are expected to provide valuable insights for policymakers and other stakeholders seeking to harness Islamic finance as a tool to reduce inequality and promote inclusive growth. More broadly, the results contribute to the global discourse on sustainable development by highlighting how context-sensitive, ethically-anchored financial systems can support the achievement of equitable economic outcomes in diverse institutional environments. The remainder of this paper is structured as follows: Section 2 reviews the theoretical and empirical literature; Section 3 outlines the data and methodology; Section 4 presents and analyzes the empirical results; and Section 5 concludes with policy implications and future research directions.

2. Literature Review

2.1. Islamic Financial Development

Financial development comprises the institutions, markets, instruments, and regulatory frameworks facilitating efficient financial transactions and credit allocation (World Bank, 2016). Classical theorists such as Kirkpatrick (2000), Schumpeter (1911), McKinnon (1973), and Shaw (1973) have underscored financial development's pivotal role in economic growth via enhanced resource allocation, capital mobilization, and technological innovation. However, empirical studies highlight a nuanced relationship with income inequality. Some scholars suggest financial development can exacerbate inequality by limiting access to privileged groups, imposing high transaction costs on poorer households (Law *et al.*, 2014; Beck *et al.*, 2004; Behrman *et al.*, 2007; and Dollar & Kraay, 2002). Conversely, others argue that inclusive financial systems disproportionately benefit lower-income groups by improving access to finance and reducing poverty (Li *et al.*, 1998; Shahbaz & Islam, 2011).

The complexity of these findings aligns with the Financial Kuznets Curve (FKC) hypothesis by Greenwood & Jovanovic (1990), proposing a non-linear relationship where inequality initially rises with financial development but declines as financial systems become inclusive and mature. Recent studies by Rambey (2018) and Kamalu & Wan Ibrahim (2023) support this inverted U-shaped pattern.

Guided by Shariah principles of risk-sharing, asset-backing, and ethical finance, Islamic financial development presents an alternative model emphasizing financial inclusivity. Islamic financial instruments such as zakat, waqf, and profit-loss sharing arrangements potentially provide greater financial access for marginalized communities, thereby effectively reducing inequality compared to conventional finance systems (Kamalu & Ibrahim, 2021; Mohamad *et al*., 2020). The global Islamic finance sector has expanded significantly, reaching USD 3.96 trillion in assets (DinarStandard, 2023), underscoring its growing relevance as an ethical alternative in financial development. This study extends existing literature by empirically testing the Islamic Financial Kuznets Curve (IFKC) hypothesis within a rigorous econometric framework.

2.2. Human Development

Human development represents a multidimensional approach that incorporates health, education, and living standards beyond income-based metrics like gross domestic product or gross national product (Comim, 2016; Bagolin & Comim, 2008). Higher human development, typically measured by HDI, generally enhances individual capabilities, productivity, and employment opportunities, contributing to reduced income inequality (Setiyaningrum & Erdkhadifa, 2023; Herlambang & Rachmawati, 2023).

Empirical evidence consistently shows improvements in HDI negatively correlate with income inequality (Putri & Wulandari 2022; Zusanti *et al*., 2020). However, the distributional effectiveness of human development investments often depends on institutional quality and labor market conditions. Notably, existing studies have inadequately explored these moderating institutional effects within the context of OIC countries, representing a critical gap. Addressing this, our research explicitly evaluates the moderating role of institutional quality on the human development-inequality nexus.

2.3. Country Risk

Country risk, encompassing economic, political, and financial dimensions, reflects a country's macroeconomic stability, institutional robustness, and political

governance, crucially influencing income distribution (Lee & Lee, 2018; Lee *et al*. 2013; and Hoti 2005). Economic and financial instability typically amplifies inequality, as weaker financial systems and institutions limit equitable resource distribution and increase vulnerability among lower-income groups (Demirgüç-Kunt & Levine, 2009; Furceri & Loungani, 2018). Furthermore, political instability and institutional weaknesses disproportionately benefit wealthier individuals through capital flight and selective policy implementation, intensifying income disparities (Chong & Calderon 2000; Tebaldi & Mohan, 2010).

Empirical findings consistently confirm that higher country risk correlates with greater income inequality, driven largely by weaker institutions and political instability (Chong & Gradstein, 2007; Lee & Lee, 2018). Despite substantial research, the integration of country risk within Islamic finance frameworks remains limited. This study uniquely addresses this gap by empirically examining how country risk affects the Islamic financial development-inequality relationship within OIC contexts.

2.4. Income Inequality

Income inequality, measured primarily through the Gini coefficient, represents disparities in resource distribution among individuals or households within society (OECD, 2019; Sheoran, 2024). Extensive literature has identified the key determinants of income inequality as being financial access, human capital development, and institutional factors. Limited financial access significantly exacerbates inequality by restricting economic participation among poorer populations, whereas inclusive financial systems facilitate more equitable economic outcomes (Bae *et al*., 2012; Wan & Zhou, 2004).

Similarly, studies emphasize the role of human development in reducing inequality, as improvements in education, health, and living standards increase economic participation and social mobility (Putri & Wulandari 2022; Zusanti *et al*., 2020). Institutional and macroeconomic stability, captured through country risk indicators, has also been highlighted as crucial for equitable economic outcomes. Higher levels of instability often exacerbate inequality through policy inefficiencies and capital flight (Chong & Calderon, 2000; Lee & Lee, 2018; and Tebaldi & Mohan (2010).

