THE EFFECT OF ISLAMIC FINANCIAL DEVELOPMENT AND HUMAN DEVELOPMENT ON INCOME INEQUALITY: DOES ISLAMIC FINANCE KUZNETS CURVE VALID IN THE OIC COUNTRIES?

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ABSTRACT

Income inequality is evident in all countries regardless of the level of development or income status. Islamic financial system has Shariah-compliant financial instruments that, when properly utilized, can facilitate equitable income distribution in the OIC member countries. This study examines the effect of Islamic financial development and human development on income inequality in the OIC. The study also analyzes the validity of the Islamic finance Kuznets curve hypothesis. We employ FMOLS and DOLS estimators with data from 20 OIC member countries covering the period from 2012 to 2022. The results show that Islamic financial development promotes equitable income distribution. There is also limited evidence that human development reduces income inequality. Finally, we confirm the validity of the Islamic finance Kuznets curve hypothesis. Thus, to reduce the income gap in the OIC, Islamic financial institutions should expand further via for examples innovation in Shariah-compliant Islamic financial products and services. In addition, policymakers should prioritize policies and programs that can promote Islamic financing and improve human development in the OIC member countries.

I. INTRODUCTION

Islam, as a divine religion, believes that the ideal society is one whose foundation is built on spirituality, equity, righteousness, and morality, as opposed to the Western-centrism that the liberal democratic system is the best form of government that guarantees freedom, growth, and development (Hassan et al., 2020). Nearly every country globally has persistent income and wealth inequality, even the best democratic countries (Khatatbeh & Moosa, 2023). Currently, 52% of the world income is held by only 10% of the world population, while meagerly 8.5% of the income is by the bottom half of the population. The global wealth distribution is even more unequal, as the bottom 50% of the world population barely controls 2% of the global wealth. The Middle East and North Africa (MENA) and Sub-Saharan Africa, predominantly members of the Organization of Islamic Cooperation (OIC), have the most unequal income distribution in the world. In the MENA region, only 10% of the population enjoys 56% of the income, whereas Africa's top 10% has 49% share of the total income (Chancel et al., 2022; Robilliard, 2022)

It is apparent that there exists a wide income gap between the rich and poor globally, where the current conventional economic and financial system has failed to address (Wray et al., 2023). However, the Islamic financial system is based on divine principles that aim to achieve an egalitarian society, through various means of redistribution of income from the rich to the poor, such as compulsory and voluntary alms (zakat and Sadaqat), endowment (waqf), and interest-free benevolent loans (Qard Hasan). Moreover, the Islamic financial system facilitates access to interest-free funds using Shariah-compliant Islamic financial instruments, such as profit sharing (Mudharabah), partnership (Musharakah), leasing (Ijarah), insurance (Takaful), Islamic bond (Sukuk), among others. When properly utilized, these instruments provide access to finance to small and medium-scale enterprises to expand their businesses or start a new project, especially those that find it difficult to obtain loans from traditional financial systems (Kamalu & Wan Ibrahim, 2021). As a result, the income gap between the rich and the poor can be significantly reduced, unlike the conventional financial system that requires collateral security and is based on interest rate (Purwanto et al., 2021).

The equitable distribution of income and wealth is given more weight in the Islamic Shariah system than in the Pareto optimality, as compulsory alms to the poor by people within a particular income threshold is one of the five pillars of Islam. According to Pareto efficiency, it is inefficient to improve the lives of millions of the poor while making a single rich person worse off. Overly relying on achieving Pareto efficiency in conventional economics hinders the development of policy change on equality and morality, exacerbating income inequality and poverty, especially in developing countries (Shaikh, 2018).

The Islamic financial sector is growing rapidly and penetrating the global markets, establishing its presence even in non-Muslim countries. S&P Global Ratings (2022) report that the global Islamic finance industry, excluding Iran, expanded rapidly at 10% to 12% between 2020 to 2022, with a global market value of over $2.2 trillion. The Covid 19 pandemic ignites the expansion and development of the Islamic Fintech market, which provides online access to innovative Islamic financial services. Although the total asset of the traditional financial sector is by far greater than that of the Islamic financial industry, the credit constraints due to lack

of collateral and rising interest, which are absent in the Islamic financial system, continue to increase an income gap even in the Muslims majority countries.

Conventionally, human development is centered on enlarging people's choices and freedom to achieve higher societal well-being (Kamalu & Wan Ibrahim, 2022). The United Nations Development Program (UNDP), under the supervision of Mahbub Ul Haq, Amartya Sen, and others, came up with a human development report in 1990. The report that provides an alternative measure of development, the "Human Development Index" (HDI), is considered a comprehensive measure and it is better than the classical GNP/GDP per capita. The HDI is constructed using three dimensions (1) knowledge, (2) healthy life, and (3) income indices. However, the main goal of human development in Islam is to protect and foster human dignity, justice, and freedom, regardless of gender, ability, age, religion, and race, to attain the highest level of human development in life and hereafter. Thus, human development in Islam goes beyond HDI, as it considers not only the socio-economic and political aspects but also the spiritual, moral, and cultural aspects of well-being (Uddin et al., 2021). Nonetheless, the Muslim world as a whole performs below average compared to the rest of the globe on the majority or all of the human development dimensions (SESRIC, 2020).

