

# Islamic Financial Inclusion and Regional Economic Resilience : Evidence Quantile Regression FMOLS on Productivity, Poverty, Unemployment

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## ABSTRACT

This study investigates the impact of Islamic Financial Inclusion Index (IFII) on regional economic resilience in Indonesia by analyzing productivity in the manufacturing sector, poverty levels, and employment rates across 33 provinces from 2014 to 2024. Using panel Quantile Regression and Fully Modified Ordinary Least Squares (FMOLS), the research examines how IFII and its interaction with education (measured by average years of schooling) influence these three development outcomes across different quantiles of financial inclusion. Provinces were grouped into five quantiles based on their IFII scores, allowing the analysis to capture heterogeneous effects across varying levels of Islamic financial access. The results reveal that IFII positively affects manufacturing output in provinces with lower financial inclusion but has a diminishing or negative effect at higher IFII quantiles. Conversely, IFII consistently reduces poverty across all financial inclusion levels, with the strongest effect in provinces with the lowest IFII. Its effect on employment appears significant only in higher inclusion quantiles, indicating that stronger financial ecosystems are more effective in supporting labor absorption. The interaction between IFII and education shows a complex pattern: it enhances industrial productivity and reduces unemployment at upper IFII quantiles but is associated with higher poverty at lower quantiles, potentially reflecting structural mismatches between education quality and financial access. FMOLS results confirm the long-run relationships between variables and reinforce the quantile-specific insights. The study emphasizes the importance of tailoring policy responses to local financial inclusion contexts to strengthen resilience, particularly by integrating financial access with education strategies in regions lagging behind.

**Keywords :** FMOLS; Islamic Financial Inclusion Index; Labor Sector; Real Sector; Social Sector; QREG.

## INTRODUCTION

In 2025, global economic growth is expected to slow from 3.3% to 2.9%, while the United States is projected to expand by only 1.1%. At the same time, global trade growth is weakening and inflation across G20 countries is predicted to remain around 3.6%. Increasing trade barriers, policy uncertainty, and fragile financial markets further intensify economic risks, disrupting supply chains, weakening

investment confidence, and threatening the stability of production, employment, and social welfare. These conditions highlight the growing importance of strengthening economic resilience across sectors in the face of global volatility [1],[2].

According to the World Bank (2025), the contribution of the industrial sector to global GDP has gradually declined, including the construction sector. Its share fell from around 32% in the early 2000s to approximately 26% in recent years, indicating a long-term structural weakening of the real sector without significant recovery over the past two decades [4].



**Picture 1. Industry Value Added (% of GDP)**  
**Source: World Bank (2025)**

Global poverty conditions have also deteriorated. By June 2025, the number of people living in poverty increased from 712.8 million in September 2024 to 838.0 million. Sub-Saharan Africa remains the most affected region, with poverty reaching 45.5% of the population and the number of poor rising from 448.0 million to 558.8 million. South Asia follows, where the poverty rate declined slightly from 9.7% to 7.3% but still represents 141.5 million people. Meanwhile, East Asia and the Pacific experienced a sharp increase in poverty from 1.0% to 2.5%, affecting around 54.0 million people. Similar increases were observed in Latin America and the Caribbean as well as the Middle East and North Africa, while even high-income countries reported rising poverty numbers despite relatively stable rates [5].

In April 2025, the OECD unemployment rate remained steady at 4.9%, with 34.4 million people unemployed. Youth unemployment stood significantly higher at 11.2%, a 7.1 percentage point gap compared to adults, with the largest disparities seen in Sweden, Luxembourg, Spain, and Costa Rica. While most OECD and EU countries saw stable rates, declines occurred in Colombia, Korea, and parts of Europe, whereas increases were recorded in Canada, Sweden, and Türkiye. Despite overall labor market stability, youth employment remains a critical concern [6].