Despite rich empirical discussions, significant literature gaps persist, particularly regarding interactions among Islamic financial development, human development, and country risk within OIC economies. The present study directly addresses these

gaps by integrating these factors in a unified empirical framework, testing both linear and non-linear (IFKC) relationships, and exploring moderating effects of institutional quality.

3. Methodology

3.1. Data and Variable Measurements

This study employs a balanced panel dataset comprising 13 OIC member countries[1] over the period 2013–2023. These countries were specifically selected based on consistent data availability and their representativeness of the OIC's diverse geographic and economic contexts. Doing so enables the study to empirically assess the relationship between income inequality and three core explanatory variables: Islamic financial development, human development, and country risk, along with several macroeconomic and institutional control variables.

The dependent variable (income inequality) is measured using the Gini Index sourced from the Standardized World Income Inequality Database (SWIID) (Solt, 2022). The Gini Index is a standard measure capturing income disparities within a country, with higher values indicating greater inequality (Chancel *et al*., 2022). The primary independent variable (Islamic financial development) is proxied by the total assets of Islamic banks and other Islamic financial institutions obtained from the Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC) (2020). This measure reflects the financial sector's depth and its potential for inclusive growth based on Shariah-compliant principles. The second independent variable, human development, is represented by HDI from the UNDP database. HDI comprises three key dimensions: education (years of schooling), health (life expectancy at birth), and standard of living (gross national income per capita). Each significantly influences economic opportunities and income distribution (HDR, 2022; Robeyns & Byskov, 2020). Country risk, the third explanatory factor, is measured using the International Country Risk Guide composite index from the PRS Group. This index aggregates political, financial, and economic risks, reflecting macroeconomic stability and institutional effectiveness that critically influence income distribution.

Control variables (Table 1) include population size (sourced from the World Development Indicators [WDI]), inflation (annual CPI change, again sourced from

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[1] Which are Uni Emirat Arab, Saudi Arabia, Nigeria, Kuwait, Turkiye, Pakistan, Malaysia, Indonesia, Brunei, Oman, Jordan, Iran, and Kazakhstan

WDI), institutional quality (average of rule of law, corruption control, voice and accountability, from the World Governance Indicators [WGI]), and environmental degradation (carbon dioxide emissions per capita, sourced from WDI). These factors have well-documented impacts on inequality (Berisha *et al*., 2023; North, 1992).

Table 1. Data and Variable Measurements

Variable	Measurement	Source
Income inequality (LIQ)	Gini Index	SWIID
Islamic Financial development (LTAS)	- Total assets of Shariah-compliant financing - Total assets of Islamic banks	SESRIC, OIC Database
Human development (LHD)	Human development index	HDR UNDP Database, WDI, World Bank
Country risk (CR)	Average of political risk, financial risk, and economic risk	International Country Risk Guide
Population (LPT)	Total population	WDI, World Bank
Inflation (IF)	Consumer price index inflation (annual, %)	WDI, World Bank
Environmental degradation (LCO$_2$)	Carbon emissions (annual, kilotonnes)	WDI, World Bank
Institutional quality (INS)	Average of rule of law, control of corruption, and voice and accountability	WGI

Source: Compiled by author.

3.2. Estimation Strategy

This study applies advanced econometric methods suitable for analyzing panel data with issues of endogeneity, cross-sectional dependence, and heterogeneity. Specifically, Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) estimators are employed to obtain robust and consistent long-run parameter estimates (Tugcu, 2018), with all estimations conducted using STATA 17.

The use of FMOLS and DOLS is preferred over standard OLS due to several econometric issues inherent in panel data analysis. Standard OLS is not suitable for estimating long-run relationships in the presence of non-stationary variables and cointegration, as it produces biased and inconsistent estimates when endogeneity, serial correlation, and cross-sectional dependence exist. FMOLS corrects for these issues through non-parametric adjustments to the error terms, while DOLS incorporates leads and lags of differenced regressors to account for potential endogeneity. These characteristics make FMOLS and DOLS more appropriate and reliable for analyzing long-run equilibrium relationships in cointegrated panel

settings, such as those involving macroeconomic variables across countries.

To ensure methodological rigor, preliminary diagnostic tests are conducted. These include tests for homogeneity (Pesaran & Yamagata, 2008), cross-sectional dependence (Breusch & Pagan, 1980; Pesaran, 2015), stationarity (Cross-sectionally Augmented IPS [CIPS] test) (Pesaran, 2007), and cointegration (Pedroni, 1999). These tests verify model assumptions and guide the selection of appropriate estimation techniques. The FMOLS estimator corrects for endogeneity and serial correlation using non-parametric adjustments, providing consistent estimates of long-run relationships. Conversely, DOLS handles similar issues by incorporating leads and lags of differenced regressors, ensuring robust estimation in finite samples (Kao & Chiang, 2001).