This study examines the effect of Islamic financial development and human development on income inequality in the OIC member countries. Previous empirical studies have mostly been carried out for conventional financial system, with limited studies on the Islamic financial system due to inadequate data (Baber, 2018). Hence, this study makes an essential contribution to the literature by examining the Islamic financial development-income inequality nexus in the OIC. This study also explores the non-linear relationship between Islamic financial development and income inequality to test the Islamic Finance Kuznets Curve (FKC) hypothesis in the OIC. The Financial Kuznets curve captures a non-linear relationship between financial development and income inequality (Greenwood & Jovanovic, 1990). Thus, this study uses the FKC but substitutes conventional finance with Islamic finance, to see whether the hypothesis is still valid. Moreover, this study argues that the effect of human development on income inequality may be indirect, conditioned upon the influence of quality institutions. Thus, we make another significant contribution by evaluating a moderating role of institutional quality in the relationship between human development and income inequality in OIC. In addition, this study employs cointegrating estimators, namely the Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) estimators. These estimators account for heterogeneity, endogeneity, and cross-section dependency while producing efficient estimators (Tugcu, 2018).

The rest of the study is organized as follows. In section 2, the study reviews related theoretical and empirical literature. In section 3, the study discusses data and methodology, and in section 4, the results are discussed. Lastly, the study concludes and highlights relevant policy implications in section 5.

II. LITERATURE REVIEW

2.1. Theoretical Literature

The idea that financial development determines economic growth is attributed to Schumpeter (1911), McKinnon (1973), and Shaw (1973) and developed in the work of Levine et al. (2014). These studies have established that financial development significantly generates robust economic growth by efficiently allocating financial resources. Also, Greenwood (1997) opines that the adoption of technology by financial institutions will increase financial access, coverage, innovation, invention, and entrepreneurship, promoting long-run economic growth. Many studies emphasize a linear relationship between finance and growth. However, Greenwood & Jovanovic (1990) predict a non-linear relationship between finance, growth, and income inequality, known as the financial Kuznets curve (FKC) hypothesis. Using the framework of Kuznets (1995), Greenwood & Jovanovic (1990) formulate the FKC hypothesis.

According to the FKC hypothesis, when a financial sector is growing, it will harm inclusive economic growth because only wealthy individuals have access to financial services, hence widening income inequality. This hypothesis is known as the inequality widening hypothesis. Subsequently, as the economy continues to expand and grow, financial services become more available and accessible to all, and human capital substitutes physical capital in the production process, income inequality will narrow in the economy. This hypothesis is known as the income inequality narrowing hypothesis. However, the theoretical literature on Islamic finance establishes that Islamic financial instruments based on Shariah compliance increase access to financial services, thereby closing the income gap between the rich and poor better than in the conventional financial systems (Kamalu & Wan Ibrahim, 2021; Mohamad et al., 2020). Therefore, this current study examines the effectiveness of these Islamic finance instruments in reducing the income gap between rich and poor in the OIC.

The approach to human development, as proposed by Sen (1989) is a significant departure from the generally held view by classical economists that growing per capita income is the primary goal of development, which will improve living standards, alleviate poverty, and narrow income inequality. The capability approach focuses on achieving "functioning" and the freedom of individuals to choose between different capabilities. This approach considers what people can "do" and "be," as well as how resources are transformed into different capabilities, which may result in achieving different "functionings" in life. Therefore, the capability approach places human well-being at the forefront of all development agendas for a healthy life, knowledge, and decent life (Stewart, 2019). This approach is frequently employed to examine the effect of macroeconomic variables like poverty, income equality, and other variables that directly or indirectly determine human welfare. Thus, this study uses the capability approach as a framework to examine the effect of human development on income inequality in the OIC.

2.2. Empirical Literature

The empirical literature on the effect of financial development on income inequality reports mixed results. The first strand of studies reports that financial

development reduces income inequality (Khatatbeh et al., 2022; Khatatbeh & Moosa, 2023; Kuscuoglu & Cicek, 2021; Odhiambo, 2020; Shahbaz et al., 2015; Thornton & Tommaso, 2020; Zhang & Ben Naceur, 2019). Secondly, the study by Chiu & Lee (2019) find that higher financial development decreases income inequality in higher-income countries but widens income inequality in countries with low income. Kebede & Tawiah (2023) reveals that financial globalization increases the income gap in countries at lower quantiles while reducing income inequality in countries at higher quantiles. The study by Shahbaz et al. (2017) shows that financial development promotes income inequality in Kazakhstan. Available empirical evidence reports that Islamic finance has a decreasing effect on income inequality (Agustina et al., 2023; Bashir, 2018; Mohamad et al., 2020; Putriani & Prastowo, 2019).

Other strands of literature reveal that compulsory alms (zakat) have a negative and significant impact on income inequality, but Islamic banking development promotes income inequality (Kamal et al., 2021; Widodo, 2019). Also, Azwar et al., (2022) find an insignificant negative effect of Islamic finance on income inequality in Indonesia. The empirical evidence available also confirms the non-linear relationship between financial development and income inequality (Khatatbeh et al., 2022; Kim & Lin, 2011; Kuscuoglu & Cicek, 2021; Shahbaz et al., 2015). Even though most of the studies focus on the effect of income inequality on human development, the few studies that examine the impact of human development on income inequality report that human development has a negative and significant effect on income inequality (Ferreira et al., 2022; Qasim et al., 2020; Sarkodie & Adams, 2020; Yasmeen et al., 2011).