Table 1. World Poverty Overview 2025

Region	Survey Coverage	Poverty Rate (%)		Number of Poor (million)	
	Jun 2025	Sep 2024	Jun 2025	Sep 2024	Jun 2025
East Asia and Pacific	94.4	1.0	2.5	20.3	54.0
Europe and Central Asia	93.4	0.5	1.1	2.4	5.3
Latin America & Caribbean	90.0	3.5	5.2	22.6	33.6
Middle East and North Africa	66.7	6.1	8.5	26.1	37.1
Other High Income countries	90.8	0.6	0.7	7.1	7.8
South Asia	84.1	9.7	7.3	186.2	141.5
Sub-Saharan Africa	48.8	37.0	45.5	448.0	558.8
East & Southern Africa	54.0	43.6	53.4	314.0	390.9
Western & Central Africa	41.1	27.3	33.8	134.0	167.9
<b>World Total</b>	<b>82.5</b>	<b>9.0</b>	<b>10.5</b>	<b>712.8</b>	<b>838.0</b>

Source: World Bank (2025)

In summary, the global economy faces persistent vulnerabilities in industrial growth, poverty, and employment. These issues reflect deep structural inefficiencies in how financial resources are distributed and accessed [7], [8]. When capital fails to reach productive and inclusive sectors, economic resilience weakens. Overcoming these challenges requires a financial system that prioritizes fairness, human development, and sustainable growth [9].

Over the past decade, provincial data in Indonesia show a mismatch between industrial productivity, poverty reduction, and employment. Sulawesi Tengah recorded extremely high manufacturing growth, including 106.29% in 2018, yet poverty declined only slightly and unemployment remained around 3%. In contrast, provinces with more stable growth such as Jawa Barat experienced clearer reductions in poverty and unemployment. Meanwhile, regions like Aceh faced declining industrial output and continued to struggle with relatively high poverty and unemployment levels.[10], [11], [12]. To resolve this, targeted policies are essential to link industrial output with inclusive development, focusing on local value chains, sustainable job creation, and financial access for underserved groups [13].

Islamic banking presents a values-based alternative to conventional finance, grounded in principles of ethics, justice, and risk-sharing [14]. Unlike interest-based systems, Islamic banking prohibits *riba* (usury) and speculative transactions, instead promoting asset-backed financing and profit-and-loss sharing models that align the interests of financial institutions with those of their clients [15]. This structure ensures that financing is not only economically viable but also socially responsible, fostering a financial ecosystem where trust, fairness, and shared risk are integral to all transactions. As such, Islamic finance offers a unique avenue to support inclusive

growth, particularly in regions where conventional financial services may have limited reach or social compatibility [16].

The Islamic Financial Inclusion Index (IFII) captures the extent to which Islamic financial services are accessible, affordable, and effectively utilized across different populations [17]. More than a measure of access, IFII reflects the capacity of Islamic finance to channel funds toward equitable and productive uses, especially in underserved provinces with persistent poverty and low industrial productivity [18]. By promoting financing instruments such as micro-*mudharabah*, *zakat*-linked accounts, and SME-focused sharia contracts, the IFII embodies a transformative potential to strengthen socio-economic resilience [19]. It enables broader participation in the formal financial system, supports localized economic activity, and ensures that financial services are tailored to the diverse socio-cultural realities of Indonesia's provinces.

Although many studies have examined the role of Islamic financial inclusion (IFII) in addressing socioeconomic issues, most focus on single-dimensional outcomes. Several studies analyze IFII in relation to poverty reduction (Putri et al., 2024; Vanesa & Nengsih, 2024), while others incorporate broader macroeconomic indicators but still emphasize poverty (Nasution et al., 2024; Sari et al., 2025). Some research explores its impact on unemployment (Zen et al., 2023) or human development and economic fundamentals (Mohamoud Omer, 2023; Darmawan et al., 2023). Meanwhile, studies on industrial performance such as Permana et al. (2024) rarely include financial inclusion as a determinant. Although Nasution et al. (2024) examined multi-sectoral impacts, their analysis did not consider the mediating role of human capital or sectoral disparities across different quantiles.[23], [25], [28] Most studies rely on linear models that may obscure distributional effects. Consequently, the role of IFII in shaping economic resilience across sectors, particularly when considering education and quantile-based analysis, remains underexplored.