Following Khatatbeh & Moosa (2023), the baseline econometric model specifies income inequality (LIQ) as a function of Islamic financial development (LTAS), human development (LHD), country risk (CR), population (LPT), inflation (IF), environmental degradation (LCO_2), and institutional quality (INS):

$$LIQ_{i,t} = \beta_0 + \beta_1 LTAS_{i,t} + \beta_2 LHD_{i,t} + \beta_3 CR_{i,t} + \beta_4 LPT_{i,t} + \beta_5 IF_{i,t} + \beta_6 LCO2_{i,t} + \beta_7 INS_{i,t} + \mu_{i,t}$$

To investigate the IFKC hypothesis, the model incorporates a non-linear term for Islamic financial development:

$$LIQ_{i,t} = \beta_0 + \beta_1 LTAS_{i,t} + \beta_2 LHD_{i,t} + \beta_3 CR_{i,t} + \beta_4 LPT_{i,t} + \beta_5 IF_{i,t} + \beta6 LCO2_{i,t} + \beta_7 INS_{i,t} + \beta_8 LTAS^2_{i,t} + \mu_{i,t}$$

Here, $LTAS^2$ is the squared term of Islamic financial development, while coefficient β_8 captures the curvature of the relationship. The hypothesis of an inverted U-shaped relationship between Islamic finance and income inequality is supported when $\beta_1 > 0$ and $\beta_8 > 0$

Furthermore, to investigate the moderating role of institutional quality, the study incorporates interaction terms in the following model:

$$LIQ_{i,t} = \beta_0 + \beta_1 LTAS_{i,t} + \beta2 LHD_{i,t} + \beta_3 CR_{i,t} + \beta_4 LPT_{i,t} + \beta_5 IF_{i,t} + \beta_6 LCO2_{i,t} + \beta_7 INS_{i,t} + \beta_8 LTAS^2_{i,t} + \mu_{i,t}$$

In this specification, the interaction term is $(LHD * INS)_{i,t}$ included to assess how institutional quality moderates the impact of human development on income inequality, while $(CR * INS)_{i,t}$ captures the moderating effect of institutional quality on the relationship between country risk and income inequality. The coefficients β_8

and β_9 provide insights into the nature and significance of these moderating effects within the context of OIC countries.

4. Results and Discussion

4.1. Diagnostic Tests

To ensure the robustness and validity of the econometric estimation, several preliminary diagnostic tests were conducted. These diagnostics assess the distributional characteristics of the data, the presence of multicollinearity, heterogeneity in slope parameters, and cross-sectional dependence across countries. The descriptive statistics indicate that all variables fall within reasonable ranges, with no extreme values observed (Table 2). This suggests the absence of outliers that could potentially distort the regression estimates. The mean and standard deviation values of key variables such as Islamic financial development (LTAS and LTAI), human development (LHD), institutional quality (INS), and environmental degradation (LCO_2) align with theoretical expectations, and the sample size of 143 observations for each variable confirms a balanced panel structure. This consistency enhances the credibility and representativeness of the dataset for the 13 OIC member countries under study.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
LIQ	143	3.316	0.132	3.161	3.976
LTAS	143	7.967	2.184	0.63	13.198
LTAI	143	8.261	2.416	1.8	13.372
LHD	143	-0.283	0.133	-0.621	-0.117
CR	143	0.589	0.101	0.373	0.741
LPT	143	17.019	1.1814	12.926	19.454
IF	143	147.489	161.851	19.516	1488.914
LCO_2	143	9.886	1.103	8.764	13.146
INS	143	-0.230	0.573	-1.36	0.784

Source: Author's calculations.

The correlation matrix (Table 3) provides insights into the linear associations among variables. Islamic financial development proxies (LTAS and LTAI) exhibit positive correlations with income inequality (LIQ), at 0.243 and 0.271, respectively. Conversely, human development (LHD) is negatively correlated with LIQ (-0.213), indicating its potential role in reducing income inequality. Additionally, while LTAS and LTAI are moderately correlated with each other (0.732), suggesting overlapping financial dimensions, none of the variables show signs of high multicollinearity.

Most pairwise correlations fall well below the critical threshold of 0.8, confirming that multicollinearity is unlikely to bias the regression coefficients in the estimation models.

Table 3. Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)LIQ	1.000								
(2)LTAS	0.243	1.000							
(3)LTAI	0.271	0.732	1.000						
(4)LHD	-0.213	0.378	0.532	1.000					
(5)CR	-0.042	0.063	0.226	0.086	1.000				
(6)LPT	0.298	-0,134	0.010	-0.596	0.238	1.000			
(7)IF	0.135	0.247	0.561	0.286	0.313	0.527	1.000		
(8)LCO$_2$	0.129	0.226	0.463	0.302	0.362	0.582	0.204	1.000	
(9)INS	-0.183	0.564	0.497	0.786	0.112	-0.587	0.057	0.049	1.000

Source: Author's calculations.

To examine the structural stability across countries, a homogeneity test was performed using the Delta and Adjusted Delta statistics proposed by Pesaran & Yamagata (2008). The null hypothesis of slope homogeneity (Table 4) is rejected at the 5% level based on the Delta statistic (p = 0.027), and at the 1% level for the Adjusted Delta (p < 0.01). These results provide strong evidence of slope heterogeneity across the panel units, justifying the use of estimators that accommodate country-specific differences in the relationship between financial development, human development, and income inequality.