The available empirical evidence reviewed in this study reveals mixed findings, and the majority of these studies are carried out for either developed or developing countries, where not much attention is given to the OIC member countries. In addition, only a few studies examine Islamic finance-inequality nexus; thus, this current study contributes to the empirical literature in this direction. Moreover, all the studies that validate the Finance Kuznets Curve (FKC) hypothesis is based on the traditional financial sector. However, this current study fills this gap by exploring the Islamic finance Kuznets curve hypothesis in the OIC.

III. METHODOLOGY AND DATA
3.1. Data and Measurements
This study uses data from 20 out of 57 OIC member countries with available annual data covering 2012 to 2022. Income inequality as our dependent variable. The independent variables of interest are Islamic financial development and human development. The control variables include population, inflation, environmental degradation, and institutional quality. Details of the variables are as below:

Income Inequality: Income inequality is the dependent variable in this study and is measured using the Gini index. The term income inequality refers to the uneven income distribution among people. It is an indicator that portrays how income is shared among the population. It also shows the gap in income distribution between high, middle, and low-income groups. Thus, the more unequal income distribution, the higher the income inequality (Chancel et al., 2022). In addition,

666

The Effect of Islamic Financial Development and Human Development on Income Inequality: Does Islamic Finance Kuznets Curve Valid in the OIC Countries?

inequality can also manifest in wealth inequality, which indicates how unequal wealth distribution is in a society. Moreover, the income gap can be between genders, where men earn more than women; or due to race, where a particular race gets higher income; or because of a social class in a class society; or because of ethnicity, location, and occupation. The most widely used measure of income inequality is the Gini index, which serves as a medium for comparing countries and regions across the globe. The higher the Gini index value, the more unequal the income distribution. The Gini index data is obtained from the Standardized World Income Inequality Database (SWIID) by Solt (2022).

Islamic Financial Development: Islamic financial development is the first variable of interest in this study, proxied by total Shariah-compliant financing and total assets of Islamic banks and other financial institutions. The data is obtained from The Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC, 2022), the OIC database. The most crucial difference between Islamic and traditional financial instruments are the interest rate, and collateral, which are totally abhorred in the Islamic financial system. Islam strongly condemns and prohibits interest rates (Kamal et al., 2021). Hence, Islamic financial instruments are interest-free, require no collateral, and never finance unethical businesses. These instruments are divided into three: Firstly, redistribution instruments: such as compulsory alms (zakat), voluntary alms (Sadaqat), and free loans (Qard Hasan). As a redistributive tool, these instruments redistribute wealth from haves to have-nots, reducing the income gap between rich and poor (Widodo, 2019).

Moreover, Qard Hasan is a loan without any collateral, interest, or profit; thus, it provides funds to people to venture into business and pay back at an agreed period, narrowing the income gap in society. Secondly, the equity-based instruments are profit-loss sharing (Musharakah) and profit sharing (Mudharabah). These instruments perform an intermediary function or partnership and provide financial access to people hitherto outside the financial system, based on profit-loss sharing or profit-sharing, capable of narrowing income inequality. Thirdly, debt-based instruments, which include Islamic bonds (Sukuk), cost-plus instruments (Murabaha), Islamic insurance (takaful), and leasing (Ijarah). These instruments are backed by Shariah-compliant assets, which provide a good source of funds to firms and governments that boost economic growth and reduce the income gap in a society (Bashir, 2018; Mohamad et al., 2020).

*Human development***:** Human development is the second variable of interest in this study, proxied with the human development index (HDI) by the UNDP in the annual human development report (HDR) since 1990. The HDI is built using three dimensions: knowledge, longevity, and decent living. The knowledge dimension is measured using a human capital index, with average years of schooling and average years of completion; the longevity dimension is measured with a life expectancy at birth; decent living with an income per capita. An increase in school enrolment and completion significantly affects the income distribution in a society. Also, a healthy population increases productivity, and income, consequently inclusive growth, which promotes equitable income distribution (Robeyns & Byskov, 2020; HDR, 2022). Thus, this study argues that increasing human

development will reduce income inequality in the OIC. The data is obtained from HDR, UNDP database.

*Control Variables***:** This study uses five control variables deemed essential determinants of income inequality. Firstly, we use population as the control variable, measured using population growth. The population is an important determinant of income distribution. Theoretically, an increase in population increases income inequality, as the GDP divided by the total population is the per capita income. Thus, the lower the population, the higher the per capita income, and the lower the income inequality. However, a population can reduce income inequality through quality education and a sound healthcare system (Chancel et al., 2022). Inflation is the second control variable, measured using the rate of change in the consumer price index (annual %). Inflation is an important factor as it influences all macroeconomic variables. Inflation may have a negative or positive impact on income inequality, depending on the initial level of income inequality. Higher inflation increases income inequality when the inequality is relatively low. At higher levels of income inequality, a higher inflation rate does not affect inequality (Berisha et al., 2023). However, evidence shows that inflation's effect is higher for people at the bottom of the income distribution than those at the top (Wimer et al., 2019).

The third control variable is institution, proxied by institutional quality. A quality institution facilitates equitable income distribution through fiscal and monetary measures, provision of essential services, and controlling corruption and mismanagement (North, 1992). The institutional quality index is constructed with the average of three important governance indicators, which include the rule of law, control of corruption, and voice and accountability. The data is obtained from World Governance Indicators, the World Bank database. The fourth control variable is environmental degradation. Environmental degradation is proxied by carbon dioxide (CO_2) per capita. Environmental degradation may exacerbate income inequality as poor people are the most affected by the troubles of environmental pollution (World Bank, 2023). The study also uses GDP per capita for robustness to human development. Increasing GDP per capita signifies a reduction in income inequality when the growth is inclusive, and vice versa, when the growth is concentrated in the hands of a few (Gillman et al., 2019; Kouadio & Gakpa, 2022). The control variables' data are obtained from the World Bank database.