This study examines the impact of Islamic Financial Inclusion Index (IFII) on Indonesia's economic resilience through three key sectors: poverty, unemployment, and manufacturing output. By incorporating average years of schooling both as a direct variable and in interaction with IFII, it explores education's moderating role. Using Quantile Regression (QREG), the research captures distributional heterogeneity in IFII's effects, while Fully Modified OLS (FMOLS) ensures robustness in panel cointegration settings. The study offers a novel, multidimensional perspective by combining social, labor, and real-sector indicators within a provincial panel from 2014 to 2024, addressing gaps in Islamic finance research and informing targeted policy design. The paper is organized as follows: Section 1 introduces the research context and motivation; Section 2 reviews the literature and highlights existing gaps; Section 3 outlines the data and methodology; Section 4 presents and interprets the empirical findings; and Section 5 concludes with policy insights.

The Islamic Financial Inclusion Index (IFII) was created as a composite index reflecting three key components: accessibility, utilization, and availability of sharia-based financial services [47]. Each component is measured on a scale of 0 to 1 to enable fair comparison between different regions and time periods. Access is

assessed based on account ownership at Islamic financial institutions, such as the number of accounts per 1,000 adult residents. Usage is assessed based on the frequency of transactions and Islamic financing per person, as well as contribution to GDP. On the other hand, availability is assessed based on the number of branches, Islamic ATMs, and the existence of Islamic microfinance institutions [48]. These aspects are designed to show the extent to which the public can access sharia financial products, use them, and receive quality services that are in accordance with sharia principles.

*H1a The Islamic Financial Inclusion Index (IFII) has a positive and significant effect on manufacturing GRDP growth.*

*H1b The Islamic Financial Inclusion Index (IFII) has a negative and significant effect on the poverty rate.*

*H1c The Islamic Financial Inclusion Index (IFII) has a negative and significant effect on the unemployment rate.*

Average length of education, measured based on the length of formal education completed by people aged 15 years and above [49], is an important indicator that reflects individual capabilities. As a reinforcing variable, education plays a role in increasing the impact of the Islamic Financial Inclusion Index (IFII) on social and economic indicators such as poverty, unemployment rates, and industrial sector development [50]. A study across 33 provinces indicates that the higher the average years of education, the greater the positive impact of financial inclusion on inclusive economic growth [51]. The Average Length of Education indicator is usually taken from official data from the Central Statistics Agency (BPS)[47], which shows the average number of years of formal education for residents aged  $\geq 15$  years in each province.

*H2a The interaction between IFII and average years of schooling has a positive effect on manufacturing GRDP growth.*

*H2b The interaction between IFII and average years of schooling has a negative effect on the poverty rate.*

*H2c The interaction between IFII and average years of schooling has a negative effect on the unemployment rate.*

## METHOD

This study employs panel data comprising 33 provinces in Indonesia over the period 2014 to 2024. The data sources are official and publicly accessible, primarily from the Financial Services Authority of Indonesia (Otoritas Jasa Keuangan/OJK) through its Islamic Banking Statistics, and the Central Statistics Agency (Badan Pusat Statistik/BPS) for macroeconomic and sectoral indicators.

The dependent variables reflect three key dimensions of economic resilience: (i) the manufacturing sector GRDP growth rate (real sector resilience), (ii) the poverty rate (social resilience), and (iii) the open unemployment rate (labor resilience). The main independent variable is the Islamic Financial Inclusion Index (IFII), constructed based on three dimensions: access, availability, and usage of Islamic financial services. The model also includes average years of schooling to capture human capital accumulation, and its interaction term with IFII (IFII  $\times$  Education) to observe moderation effects. Control variables include log-

transformed GRDP per capita, inflation rate, government expenditure (log), a COVID-19 dummy variable (coded 1 for 2020–2021 and 0 otherwise), and an interaction term (IFII × COVID) to capture potential pandemic-induced differential effects (Appendix Table 2).