Table 4. Homogenous Test

Null (H2)	Delta	P-value
Homogenous slope	2.164**	0.027
Adj.	3.526***	0.000

***, **&*stand for 1%, 5% &10% level of significance.
Source: Author's calculations.

In addition, the presence of cross-sectional dependence, a common feature in macro panel datasets, was tested using both the Breusch Pagan LM test and the Pesaran CD test. The LM statistics are highly significant (at the 1% level) for all variables (Table 5), confirming strong cross-sectional dependence. The Pesaran CD test further supports this finding for most variables, particularly LTAS, LTAI, LHD, LPT, and LCO$_2$, which all exhibit significant dependence across countries. While the Pesaran CD results for LIQ and INS are statistically insignificant, the LM test indicates significant dependence, suggesting that unobserved common factors may influence these variables across the sample countries.

Table 5. Cross-sectional Dependency Tests

Variables	Breusch-Pagan LM Test	Pesaran CD Test
LIQ	1126.1***	-1.3532
LTAS	627.58***	10.796***
LTAI	574.31***	4.1526***
LHD	1269.3***	21.463***
CR	628.32***	14.836***
LPT	1812.6***	40.231***
IF	383.24***	15.021***
LCO_2	427.26***	18.540***
INS	503.03***	-0.7832

***, **&*stand for 1%, 5% &10% level of significance. L means logarithm.
Source: Author's calculations.

Taken together, the diagnostic test results highlight three critical econometric features of the dataset: (i) absence of outliers and satisfactory data dispersion, (ii) limited multicollinearity among regressors, and (iii) significant slope heterogeneity and cross-sectional dependence. These characteristics justify the application of FMOLS and DOLS estimators, which are robust to these data complexities. As such, the methodological rigor adopted in this study yields efficient and consistent parameter estimates, enhancing the reliability of the empirical findings.

Table 6 presents the results of two panel unit root tests: the Cross-sectionally Augmented Dickey-Fuller (CADF) test and the CIPS test, both developed by Pesaran (2007). These tests are well-suited for panel data characterized by cross-sectional dependence, which was previously confirmed in the diagnostic tests (Table 6). The results suggest that all variables are non-stationary at level but become stationary after first differencing, confirming the presence of unit roots in their level form. An exception is LTAS, which appears to be marginally stationary at level under the CADF test; however, the CIPS test indicates it is only stationary after first differencing. Thus, for consistency, all variables are treated as integrated of order one, I(1).

Table 6. Panel Unit Root Tests

Variables	CADF Test		CIPS Test	
	Level	1st difference	Level	1st difference
LIQ	-1.458	-2.472***	13.176	-2.984***
LTAS	-2.379	-2.357***	0.614	-3.375***
LTAI	-1.732	-2.743***	14.862	-3.821***
LHD	-1.635	-2.631***	1.647	-2.194***
CR	-1.726	-2.164***	0.327	-2.521***
LPT	-1.328	-2.784***	13.684	-4.263***
IF	-1.731	-2.145	15.846	-1.631**

LCO_2	-1.376	-2.374***	10.476	-3.145***
INS	-1.697	-2.850***	-0.528	-3.537***

***, **&*stand for 1%, 5% &10% level of significance. L means logarithm.
Source: Author's calculations.

Following the confirmation of the same order of integration, the long-run equilibrium relationship among the variables is examined using Pedroni (2000) residual-based cointegration test. The results indicate that the null hypothesis of no cointegration is rejected in multiple test statistics (Table 7). Specifically, the panel PP-statistic, panel ADF-statistic, and the group ADF-statistic are all significant at the 1% level. Additionally, the group PP-statistic also rejects the null of no cointegration at the 1% level. Out of the total 11 test statistics reported, at least seven show strong statistical significance, thereby confirming the existence of a long run cointegrating relationship among the variables.

Table 7. Panel Cointegration Tests

Within-Dimension	Statistics	Weighted Statistics	Between-Dimension	Statistics
Panel v-Statistics	-2.976	-4.016*	Group rho-Statistic	57.412***
Panel rho-Statistics	4.891	3.903	Group PP-Statistic	-23.279***
Panel PP-Statistics	27.362***	-14.739***	Group ADF-Statistic	-0.563
Panel ADF-Statistics	-6.013***	-13.826**		

***, **&* stand for 1%, 5% &10% level of significance.
Source: Author's calculations.

Due to the limited time span of the panel data (2013–2023) and the relatively recent development of Islamic financial instruments in many OIC countries, more advanced time-dynamic cointegration tests such as Westerlund (2007) could not be applied. Therefore, Pedroni's residual-based approach was selected as the most appropriate alternative for establishing long-run relationships within the panel structure. Overall, the results from both the unit root and cointegration tests provide strong support for proceeding with long-run estimators such as FMOLS and DOLS, which are consistent under cointegrated panel settings with heterogeneous slopes and cross-sectional dependence.

4.2. Results for Cointegrating Estimators

This study estimates three models with different specifications. First, the baseline model examines the effect of Islamic financial development and human development on income inequality in the OIC. Second, the interaction model evaluates the moderating role of institutional quality on the impact of human development on income inequality in the OIC. Third, the non-linear model that

examines the validity of Islamic financial development Kuznets hypothesis in the OIC.