Table 1.
Variables and Measurements

Variable	Measurement	Sources
Income inequality (LIQ)	Gini Index	SWIID
Islamic Financial development (LTAS)	-Total asset, Sharia-compliant financing. -Total asset of Islamic banks	SESRIC, OIC Database
Human development (LHD)	-Human development index -GDP per capita	HDR, UNDP Database WDI, World Bank
Population (LPT)	Total population	WDI
Inflation (IF)	Consumer price (annual %)	WDI
Environmental degradation (LCO2)	Carbon emission (kt)	WDI
Institutional Quality (INS)	The average of: Rule of law, control of corruption & voice and accountability	WGI

Notes: SWIID stands for the Standardized World Income Inequality Database; SESRIC is the Statistical, Economic and Social Research and Training Centre for Islamic Countries; HDR is the Human Development Report; WDI is the World Development Indicators; WGI is the World Governance Indicators.

3.2. Estimation Strategy

To achieve the objectives of this study, we use Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) estimators to estimate our models. These estimators account for endogeneity, heterogeneity, and cross-section dependence, at the same time achieving consistency and efficiency (Tugcu, 2018). Before evaluating our models, the following diagnostic tests are carried out on our data. Apart from the regular descriptive statistics and correlation matrix, the study undertakes homogeneity tests, cross-sectional dependence tests, unit root tests, and cointegration tests.

3.2.1. Homogeneity Test

The homogeneity test is one of the most important diagnostic tests in a panel data analysis. The test determines whether the slope coefficients are homogeneous or heterogenous. Pesaran & Yamagata (2008) provide a homogenous test with cross-sections (N) greater than the time dimension (T) in a standard normal distribution (N, T→ ∞). The test has a null hypothesis (H0) of homogeneity.

3.2.2. Cross-Section Dependence Test

Before conducting a panel data estimation, a cross-section dependence test is among the essential diagnostic tests to determine whether the variables have cross-section dependence or are cross-sectionally independent. Panel data can exhibit widespread cross-sectional dependence due to certain unobserved common factors that are common to all units and affect each of them differently (De Hoyos & Sarafidis, 2006). There are various cross-sectional dependence tests, but the most notable are Breusch & Pagan (1980) LM test and Pesaran (2015) CD test. Whenever the cross-sections (N) are finite, the LM tests performs better than the Pesaran CD test. However, the Pesaran CD tests perform well in a panel with small N

and large T or small N and T (Tugcu, 2018). The null hypothesis (H_0) states that the cross-sections are cross-sectionally independent. If the null is rejected, cross-section dependence exists across the panel, and subsequent methods to apply must account for the cross-sectional dependence.

3.2.3. Stationarity Tests

The panel unit root test is the next crucial test to be carried out after the cross-sectional dependence test. Panel stationarity tests are of two types, first and second-generation tests. First-generation tests are specified based on the assumption of cross-sectional independence. Thus, panel unit root tests such as IPS by Im et al. (2003), Levin et al. (2002), and Maddala & Wu (1999) are first-generation tests that ignore any dependency across the panel. The panel unit root tests categorized under the second-generation account for cross-sectional dependence across panels. Examples of second-generation tests include Covariate Augmented Dickey Fuller (CADF) and Cross-sectional IPS (CIPS) tests by Pesaran (2007) and Bai & Ng, (2005) test, among others. These tests have a null hypothesis of a unit root. The outcomes of the cross-sectional dependence tests will determine the choice of the type of unit root to use.

3.2.4. Panel Cointegration Tests

The proof that the variables are not stationary at level is necessary to determine the long-run relationship in a panel econometric analysis. The cointegration test is used to evaluate whether there is a long-run relationship between economic variables. Panel cointegration tests can be residual-based, maximum Likelihood-based, or error correction modeling. Whatever the type of panel cointegration test, the power in evaluating the long-run relation is more accurate than the time series cointegration tests (Baltagi, 2005). Cointegration tests such as Kao (1999) and Pedroni (1999) are residual-based tests. Meanwhile, Larsson et al. (2001) and Groen & Kleibergen (2003) provide Likelihood-based tests, and Westerlund (2007) is an example of an error correction panel cointegration test. All these tests except Groen & Kleibergen (2003) and Westerlund (2007) assume cross-sectional independence. Moreover, Pedroni (1999) tests are considered more powerful than residual-based tests. The null hypothesis (H_0) states that there is no cointegration. However, the type of test to use will be determined by the outcomes of the cross-section dependence test.