To construct the Islamic Financial Inclusion Index (IFII), the value of each dimension  $i$ , where  $i=1,2,3$ , is first normalized using the following equation:

$$d_i = w_i \frac{A_{i,k,t} - m_i}{M_i - m_i} \tag{1}$$

Where:

- $d_i$ =normalized score for dimension  $i$
- $w_i$ =assigned weight for dimension  $i$  ( $0 \leq w_i \leq 1$ )
- $A_{i,k,t}$ =raw value of dimension  $i$  in province  $k$  and year  $t$
- $m_i, M_i$ =minimum and maximum values of dimension  $i$  within the sample

This standardization approach is adapted from Sarma (2012), using weights to reflect the significance of each component. In this study, accessibility ( $d1$ ) (proxied by total of Islamic bank third party funds per 1000 adults) is given a weight of 1, while availability ( $d2$ ) (measured by the number of Islamic banks offices/100,000 adults) and usage ( $d3$ ) (total of Islamic bank financing/1000 adults) are each weighted 0.5. This weighting scheme reflects the dominant role of banking outreach (accessibility) in assessing financial inclusion.

Once normalized scores for all dimensions are calculated, two distances are estimated to represent each province's financial inclusion position within an nnn-dimensional space. These are:

- $X_1$ : the normalized Euclidean distance from the worst-case point (denoted  $O$ )
- $X_2$ : the normalized Euclidean distance from the ideal point (denoted  $W$ )

The formulas are:

$$X_1 = \frac{\sqrt{d_1^2 + d_2^2 + \dots + d_n^2}}{\sqrt{w_1^2 + w_2^2 + \dots + w_n^2}} \tag{2}$$

$$X_2 = \frac{\sqrt{(w_1 - d_1)^2 + (w_2 - d_2)^2 \dots + (w_n - d_n)^2}}{\sqrt{w_1^2 + w_2^2 + \dots + w_n^2}} \tag{3}$$

These two scores are then averaged to derive the final IFII score for each province and year:

$$IFII = \frac{1}{2}(X_1 + X_2) \tag{4}$$

For the specific case of three dimensions (penetration, availability, usage) with respective weights 1, 0.5, and 0.5, the IFII becomes:

$$IFII = \frac{1}{2} \left[ \frac{\sqrt{d_1^2 + d_2^2 + d_3^2}}{\sqrt{1.5}} + \left( 1 - \frac{\sqrt{(1 - d_1)^2 + (0.5 - d_2)^2 + (0.5 - d_3)^2}}{\sqrt{1.5}} \right) \right] \tag{5}$$

This dual-distance approach ensures that the IFII captures both how far a province has progressed from the worst case and how close it is to the ideal level of Islamic financial inclusion. The final index ranges between 0 and 1, with higher values indicating greater inclusion.

To ensure the validity of the panel data analysis and the reliability of the estimation results, several diagnostic tests are conducted. The first set of tests

focuses on the stationarity of variables using panel unit root methods. These include the Levin, Lin and Chu (LLC) test [53], which assumes a common unit root across panels, and the Im, Pesaran and Shin (IPS) test [54], which allows for heterogeneous unit root processes. Additionally, the ADF-Fisher and PP-Fisher tests are employed by combining individual augmented Dickey-Fuller and Phillips-Perron test statistics using Fisher's approach [55]. These tests help determine whether the panel series are stationary at level or at first difference, which is essential before conducting long-run estimations. After confirming stationarity, the Kao residual-based panel cointegration test [56] is used to verify whether a long-run equilibrium relationship exists among the core variables in the model, including Islamic financial inclusion, education, and macroeconomic controls.

Beyond stationarity and cointegration, cross-sectional dependence is tested using three common methods: the Breusch-Pagan LM test [57], the Pesaran scaled LM test, and the Pesaran CD test [58]. These tests detect whether provinces are interdependent, which is often the case in macro-panel data involving economic and institutional variables. Unaddressed cross-sectional dependence can lead to biased standard errors and inefficient estimation. Identifying these characteristics supports the appropriateness of robust estimation techniques, such as Quantile Regression and FMOLS, which account for distributional heterogeneity and long-run relationships across regional economic outcomes.