4.2.1. Result for FMOLS Estimators

Table 8 summarizes the estimation results obtained using the FMOLS estimator across three distinct model specifications. Islamic financial development, measured by total Islamic financing (LTAS), consistently exhibits a significant negative relationship with income inequality at the 1% significance level. Specifically, a 1% increase in LTAS leads to a reduction in income inequality by approximately 0.362% in Model 1 and 0.216% in Model 3. These findings robustly support the theoretical notion that Islamic finance, through its interest-free and equity-based instruments, significantly promotes financial inclusion and reduces economic disparities (Azwar *et al*., 2022; Widodo, 2019). Likewise, in Model 2, total Islamic financial assets (LTAI) show a smaller yet significant negative impact, further validating Islamic finance's role in fostering equitable economic outcomes in OIC countries (Mohamad *et al*., 2020; Putriani & Prastowo, 2019).

Table 8. Results of FMOLS Estimator

	Dependent Variable: Income Inequality (Gini index)		
Variables	Model 1	Model 2	Model 3
LTAS	-0.3623***		-0.2164***
LTAI		-0.0442***	
LHD	4.3175***	2.6833***	1.5162***
CR	0.4728***	0.2115***	0.3312***
LPT	0.0216**	0.1406**	0.3124***
IF	0.3623***	0.5228***	-0.0032
LCO_2	0.6380***	0.2267**	0.2615
INS	-0.5326***	-0.0247	-0.3170**
LHD*INS			0.5841***
CR*INS			0.3228**

***, **&*stand for 1%, 5% &10% level of significance. L means logarithm
Source: Author's calculations..

Intriguingly, human development (LHD) demonstrates positive and highly significant coefficients across all FMOLS models (ranging from 4.3175 to 1.5162 at the 1% significance level). This counterintuitive finding indicates that improvements in health, education, and living standards may initially exacerbate inequality, particularly if these gains accrue to privileged groups. Such outcomes echo earlier findings by Uddin *et al*. (2021), who identified scenarios wherein elite capture or uneven access to development resources amplify inequality, particularly during early phases of socio-economic improvements.

Country risk (CR) consistently shows a significant positive effect on income inequality across models, with coefficients ranging from 0.2115 to 0.4728. This reinforces existing evidence that heightened economic, political, or financial instability disproportionately harms lower-income groups and hinders inclusive economic policies (Lee & Lee, 2018; Lee & Wang, 2021; Pintus *et al.*, 2018). Addressing country risk through targeted governance and economic stability measures thus emerges as critical to promoting equitable income distribution.

Results for control variables provide additional insights. Population size (LPT) is positively and significantly associated with income inequality across all models, aligning with Butler *et al.* (2020), who argue that rapid population growth without corresponding infrastructural and social investments exacerbates disparities. Inflation (IF) significantly increases inequality in Models 1 and 2, corroborating previous findings by Berisha *et al.* (2023) that inflation disproportionately erodes the purchasing power of lower-income groups. Environmental degradation (LCO_2) also exhibits a significant positive impact in Models 1 and 2, aligning with Sarkodie & Strezov (2019), who highlight how environmental challenges disproportionately burden poorer communities.

Institutional quality (INS) consistently indicates that stronger institutions typically reduce inequality, evidenced by significant negative coefficients in Models 1 and 3. Effective governance mechanisms, therefore, appear crucial for achieving equitable economic outcomes, resonating with insights from Stewart *et al.* (2018).

Interaction terms in Model 3 offer further critical insights into institutional dynamics. The positive and significant interaction between human development and institutional quality (LHD*INS) suggests that stronger institutions do not automatically guarantee equitable distribution of human development benefits, particularly in contexts marked by elite dominance or uneven access to resources (Robeyns & Byskov, 2020). Similarly, the positive interaction between country risk and institutional quality (CR*INS) indicates that stronger institutions might sometimes intensify inequality in unstable environments if institutions disproportionately favor elite interests or capital holders, aligning with concerns raised by Lee & Wang (2021).

4.2.2 Result for DOLS Estimators

To validate and enhance the robustness of the previous FMOLS results, this also study employs the DOLS estimator, particularly advantageous for correcting endogeneity and serial correlation issues in panel data analyses. Table 9 presents the estimation outcomes of three DOLS models.

Table 9. Results of the DOLS Estimator

	Dependent Variable: Income Inequality (Gini index)		
Variables	Model 1	Model 2	Model 3
LTAS	-0.0226**		-0.3120***
LTAI		-0.0256***	
LHD	-1.6752***	-1.3508***	-1.1404***
CR	0.5830***	0.3260***	0.2215**
LPT	0.7981**	0.2058**	0.1511**
IF	0.0432	-0.0034*	-0.0032
LCO_2	-0.2142**	0.0255	0.1458***
INS	-0.6229**	0.2114***	0.1636***
LHD*INS			0.1109**
CR*INS			0.0371*

***, **&*stand for 1%, 5% &10% level of significance. L means logarithm.
Source: Author's calculations.

The DOLS findings strongly corroborate the FMOLS outcomes, particularly emphasizing the role of Islamic financial development as a consistent and significant factor in reducing income inequality. Specifically, in Model 1, total Islamic financing (LTAS) demonstrates a statistically significant negative effect at the 5% level, indicating that a 1% increase in LTAS results in approximately a 0.0226% reduction in inequality. This effect is notably stronger in Model 3, where the coefficient's magnitude and significance rise substantially, reinforcing Islamic finance's pivotal role in promoting equitable income distribution. Similarly, Model 2 employs total assets of Islamic financial institutions (LTAI) and yields consistent negative and significant associations, further solidifying Islamic finance as an effective long-term tool to combat inequality.