3.2.5. Cointegrating Estimators

The simultaneity bias and serial correlation issues that the pooled OLS technique fails to account for in cointegrated panels with finite samples necessitate researchers to develop suitable tools to produce efficient estimators. Two estimators emerge for estimating cointegrating variables, the FMOLS and the DOLS estimators, that are considered efficient and less biased as they account for endogeneity and serial correlation regardless of the nature of the slope coefficient (Tugcu, 2018). The FMOLS estimator is an extension of the Phillips & Hansen (1990), developed

by Phillips & Moon (1999), Pedroni (2000), Kao & Chiang (2001), and Bai & Kao (2006). Whereas the DOLS estimator evolves from the work of Saikkonen (1992), developed by Stock & Watson (1993), and improved by Mark & Sul (1999) as Weighted DOLS, Kao & Chiang (2001) as Pooled DOLS, and Pedroni (2001) as Group-mean estimators. The FMOLS and the DOLS estimators account for endogeneity and serial correction and provide efficient estimators. The difference is that FMOLS is a non-parametric method for addressing serial correlation. Dynamic OLS (DOLS) is an alternative (parametric) estimator that introduces lags and leads to dealing with serial correlation issues regardless of the presence or absence of a long-run relation (Ahmed et al., 2022). The FMOLS model based on Pedroni (2001) Group-mean, and the DOLS estimator based on Mark and Sul (2003) Pool-DOLS, are given as follows.

$$
\beta_{N,T}^{\tau} - \beta = \left[\sum_{i-1}^{N} Z_{22,i}^{-2} \sum_{i=1}^{T} \left(X_{i,t} - \overline{X}_{i,t} \right)^2 \right] \sum_{i=1}^{N} Z_{11,i}^{-1} Z_{22,i}^{-1} \left[\sum_{i=1}^{T} \left(X_{i,t} - \overline{X}_i \right) \mu_{i,t}^{\tau} \right.
$$
$$
\left. - T_{\gamma i}^* \right]
\tag{1}
$$

Based on equation (1), the asymptotic distribution of the FMOLS and DOLS estimators are the same, and both are efficient, only that DOLS are found to be less biased with finite sample and do not need any pre-estimation and non-parametric correction (Kao & Chiang, 2001). This study follows the model of Khatatbeh & Moosa (2023) to develop our econometric model.

$$
LIQ = f(LTAS, LHD, LPT, IF, LCO2, INS)
\tag{2}
$$

Where income inequality is expressed as a function of Islamic financial development (LTAS), human development (LHD), population (LPT), inflation (IF), environmental degradation (LCO2), and institutional quality (INS), the baseline model is specified as follows.

$$
LIQ_{i,t} = \beta_0 + \beta_1 LTAS_{i,t} + \beta_2 LHD_{i,t} + \beta_3 LPT_{i,t} + \beta_4 IF_{i,t} + \beta_5 LCO2_{i,t} + \beta_6 INS_{i,t} + \mu_{i,t}
\tag{3}
$$

Equation (3) is the baseline model where the variable of interest is financial development proxied by total Shariah complaint financing (LATS) and total assets of Islamic banks and other financial institutions (LTAI). The second variable of interest is the human development proxied by the human development index (LHD) and GDP per capita (LGP). β_0 is the intercept; the β_1-β_6 are the parameters to be estimated, and $\mu_{i,t}$ is the standard error term for i cross-section at time t.

$$LIQ_{i,t} = \beta_0 + \beta_1 LTAS_{i,t} + \beta_2 LHD_{i,t} + \beta_3 LPT_{i,t} + \beta_4 IF_{i,t} + \beta_5 LCO2_{i,t}$$
$$+ \beta_6 INS_{i,t} + \beta_7 LTAS_{i,t}^2 + \mu_{i,t} \qquad (4)$$

Equation (4) is the non-linear model to estimate the Islamic finance Kuznets Curve hypothesis. The $LTAS^2$ is the squared Islamic financial development variable. β_7 is the parameter for the squared term. The inverted U-shaped hypothesis will be accepted when $\beta_1 > 0$ and $\beta_7 < 0$, which will validate Islamic finance Kuznets curve in OIC.

$$LIQ_{i,t} = \beta_0 + \beta_1 LTAS_{i,t} + \beta_2 LHD_{i,t} + \beta_3 LPT_{i,t} + \beta_4 IF_{i,t} + \beta_5 LCO2_{i,t}$$
$$+ \beta_6 INS_{i,t} + \beta_7 (LHD * INS)_{i,t} + \mu_{i,t} \qquad (5)$$

Equation (5) is the model for the interaction term $(LHD*INS)_{i,t}$, which examines the role of institutional quality in moderating the effect of human development on income inequality in OIC. Also, β_7 stands as an interaction coefficient.

IV. RESULTS AND DISCUSSIONS
4.1. Diagnostic Tests
The descriptive statistics presented in Table 2 do not indicate the presence of an outlier as no extreme values are observed. Table 3 presents the correlation matrix, and the results show that all the independent variables correlate significantly with the dependent variable—also, the correlation between the independent variables is not high; hence no multicollinearity in the data. In Table 4, the result of the homogenous test rejects the null hypothesis of homogeneity using Delta statistics at 5%, and in Adj. statistics at 1%, which confirm the heterogenous slope coefficients in the models. Also, in Table 5, the results for cross-sectional dependence tests reject the null hypothesis of cross-sectional independence using Breusch & Pagan (1980) LM test and Pesaran (2015) CD test at a 1% level for all the variables, except LIQ and INS that are significant only in LM test. Based on these findings, all the variables have a cross-sectional dependence. Therefore, in the subsequent estimation stages, only methods that account for cross-section dependence will provide efficient estimators.