This study employs two complementary estimation techniques: Quantile Regression (QREG) and Fully Modified Ordinary Least Squares (FMOLS). These methods are selected to comprehensively capture the relationship between Islamic financial inclusion and multisectoral economic resilience, allowing for both distributional heterogeneity and long-run equilibrium analysis across Indonesia's 33 provinces from 2014 to 2024.

#### 1. Quantile Regression (QREG) Model

Quantile Regression is used to estimate the effects of Islamic Financial Inclusion Index (IFII) across different points of the conditional distribution of the dependent variables. Unlike classical OLS, which assumes a constant effect across the mean, QREG provides more robust insights into how the relationship varies across provinces with low, medium, or high sectoral performance. The general form of the QREG model is expressed as:

$$Q_{\tau}(Y_{it}|X_{it}) = \alpha_{\tau} + \beta_{1\tau}IFII_{it} + \beta_{2\tau}AVE\_SCHOOL_{it} + \beta_{3\tau}(IFII * AVE\_SCHOOL)_{it} + \gamma_{\tau}Z_{it} + \varepsilon_{it} \quad (6)$$

Where:

- $Q_{\tau}(Y_{it})$  denotes the conditional quantile of the dependent variable at quantile  $\tau$
- $Y_{it}$  is the outcome variable (GRDP growth, poverty, or unemployment)
- $X_{it}$  includes the main predictors: IFII, education (AVE\_SCHOOL), and their interaction
- $Z_{it}$  is the vector of control variables
- $\tau \in \{0.1, 0.25, 0.5, 0.75, 0.90\}$

This model is estimated separately for each of the three resilience dimensions.

2. Fully Modified OLS (FMOLS) Model

To ensure robustness and capture long-run relationships under potential non-stationarity and cointegration, the study also applies the FMOLS method. This technique is particularly suited for panel data with cointegrated regressors, correcting for serial correlation and endogeneity in the regressors. The FMOLS specification is written as:

$$Y_{it} = \alpha + \beta_1 IFII_{it} + \beta_2 AVE\_SCHOOL_{it} + \beta_3 (IFII * AVE\_SCHOOL)_{it} + \gamma Z_{it} + v_{it} \quad (7)$$

Where all variables are defined as in the previous equation, and estimation is conducted across the panel as a whole.

3. Model Specification by Dependent Variable

a. Model 1: Real Sector Resilience (Manufacturing GRDP Growth)

$$GRDP\_INDUS_{it} = \alpha + \beta_1 IFII_{it} + \beta_2 AVE\_SCHOOL_{it} + \beta_3 (IFII * AVE\_SCHOOL)_{it} + \Gamma X_{it} + \varepsilon_{it} \quad (8)$$

This model examines how Islamic financial inclusion and education affect regional growth in the manufacturing sector.

b. Model 2: Social Resilience (Poverty Rate)

$$POVERTY_{it} = \alpha + \beta_1 IFII_{it} + \beta_2 AVE\_SCHOOL_{it} + \beta_3 (IFII * AVE\_SCHOOL)_{it} + \Gamma X_{it} + \varepsilon_{it} \quad (9)$$

This model estimates the impact of IFII and education on poverty reduction across provinces.

2. Model 3: Labor Resilience (Unemployment Rate)

$$TPT_{it} = \alpha + \beta_1 IFII_{it} + \beta_2 AVE\_SCHOOL_{it} + \beta_3 (IFII * AVE\_SCHOOL)_{it} + \Gamma X_{it} + \varepsilon_{it} \quad (10)$$

This model investigates the influence of IFII and educational attainment on provincial unemployment levels.