Distinctively, the human development index (LHD) consistently exhibits a negative and highly significant association with income inequality across all models (coefficients ranging between -1.6752 and -1.1404 at the 1% significance level). These robust findings, contrasting slightly with the mixed FMOLS results, align clearly with Sen's (1999) capability approach, underscoring human development as a critical driver of equitable economic participation and reduced income disparities. The findings resonate with prior empirical studies, highlighting those investments in education, health, and living standards disproportionately benefit disadvantaged populations when institutional environments are conducive.

Country risk (CR) maintains a consistent positive and significant relationship with inequality, reflecting how economic instability, political uncertainty, and poor governance disproportionately impact lower-income population segments. These

outcomes reinforce prior empirical insights (Lee & Lee, 2018) and underline the urgency of targeted macroeconomic stabilization and governance improvements to foster inclusive growth.

Regarding the control variables, population size (LPT) remains positively and significantly linked to inequality across all models, reflecting pressure on public resources and distribution mechanisms. Conversely, inflation (IF) presents a nuanced pattern: insignificant in Model 1 but marginally negative in Models 2 and 3. This suggests that moderate inflation might not inherently worsen inequality, particularly under effective macroeconomic management. Environmental degradation (LCO$_2$) displays varying impacts, with Model 1 indicating a significant negative association, possibly reflecting progressive environmental policies in more equitable contexts. However, its effect turns positive and significant in Model 3, suggesting complexity and context-specific responses that depend heavily on institutional and policy frameworks.

Institutional quality (INS) reveals diverse and critical implications across models. In Model 1, improved institutional quality significantly reduces inequality. However, in Models 2 and 3, the relationship turns positive and significant, signaling potential institutional asymmetries or elite capture scenarios. This result indicates that the distributional effectiveness of institutions heavily depends on their inclusivity and fairness in resource allocation and policy implementation.

The interaction terms introduced in Model 3 further deepens these insights. Specifically, the interaction between human development and institutional quality (LHD*INS) is significantly positive, suggesting that institutional environments characterized by unequal resource distribution might diminish or reverse human development's equity-enhancing effects. Similarly, the interaction term between country risk and institutional quality (CR*INS) yields a positive and weakly significant coefficient, highlighting that institutions may, under certain circumstances, exacerbate inequality rather than mitigate it, particularly if they reinforce existing power dynamics and elite interests (Lee & Wang, 2021).

4.2.3. Results of Non-Linear Models

The results of the non-linear models are presented in Table 10, where four models are estimated using FMOLS (Models 1–2) and DOLS (Models 3–4) estimators. These specifications include the squared terms of Islamic financial development (LTAS^2 and LTAI^2) to examine the validity of the IFKC hypothesis in the context of OIC countries. The results show that the coefficients of Islamic financial development (LTAS and LTAI) are positive and statistically significant across all models, except

for LTAI in Model 4, which is positive but not significant. In contrast, the squared terms (LTAS² and LTAI²) are negative and statistically significant, confirming a non-linear (inverted U-shape) relationship between Islamic financial development and income inequality. These findings provide strong support for the IFKC hypothesis, in line with the conventional Kuznets theory (Greenwood & Jovanovic, 1990) and consistent with recent studies by Khatatbeh & Moosa (2023) and Kim & Lin (2011).

Table 10. Results of Non-Linear Models

	Dependent Variable: Income Inequality (Gini index)			
Variables	Model 1	Model 2	Model 3	Model 4
LTAS	4.7668***		0.1346***	
LTAI		0.2906***		0.0274
LHD	-1.5809***	0.2621	-0.6011**	-1.1375**
CR	0.0532***	0.2743**	0.1731***	0.0429**
LPT	0.7265***	0.1483**	0.2115***	0.0654
IF	0.3980***	0.0028*	3.0141	-0.0032
LCO_2	0.6170***	0.0189	0.0278*	0.1476**
INS	-0.0342***	0.0672	-01171*	-0.1793***
LTAS²	-3.1041***		-0.0083***	
LTAI²		-0.0780***		-0.0025*

***, **&*stand for 1%, 5% &10% level of significance. L means logarithm.
Source: Author's calculations.

The empirical confirmation of an inverted U-shaped relationship implies that Islamic financial development initially contributes to rising inequality, likely due to access barriers or elite financial capture during early phases of expansion. However, as Islamic finance matures and expands its reach through ethical finance instruments targeting underserved populations, it begins to reduce inequality. This non-linear result supports the view that sustained and inclusive Islamic financial development is necessary to unlock its full potential in promoting equity. Policymakers should thus avoid making premature conclusions during early growth stages and instead focus on expanding the sector's inclusivity.