Table 2.
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
LIQ	220	3.621	0.176	3.161	3.976
LTAI	220	8.036	2.376	0.03	13.198
LTAS	220	8.799	2.564	1.8	13.589
LHD	220	-0.347	0.191	-0.777	-0.117
GG	220	2.295	4.584	-21.4	12.752
LPT	220	16.833	1.756	12.916	19.434
IF	220	11.386	1.286	8.764	13.365
LCO2	220	11.386	1.286	8.764	13.365
INS	220	-0.293	0.75	-1.6	1.278

Table 3.
Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) LIQ	1.000								
(2) LTAI	0.229	1.000							
(3) LTAS	0.240	0.847	1.000						
(4) LHD	-0.175	0.367	0.487	1.000					
(5) GG	-0.036	0.080	0.237	0.048	1.000				
(6) LPT	0.304	-0.123	0.009	-0.601	0.210	1.000			
(7) IF	0.136	0.255	0.535	0.275	0.322	0.547	1.000		
(8) LCO2	0.136	0.255	0.535	0.275	0.322	0.547	0.170	1.000	
(9) INS	-0.155	0.440	0.503	0.772	0.108	-0.606	0.089	0.089	1.000

Table 4.
Homogenous Test

Null (H2)	Delta	P-value
Homogenous slope	2.039**	0.041
Adj.	3.382***	0.001

***, **&*stand for 1%, 5% &10% level of significance.

Table 5.
Cross-sectional Dependency Tests

Variables	Breusch-Pagan LM Test	Pesaran CD Test
LIQ	1093.7***	-1.2606
LTAS	846.87***	13.567***
LTAI	661.41***	3.7978***
LHD	1472.1***	22.853***
LGG	649.22***	16.541***
LPT	1730.9***	39.062***
IF	376.94***	13.042***
INS	487.05***	-0.8940

***, **&*stand for 1%, 5% &10% level of significance. L means logarithm

Table 6 presents the results of two-panel unit root tests, the Cross-sectional Augmented Dick Fuller (CADF) test and the Cross-sectional Im Pesaran Shin (CIPS) test, provided in Pesaran (2007). These tests account for cross-sectional dependence, hence provide efficient estimators. The results show that all the variables have unit roots at the level and become stationary at the first difference, except LTAS, which is stationary at a level by the CADF test. The results of the panel cointegration test presented in Table 7 show that the null hypothesis of no cointegration is rejected in 7 out of the 11 statistics of Pedroni (2000), which confirm that the variables are cointegrated, hence have a long-run relationship. Due to the lack of long time series data for the Islamic financial development variable, we cannot use Westerlund (2007) panel cointegration test; hence we settle for Pedroni (2000) residual-based test.

Table 6.
Panel Unit Root Tests

Variables	CADF Test		CIPS Test	
	Level	1st difference	Level	1st difference
LIQ	-1.287	-2.693***	15.914	-3.093***
LTAS	-2.119**	-2.524***	0.455	-3.368***
LTAI	-1.594	-2.680***	17.724	-3.565***
LHD	-1.702	-2.826***	1.596	-2.242**
LGP	-1.602	-2.297**	0.043	-2.287**
LPT	-1.297	-2.923***	15.914	-4.115***
IF	-1.589	-2.031	17.724	-1.921**
INS	-1.837	-2.960***	-0.331	-3.398***

***, **&* stand for 1%, 5% &10% level of significance. L means logarithm

Table 7.
Panel Cointegration Tests

Within-Dimension	Statistics	Weighted Statistics	Between-Dimension	Statistic
Panel v-Statistics	-3.304	-4.088*	Group rho-Statistic	61.635***
Panel rho-Statistics	5.218	4.081	Group PP-Statistic	-28.157***
Panel PP-Statistics	29.014***	-17.246***	Group ADF-Statistic	-0.417
Panel ADF-Statistics	-5.686***	-11.413**		

***, **&* stand for 1%, 5% &10% level of significance

4.2. The 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.

In Table 8, we present the estimation of the baseline model using the FMOLS estimator, i.e. models 1-4. The results show that Islamic financial development proxied by the total Islamic financing (LTAS) has negative and significant coefficients and they are significant at 1% (see models 1-2). From the results, we note that a 1% increase in Islamic financial development will reduce income inequality by 0.033% to 0.46% in the OIC, which is consistent with Azwar et al. (2022) and Widodo (2019). Also, the finding confirms the assertion in the literature that Islamic financial instruments increases access to interest-free financial services without the need for collateral, which promote economic activities, employment, and income (Baber, 2018), consequently reducing income inequality in the long run (Agustina et al., 2023). Moreover, the result also supports the income inequality narrowing hypothesis by Greenwood & Jovanovic, (1990). These findings are further reaffirmed when we use total assets of the Islamic financial institutions (LTAI) as a measure of Islamic financial development, see models 3-4.

674
The Effect of Islamic Financial Development and Human Development on Income Inequality:
Does Islamic Finance Kuznets Curve Valid in the OIC Countries?

The results in Table 8 also show that human development proxy by human development index (LHD) has positive and significant coefficients in models 1-3. These results are not consistent with findings from previous studies (Ferreira et al., 2022; Qasim et al., 2020). However, we should note that the coefficient of human development turns negative in model 4, i.e. when LTAI and LGP are used as measures of Islamic financial development and human development respectively.

The results of control variables presented in Table 8 show that population (LPT) has a positive and significant coefficient in 4 out of the five models in Table 8. It reveals that a 1% increase in the total population will increase income inequality by 0.01% to 0.3% in the OIC. The results of the second control variable indicate that inflation (IF) has positive and significant coefficients in 3 out of the five models in Table 8. In another finding, environmental degradation (LCO2) has a positive and significant coefficient in 3 of the five models. These findings indicate that a 1% increase in environmental degradation will increase income inequality by 0.017% to 0.74%. Also, the results show that institutional quality (INS) has negative and significant coefficient in 3 out of the five models in Table 8. A 1% increase in institutional quality reduces income inequality by 0.22% to 0.39% in the OIC.