**RESULT AND DISCUSSION**

**Islamic Financial Inclusion Index (IFII) : Ranking and Quantile Distribution**

The Islamic Financial Inclusion Index (IFII) shows disparities across 33 Indonesian provinces (2014–2024). Provinces are grouped into five quantiles based on average IFII scores, where Q5 regions (e.g., Bangka Belitung, Central Java, Yogyakarta) have higher inclusion, while Q1 regions (e.g., Papua, East Nusa Tenggara, Maluku) remain low (see Appendix Table 3).

**Descriptive Statistic**

Appendix Table 4 shows considerable variation across variables. Manufacturing growth averages 5.25% with a wide range, indicating strong regional disparities. Poverty (10.74%) and unemployment (5.14%) vary moderately. Meanwhile, IFII (0.074) remains low and skewed, suggesting limited Islamic financial access in most regions. These patterns support the use of quantile regression to capture distributional differences.

### Correlation Matrix

Appendix Table 5 indicates that IFII is negatively related to poverty but positively to unemployment. Education also lowers poverty but is associated with higher unemployment, suggesting labor market mismatch. Despite high interaction correlations, no serious multicollinearity is detected, though further tests are needed.

### Diagnostic Tests

Several diagnostic tests confirm estimation reliability. Panel unit root tests (ADF-Fisher, PP-Fisher, Levin-Lin-Chu, and Im-Pesaran-Shin) show most variables are non-stationary at level but stationary after first differencing, indicating they are integrated of order one (I(1)) and suitable for FMOLS cointegration analysis (Appendix Table 6).

**Table 6. Unit Root Tests**

Variable	ADF - Fisher		PP - Fisher		Levin, Lin & Chu		Im, Pesaran, Shin	
	Level	1st Difference	Level	1st Difference	Level	1st Difference	Level	1st Difference
GDRP_IN DUS	0.005	0.000	0.000	0.000	0.000	0.000	0.001	0.000
POVERTY	0.923	0.000	0.987	0.000	0.018	0.002	0.856	0.002
TPT	0.000	0.000	0.022	0.000	0.000	0.000	0.000	0.000
IFII	0.007	0.000	0.003	0.000	0.000	0.000	0.085	0.000
AVE_SCH OOL	0.999	0.000	0.922	0.000	0.000	0.000	0.999	0.000
IFII_AVE_ SCHOOL	0.020	0.000	0.046	0.000	0.000	0.000	0.147	0.000
LGDRP_C AP	1.000	0.000	1.000	0.000	1.000	0.000	1.000	0.000
LGOV_EX P	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
LINFLATI ON	0.231	0.034	0.211	0.000	0.000	0.000	0.040	0.010
IFII_COVI D	0.008	0.000	0.616	0.000	0.000	0.000	0.003	0.000

The Kao panel cointegration test shows a significant long-run relationship among variables (p-value 0.000), rejecting the null of no cointegration (Table 7). Tests for cross-sectional dependence also indicate interdependence among provinces, while heteroskedasticity tests confirm unequal variance in the data (p-value 0.000) (Table 8). These findings justify the use of robust methods such as FMOLS and quantile regression.

**Table 7. Cointegration & Homogeneity Tests**

Test	Statistic	Prob.
<b>Cointegration Test</b>		
KAO	-5.039	0.000
<b>Homogeneity Test</b>		
Panel Cross-section	778.63	0.000
Heteroskedasticity LR Test		

Panel Period	178	0.000
Heteroskedasticity LR Test		

**Table 8. Cross-sectional Dependency Tests**

Model	Test		
	Breusch-Pagan LM	Pesaran scaled LM	Pesaran CD
Model 1	884.94***	10.98***	11.88***
Model 2	1704.984***	36.219***	18.188***
Model 3	1716.562***	36.575***	33.877***

**Quantile Regression (QREG) Estimation Results**

1. Model 1 - Gross Regional Domestic Product in the Industrial Sector

The quantile regression (Model 1) shows that IFII raises manufacturing growth at lower and median quantiles ( $\tau = 0.1, 0.25, 0.5$ ) but becomes negative at higher quantiles ( $\tau = 0.75, 0.90$ ). Education is significant only at  $\tau = 0.5$ , while the IFII-education interaction turns positive at higher quantiles. Capital and government spending are stronger at higher quantiles, inflation stimulates growth at lower ones, and the IFII-COVID interaction ( $\tau = 0.25, 0.5$ ) suggests financial inclusion helped ease the crisis impact.