The results further show that human development (LHD) has a negative and statistically significant impact on income inequality in Models 1, 3, and 4. This suggests that improvements in education, health, and living standards contribute to reducing income disparities in OIC countries. Although insignificant in Model 2, the dominant pattern is in line with expectations and consistent with earlier findings (Tables 8 and 9). In addition, country risk (CR) continues to show a positive and statistically significant effect on income inequality in all four models. This indicates that higher levels of political, economic, or financial risk exacerbate income disparities, as previously established in FMOLS and DOLS results. These findings are

consistent with Lee & Lee (2018) and Pintus *et al*. (2018), who argue that country-level uncertainty limits investment, weakens institutions, and disproportionately affects the poor, thereby worsening inequality. Overall, the non-linear models reinforce the robustness of earlier findings and provide strong evidence for the non-linear relationship between Islamic financial development and income inequality. The models also highlight the persistent impact of human development in reducing inequality and country risk in amplifying it, underlining the need for integrated policy strategies that combine financial inclusion, social investment, and macro-political stability.

4.3. Discussion

The cointegration test results confirm the presence of a long-run relationship among Islamic financial development, human development, country risk, institutional quality, and income inequality in OIC countries. This statistically validates the adoption of long-run estimators, namely FMOLS and DOLS, to explore the structural dynamics of inequality in these economies. The results from both estimators consistently reveal that Islamic financial development, measured through total Islamic financing (LTAS) and total Islamic financial assets (LTAI), plays a significant role in reducing income inequality in the long run. These findings reinforce the theoretical argument that Islamic financial instruments, being interest free, profit and loss sharing based, and collateral independent, create access to capital for underserved groups, particularly micro, small, and medium enterprises and low-income households (Azwar *et al*., 2022; Baber, 2018; Wray *et al*., 2023). This financial inclusion leads to broader participation in economic activity, thereby narrowing income disparities and supporting the inequality-narrowing hypothesis of Greenwood & Jovanovic (1990).

The role of human development, however, exhibits contrasting patterns across estimators. Under FMOLS, human development shows a positive and significant effect on income inequality, suggesting that in some OIC countries, early gains in education and health may disproportionately benefit elite or urban groups, thus widening the income gap. On the other hand, under DOLS, human development consistently exhibits a negative and significant coefficient, confirming its equalizing effect. These findings are consistent with Sen's capability approach, which argues that enhancing people's basic capabilities enables greater agency, employment in high-value sectors, and, eventually, a fairer income distribution (Ferreira *et al*., 2022; Qasim *et al*., 2020). Country risk is another important determinant that shows a robust positive association with income inequality in all models. Political instability,

financial uncertainty, and poor economic governance create environments where low-income populations are most exposed to shocks, while the wealthy can insulate themselves via asset mobility and institutional influence. These results align with Lee & Lee (2018), Lee & Wang (2021), and Pintus *et al*. (2018), who emphasize that country-level risk undermines equitable development and disproportionately harms vulnerable groups.

In terms of institutional quality, results across both estimators are mixed. FMOLS results indicate that stronger institutions reduce inequality, while DOLS estimations sometimes yield positive coefficients, suggesting that institutional structures in some OIC contexts may benefit dominant groups more than the broader population. These findings highlight the potential for institutional asymmetry where formal rules exist but enforcement or access remains skewed.

Importantly, Model 3 in both FMOLS and DOLS includes interaction terms to test the moderating effect of institutional quality on the relationships between human development, country risk, and income inequality. The results show that the interaction between human development and institutional quality is positive and significant in both estimators. This indicates that, paradoxically, in settings with stronger institutions, human development may have a less equalizing or even adverse effect on income distribution. A plausible explanation lies in institutional capture or limited inclusivity, where formal institutions are present, but development gains are disproportionately captured by elites. Thus, institutional quality, while necessary, is not a sufficient condition for equity unless paired with inclusive policies and fair access mechanisms (Robeyns & Byskov, 2020; Stewart *et al*., 2018). Similarly, the interaction between country risk and institutional quality also shows a positive and significant coefficient, suggesting that stronger institutions do not always mitigate the negative impact of country risk on inequality. In some cases, strong institutions may even exacerbate inequality, especially where institutions are designed or co-opted to shield the interests of the elite. These findings underscore the complexity of institutional dynamics and highlight the need for governance reforms that are not only robust in form but also inclusive in practice.

Finally, the non-linear model results further enrich the analysis by confirming the IFKC hypothesis. The positive and significant coefficients of total Islamic financing and total Islamic financial assets, combined with the negative and significant squared terms ($LTAS^2$ and $LTAI^2$), suggest an inverted U-shaped relationship between Islamic financial development and income inequality. This implies that in the early stages, Islamic finance may initially increase inequality due to limited

reach and market immaturity. However, as the sector matures and improves access, it eventually contributes to more equitable income distribution. This is consistent with the original Kuznets hypothesis (Greenwood & Jovanovic, 1990) and empirical support from Khatatbeh & Moosa (2023) and Kim & Lin (2011). The results from FMOLS, DOLS, and non-linear specifications reveal that Islamic finance can serve as a powerful tool for reducing inequality in OIC countries, particularly when accompanied by human capital investment and sound institutions. However, the effectiveness of these drivers is contingent on the quality and inclusiveness of institutional frameworks, which can either amplify or weaken their impacts. This highlights the need for targeted, equity-focused reforms that integrate financial, human, and institutional development agendas to achieve sustainable income distribution in the region.