Table 8.
The Results of FMOLS Estimator

Dependent Variable: Income Inequality (Gini index)					
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
LTAS	-0.4642***	-0.336**			0.1762***
LTAI			-0.0221***	-1.7359***	
LHD	6.8642***		3.2602***		1.7131***
LGP		0.6577*		-0.0868***	
LPT	0.0070**	0.2793***	-0.7043**	0.1509***	0.3214***
IF	0.2589***	0.0023**	0.0047	0.8313***	-0.0011
LCO2	0.7381***	-0.0977	0.2398**	0.0169**	0.1183
INS	-2.1344***	-0.2208***	-0.0379	-0.3878***	0.4388
LHD*INS					0.6557***
Adjusted R-squared	-78.6023	-52.9415	28.343	-188.762	-11.788

***,**&*stand for 1%, 5% &10% level of significance. L means logarithm

In Table 9, we apply the DOLS estimator to the baseline model and present the results as models 1-4. The results from the DOLS further reaffirm the significance of Islamic financial development in narrowing (LTAS & LTAI) income inequality. Interestingly, using the DOLS, we uncover more evidence that human development also reduces income inequality. As may be observed in Table 9, the coefficient of LHD is negative and significant in both model 1 and model 3. However, the coefficient of LGP turns insignificant or positive.

The result of the interaction term (LHD*INS) presented in Tables 8 (model 5) show positive and significant coefficients at 1% levels of significance. The result means that the existence of quality institutions in the OIC member countries strengthen the adverse effect of human development (LHD) on income inequality,

thereby widening income gap in the OIC. Contrarily, the result of the interaction term (LHD*INS) in Table 9 (model 5) is also positive and significant at 1%, which means that quality institutions enhanced the adverse effect of human development on income inequality, thereby narrowing income gap in the region. These findings are not as expected and perhaps require more investigation.

Table 9.
The Results of the DOLS Estimator

	Dependent Variable: Income Inequality (Gini index)				
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
LTAS	-0.0170**	-0.0445*			0.0010
LTAI			-0.0041***	-0.0069**	
LHD	-1.7884***		-1.4057***		-1.0207***
LGP		-0.0026		0.0048**	
LPT	1.4908**	0.0843***	0.2104***	0.2398***	0.1243***
IF	0.0575	0.0002*	-0.0001	-8.9305**	-0.0001
LCO2	-0.1312**	0.1719***	0.0333	-0.0173	0.1267***
INS	-1.4229**	-0.1072***	0.1229***	0.1372***	0.1812***
LHD*INS					0.0944*
Adjusted R-squared	46.812	19.907	0.6782	0.6987	0.9288

***, **&*stand for 1%, 5% &10% level of significance. L means logarithm

The results of non-linear models are presented in Table 10, where four models are estimated using FMOLS (models 1-2) and DOLS (models 3-4) estimators. The results show that all the coefficients of Islamic financial development (LTAS & LTAI) are positive and significant at 1%, except for LTAI, which is insignificant in model 4. The coefficients of the squared Islamic financial development (LTAS2 & LTAI2) are negative and significant at 1%, except in model 4 at 10%. The findings confirm the validity of the Islamic finance Kuznets curve hypothesis in the OIC, in line with the conventional version (Greenwood & Jovanovic, 1990). It is also consistent with Khatatbeh & Moosa (2023) and Kim & Lin (2011). They validate the presence of the conventional finance Kuznets curve hypothesis. In these models, we further note that the coefficient of human development is negative and significant. This suggests that human development results in more equitable income distribution. Moreover, the results of other regressors show expected signs, as in the previous findings in Tables 8 and 9.

Table 10.
The Results of Non-Linear Models

Dependent Variable: Income Inequality (Gini index)				
Variables	Model 1	Model 2	Model 3	Model 4
LTAS	5.4943***		0.1115***	
LTAI		0.3095***		0.0363
LHD	-1.8708***	0.2291	-0.5854**	-1.3268**
LPT	0.8197***	0.1201**	0.1511***	0.0789
IF	0.5049***	0.0017*	2.9105	-0.0002
LCO_2	0.6135***	0.0373	0.0617	0.1656**
INS	-0.0132***	0.0482	-0.1041*	-0.1684***
$LTAS^2$	-3.0708***		-0.0074***	
$LTAI^2$		-0.0180***		-0.0015*
Adjusted R-squared	71.091	-56.066	9.793	16.766

***, **&*stand for 1%, 5% &10% level of significance. L means logarithm.

4.3. Robustness

The findings reported in this study are robust when we use the total asset of Islamic banks (LTAI) to proxy Islamic financial development, and GDP per capita (LPT) to proxy human development in Table 8,9 and 10. The only difference is that the coefficients are stronger when total assets (LTAS) and human development index (LHD) are used in Table 8, 9 and 10. Moreover, the results are similar for the LTAI and LTAS in both FMOLS and DOLS estimators, except for the LHD that shows positive and significant effect on income inequality in Table 8 (FMOLS), while negative and significant in Table 9 (DOLS) and in Table 10 (FMOLS and DOLS).