**Table 9. QREG Estimation Model 1**

Variable	Dependen Variable Manufacturing Sector GRDP Growth Rate				
	$\tau = 0.1$	$\tau = 0.25$	$\tau = 0.5$	$\tau = 0.75$	$\tau = 0.90$
C	-54.814***	-85.903***	-130.994***	-102.659*	-440.630**
IFII	66.440**	61.672**	185.429***	-167.349	-508.568***
AVE_SCHOOL	0.604	0.562*	3.583***	-4.252*	-8.271***
IFII_AVE_SCHOOL	-9.132**	-9.422**	-25.687***	28.105*	65.134***
LGRDP_CAP	0.394	-0.527	-3.061**	6.103**	9.673***
LGOV_EXP	-0.066	0.271	-0.883**	3.921*	21.993**
LINFLATION	10.077***	19.016***	35.125***	0.481	29.822*
COVID	-5.373***	-5.500***	-17.566***	15.704*	-39.996**
IFII_COVID	13.364*	21.150**	34.810**	-72.308**	267.470

2. Model 2 - Poverty Rate in the Social Sector

The quantile regression (Model 2) shows that IFII significantly reduces poverty across all quantiles, with stronger effects at higher levels. Education also helps reduce poverty, and the IFII-education interaction further strengthens this effect. Capital per capita and government spending reduce poverty from the median quantile upward, while inflation, COVID-19, and the IFII-COVID interaction are not significant.

**Table 10. QREG Estimation Model 2**

Variable	Dependen Variable Poverty Rate				
	$\tau = 0.1$	$\tau = 0.25$	$\tau = 0.5$	$\tau = 0.75$	$\tau = 0.90$
C	19.647	32.586*	78.352***	105.077***	134.819***
IFII	-81.004**	-103.719*	-215.780***	-254.272***	-327.581***
AVE_SCHOOL	-1.518**	-2.748***	-3.732***	-3.859***	-5.388***

IFII_AVE_SCHOOL	9.741**	11.682*	24.168***	28.368***	35.553***
LGRDP_CAP	-0.939	-0.381	-2.637***	-3.204***	-2.767***
LGOV_EXP	0.695	0.605**	0.023	-0.876***	-2.221***
LINFLATION	0.339	-0.751	-1.463	-3.166	-3.798
COVID	0.308	0.804	1.206	0.857	0.216
IFII_COVID	0.653	-3.521	-6.246	0.146	-1.437

### 3. Model 3 – Unemployment Rate in the Labor Sector

The quantile regression (Model 3) shows that the effect of IFII on unemployment varies across quantiles and becomes stronger at higher levels, with a significant positive effect at  $\tau = 0.75$ , suggesting financial inclusion may encourage job search or informal work. Education is also positively related to unemployment up to  $\tau = 0.75$ , indicating possible labor market mismatches, but the IFII–education interaction is negative at  $\tau = 0.75$ , suggesting their combined effect can reduce unemployment in some regions. Government spending and inflation show positive effects, while COVID-19 and the IFII–COVID interaction are mostly insignificant.