5. Conclusion and Recommendations

5.1. Conclusion

This study investigates the impact of Islamic financial development, human development, country risk, and institutional quality on income inequality in 13 OIC member countries using annual data from 2013 to 2023. The analysis employs both FMOLS and DOLS estimators, supported by panel cointegration and non-linear modeling techniques. The findings reveal that Islamic financial development, measured through total Islamic financing and total Islamic financial assets, significantly contributes to reducing income inequality in the long run. These results validate the theoretical expectation that Shariah-compliant financial services enhance access to capital and foster inclusive economic growth. We also find evidence that human development reduces income inequality, particularly in the DOLS and non-linear models, which aligns with the capability approach to development.

Furthermore, country risk consistently appears as a key driver of rising income inequality in OIC countries, highlighting the importance of macroeconomic and political stability in achieving equitable outcomes. The role of institutional quality is mixed but generally supports the notion that stronger governance frameworks can reduce inequality. However, in some contexts, institutional strength alone may not be sufficient to deliver inclusive development. Importantly, the study also establishes the validity of the Islamic Finance Kuznets Curve (IFKC) hypothesis in the OIC. The non-linear models show that the relationship between Islamic financial development and income inequality follows an inverted U-shape, suggesting that

inequality initially increases at early stages of financial development but declines as the sector matures and access broadens.

5.2. Policy Implication

The outcomes of this study carry important policy implications for governments, regulators, and stakeholders across the OIC member countries. Tackling income inequality remains a critical challenge regardless of the stage of development. Although it may not be possible to eliminate income disparities entirely, narrowing the income gap is a fundamental objective of sustainable development. In this context, the findings of this study offer several actionable recommendations. First, the strong and consistent evidence that Islamic financial development reduces income inequality suggests that policymakers should strengthen the infrastructure and ecosystem of Islamic finance. This includes expanding the reach of Islamic banking by improving physical access, especially in rural and underserved areas. It is equally important to develop supporting components such as sukuk and takaful to create a diversified and resilient Shariah-compliant financial system. Governments of OIC countries should also create a level playing field that enables Islamic financial institutions to compete effectively with their conventional counterparts through supportive regulations and targeted incentives.

Policymakers and financial industry players are encouraged to invest in capacity building by hiring and training skilled professionals capable of innovating and delivering a wide range of Shariah-compliant financial products tailored to the needs of different socio-economic segments. Furthermore, regulators and policymakers should incentivize Islamic financial institutions to allocate a portion of their financing portfolios to micro, small, and medium enterprises, particularly in vulnerable and low-income communities. Establishing Islamic finance institutions, such as microfinance banks, in rural and remote regions can also significantly enhance financial inclusion and bridge the income divide. In addition, leveraging financial technology offers great potential to improve the accessibility and affordability of Islamic financial services. Digital platforms can streamline outreach and reduce operational costs, particularly in geographically dispersed communities, although they also require infrastructure and institutional support. Furthermore, redistributive instruments rooted in Islamic principles, such as zakat and waqf, should be institutionalized and integrated into national poverty alleviation frameworks to maximize their impact.

Second, the findings that human development contributes to reducing income inequality, especially in the DOLS and non-linear models, reinforce the urgency

for OIC countries to prioritize human capital development. Policies should focus on improving quality and accessibility of education, especially for disadvantaged populations. Equipping people with relevant skills and knowledge will expand their access to higher-paying jobs, promote entrepreneurship, and enhance their capacity to innovate, all of which contribute to more equitable economic structures. Additionally, given the fragilities revealed by the COVID-19 pandemic, greater investment in the healthcare sector is essential. Ensuring universal access to quality healthcare services will improve the well-being and productivity of the labor force, particularly among lower-income households. Health equity is not only a moral imperative but also a crucial lever for economic inclusion.

Third, since country risk is found to exacerbate income inequality, policymakers should implement strategies that strengthen macroeconomic and political stability, including improvements in governance, fiscal discipline, and conflict resolution. Reducing economic uncertainty will improve investment climates, enhance access to services, and reduce the structural vulnerabilities that disproportionately affect the poor. Lastly, the confirmation of the IFKC implies that Islamic financial development has a non-linear relationship with inequality. While inequality may rise in the early stages, it will decline once financial access improves. Therefore, policies should aim not only to grow the sector but also to accelerate outreach and inclusivity. This calls for targeted expansion of Shariah-compliant finance into sectors and regions that are typically excluded, ensuring that the benefits of financial development are distributed more equitably.

5.3. Limitations and Future Research

This study is limited by the availability of long time series data, which restricts the sample to 13 out of 57 OIC countries. Future research should aim to expand coverage by including more OIC member states and utilizing longer timeframes. Moreover, the proxies used for Islamic financial development (LTAS and LTAI) do not fully capture the diversity of the Islamic financial system. Hence, future studies should consider incorporating other instruments such as sukuk, waqf, and takaful for a more comprehensive analysis. Lastly, the unexpected positive moderating effects of institutional quality on human development and country risk warrant deeper investigation. Future research should explore this further using disaggregated institutional indicators and alternative methodologies.

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