4.4. Discussions

The cointegration test results confirm the long-run relationship among the variables, which validated the adoption of cointegrating estimators (FMOLS & DOLS) in this study. The findings that Islamic financial development will narrow income inequality justify the theoretical importance of Islamic financial instruments in providing access to affordable financial services, which support the inequality narrowing hypothesis. Being interest-free and not requiring collateral, Islamic finance enables people with entrepreneurship ability, small and medium-scale businesses, and individuals with good innovative ideas to have access to funds through various Shariah-compliant financial products and services. Thus, increasing access to affordable finance boosts economic activities, employment opportunities, income, and inclusive economic growth, hence, contracting the gap in income distribution (Azwar et al., 2022; Wray et al., 2023). Regulatory agencies should be empowered to provide effective and efficient regulation of the sector.

Human development is found to adversely affect income distribution in the OIC when the FMOLS estimator is used. However, the results from the DOLS show that human development promotes equitable income distribution. In models with squared Islamic financial development, we also note the role of human

development in reducing income inequality. This finding is consistent with the capability approach to human development as theorized by Sen (1999). Sen (1999) argues that human beings require basic capabilities to function well in society. The proxy of human development, the human development index (HDI), is based on knowledge, healthy life, and decent living. When there is increased investment in human capital development and the healthcare sector, the supply of quality human capital will increase, innovation and invention will also increase, job opportunities will be created, people will be employed in higher-paying jobs, and income will rise, consequently, improve the income distributions in the economy.

Quality institutions as represented collectively by corruption control, protection of property rights, the rule of law, and quality regulations directly favor equitable income distribution (Stewart et al., 2018). Moreover, the findings reported for the non-linear model confirm the validity of the Islamic finance Kuznets curve hypothesis in the OIC. The results for the proxies of Islamic financial development are positive in Table 9, which reveals that at the initial stage of Islamic financial development, income inequality rises because the sector is at an infant stage and cannot cover many individuals and small and medium firms that need funds for expansion. However, the negative and significant coefficients of the squared Islamic financial development (LTAS2 & LTAS2) mean that as the Islamic financial sector continues to grow to its maturity stage, access to Islamic financing increases, which expands economic activities rapidly, generating more job opportunities, income, and inclusive economic growth, which promote equitable income distribution (Greenwood & Jovanovic, 1990).

V. CONCLUSION AND POLICY IMPLICATIONS
5.1. Conclusion
This study examines the effect of Islamic financial development and human development on income inequality in 20 out of the 57 OIC members with available data from 2012 to 2022. Based on the findings, Islamic financial development promotes equitable income distribution in the long run. We also uncover some evidence that human development is also equalizing income distribution. Further, our results show that population, inflation, and environmental degradation promote income inequality, while higher institutional quality reduces income inequality in the OIC. Importantly, we also establish the validity of the Islamic finance Kuznets curve hypothesis in the OIC, where the effect of Islamic financial development on income inequality is found to be non-linear.

5.2. Policy Implications
The outcomes of this study have significant policy implications for the policymakers and the stakeholders in the OIC. Income inequality is a big challenge in all societies regardless of the level of its development. Although the income gap can never be wiped out completely, narrowing it is one of the Sustainable Development Goals (SDGs) that all countries strive to achieve. Therefore, to reduce the income gap between the rich and the poor in the OIC, policymakers should formulate and implement policies and programs to promote Islamic financial and human

development. Accessibility and availability of Islamic financial services should be increased by establishing more Islamic banks, bank branches and ATMs in urban and remote locations, as well as developing islamic capital markets (Sukuk), and Islamic insurance (Takaful) sector. Policymakers should provide an enabling environment for Islamic banks to compete with established traditional financial institutions.

Also, industry players should employ competent and qualified personnel who can organize and coordinate innovation and invention of Sharia-compliant financial products and services, to provide alternative financing options for firms and individuals according to their needs. Moreover, policymakers in the OIC should persuade Islamic financial institutions to give out a certain percentage of their funds to small and medium firms and individuals. Policymakers can also facilitate the establishment of Islamic Microfinance banks, especially in remote locations, to increase financial inclusion and make financial services more available and accessible to all, reducing the income gap between the rich and the poor. In addition, Islamic finance providers should utilize the opportunities in the Fintech sector to increase their coverage and ease accessibility issues. Furthermore, the Islamic redistributive instruments such as the compulsory alms (zakat) and foundation (waqf) if properly institutionalized can effectively reduce income inequality in the OIC members.

In addition, policies that promote human development should be prioritized by the policymakers at the OIC member countries. They should concentrate on upgrading their educational system, especially in low-income OIC member countries, which will increase opportunities for low-income people to secure higher-paying jobs, invent new products, and innovate the existing ones, consequently reducing the income gap. However, the recent covid 19 pandemic has exposed many countries' healthcare systems. Hence, massive investments should be channeled into the healthcare system to increase accessibility to quality healthcare services so that the poor will also gain access to good healthcare. In addition, policies to control environmental degradation should also be formulated and enforced, such as increasing the use of renewable energy and cutting down subsidies on fossil fuels. That will reduce environmental degradation and narrow the income gap, as low-income people suffer significantly from environmental pollution.

5.3. Limitations and Future Research

This study is limited by the lack of a long time series data on Islamic financial development. This compels us to use only 20 out of the 57 OIC member countries. Therefore, future research should obtain long time series data for Islamic finance and cover as many the OIC members as possible. The future research should also include data on other Islamic assets such as *Sukuk* and *Takaful*, to provide comprehensive coverage of the Islamic financial system. Finally, the puzzling finding pertaining to the moderating role of institutions necessitates more extensive investigation.

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684

The Effect of Islamic Financial Development and Human Development on Income Inequality:
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