**Table 11. QREG Estimation Model 3**

Variable	Dependent Variable Unemployment Rate				
	$\tau = 0.1$	$\tau = 0.25$	$\tau = 0.5$	$\tau = 0.75$	$\tau = 0.90$
C	-15.351***	-22.143***	-25.398***	-30.004***	-32.898**
IFII	9.548	14.089	2.314	33.317***	48.994
AVE_SCHOOL	0.227	0.498***	0.572***	0.978***	1.185
IFII_AVE_SCHOOL	-0.928	-1.496	0.098	-3.621**	-5.212
LGRDP_CAP	0.231	0.355	0.271	0.336	0.311
LGOV_EXP	0.501***	0.619***	0.564***	0.576***	0.504
LINFLATION	1.924*	2.464**	3.464***	3.778***	4.465*
COVID	0.460*	0.696**	0.599*	0.347	5.754
IFII_COVID	3.058	0.715	0.712	-0.092	5.754

### Fully Modified Ordinary Least Square (FMOLS) Estimation Results

The FMOLS results show that Islamic financial inclusion (IFII) significantly reduces poverty, but has mixed effects on manufacturing growth and unemployment, as it weakens manufacturing performance and increases unemployment. Average years of schooling also has negative effects, particularly in manufacturing, indicating possible skill mismatches.

The IFII–education interaction supports manufacturing but weakens poverty and labor outcomes. Meanwhile, capital per capita promotes industrial growth, government expenditure worsens manufacturing and labor outcomes while increasing poverty, and the IFII–COVID interaction highlights the protective role of financial inclusion during crises.

Table 12. FMOLS Estimation

Dependen Variable			
Manufacturing Sector GRDP Growth Rate (1), Poverty Rate (2), Unemployment Rate (3)			
Variable	Model 1	Model 2	Model 3
IFII	-820.844***	-22.2051***	4.275142***
AVE_SCHOOL	-12379.3***	-2.88302***	-1.28356***
IFII_AVE_SCHOOL	2535.367***	-0.09998***	-1.5376***
LGRDP_CAP	13890.51***	0.028597	0.182296***
LGOV_EXP	-35962.2***	1.031885***	-0.97675***
LINFLATION	5788.895***	0.287933***	2.1598***
COVID	6011.336***	-0.03662***	0.688353***
IFII_COVID	11053.13***	-0.57473***	2.811414***

### The Impact of Islamic Financial Inclusion on Multisectoral Economic Resilience

The findings show that the Islamic Financial Inclusion Index (IFII) affects the manufacturing, poverty, and labor sectors differently across Indonesian provinces. In the manufacturing sector, IFII has a positive effect at lower and middle quantiles, but becomes negative at the highest quantile, indicating diminishing returns in more advanced regions, supporting Antwi et al. [59] and concerns from Ansari et al. [60].

For poverty, IFII has a consistently negative and significant effect, confirming its role in poverty reduction, consistent with Soyemi et al. [61] and Vanesa & Nengsih [62], but differing from Nsiah et al. [63]. Meanwhile, the relationship between IFII and unemployment is mixed, as FMOLS shows a positive association while quantile regression is significant only in certain quantiles, supporting findings from Amakor & Eneh [64] and Yanlin & Scola [65].

### Education as a Reinforcing Factor

The interaction between IFII and average years of schooling shows mixed effects across sectors. In the manufacturing sector, the interaction is negative and significant at lower to median quantiles, indicating that higher education does not always strengthen the impact of financial inclusion in less industrialized regions, possibly due to skill mismatches [66]. This contrasts with findings from more advanced economies where education improves the effective use of financial services in productive sectors [67]. In the labor model, the interaction is significant only in certain quantiles and mostly negative, suggesting that higher education does not always lead to greater employment gains from financial inclusion [68].

In the poverty model, the interaction shows a consistently positive and significant effect across quantiles, indicating that education enhances the poverty-reducing impact of financial access, likely through better financial literacy and utilization [69]. However, the strength of this effect may vary depending on education quality and regional disparities [70]. Overall, education acts as a moderating factor, but its impact differs across sectors and development levels.

## CONCLUSION

This study examines the impact of Islamic financial inclusion (IFI) and its interaction with education on manufacturing growth, poverty, and unemployment in Indonesia. The results show that IFI supports early-stage manufacturing and consistently reduces poverty, but its effects weaken or become negative in more advanced regions and higher unemployment quantiles. The interaction with education strengthens poverty reduction but shows limited or negative effects in manufacturing and labor sectors, indicating uneven regional complementarities.

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