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ISLAMIC FINANCIAL INCLUSION AND ECONOMIC GROWTH IN OIC COUNTRIES: PANEL QUANTILE REGRESSION ANALYSIS

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ABSTRACT

This study examines how Islamic financial inclusion contributes to economic growth across different quantiles within the OIC countries. Sarma's method is used to construct a novel index of Islamic financial inclusion (IIFI) and a quantile regression with fixed effects approach is applied to data spanning the period 2015 to 2020 from 25 OIC countries. The findings reveal that Islamic financial inclusion contributes positively to economic growth in the OIC countries across different segments of the GDP per capita with the impact being consistent across all segments. By expanding the network of Islamic banks and enhancing the technological infrastructure for financial access, policymakers can harness the transformative potential of Islamic finance to promote sustainable economic growth and development in the OIC countries.

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I. INTRODUCTION

Financial inclusion, as defined by (World Bank, 2022), (Le et al., 2019) and (Mhlanga, 2022) refers to the ease of access by individuals and businesses to affordable financial services to meet their needs. With the evolution of fintech, the concept of digital financial inclusion has emerged involving leveraging digital technologies to deliver affordable formal financial services to unbanked individuals and businesses (Lyman & Lauer, 2015).

While financial inclusion is not explicitly considered a sustainable development goal (SDG), it is recognized as a pivotal enabler of eight out of the seventeen SDGs (Leora Klapper et al., 2016). This underscores the pivotal role of financial inclusion in driving progress towards development objectives, prompting concerted efforts by most developing nations to attain high levels of financial inclusion.

Despite ongoing efforts by governments in many countries, global financial inclusion remains a challenge. The Global Findex report indicates that 29 % of adults in developing countries remain financially excluded. The main reasons for exclusion are multifaceted, ranging from physical distance to financial institutions, cost barriers, and lack of documentation. Religious beliefs are also be a factor, particularly in countries with predominantly Muslim populations While cited by only a relatively small proportion (10%) globally, religious concerns hold greater weight in the Organization of Islamic Cooperation (OIC) countries, where exclusion rates due to religious concerns soar up to 24% and 19% in Iraq and Morocco, respectively (Demirgüç-Kunt et al., 2022). Thus, traditional approaches to financial inclusion prove inadequate for addressing the needs of countries within this region.

In light of these challenges, Islamic finance, which adheres to principles compatible with Shariah law, offers a potential solution for addressing the needs of these excluded segments. These principles underpinning Islamic finance emphasize equity, social responsibility, and risk-sharing, distinguishing it from conventional finance.

According to the World Bank and Islamic Development Bank Group (2016), Islamic finance has the potential to integrate 40 million individuals into formal financial systems and through increased access Islamic finance can positively impact economic growth (Imam & Kpodar, 2016). Furthermore, OECD (2020) highlights the potential of Islamic finance to create a more stable and inclusive financial system aligned with the Sustainable Development Goals (SDGs). Ahmed (2017) reinforces this notion, suggesting Islamic finance can promote SDGs by facilitating sustainable infrastructure investments.

Despite the established presence and growth of Islamic finance in the region, access remains limited, according to the Global Findex 2021, highlighting a gap in financial inclusion due to religious considerations in Islamic countries (Demirgüç-Kunt et al., 2022). Even leading markets like Malaysia, Indonesia, Saudi Arabia, and the UAE require further improvement. These nations are actively strengthening their Islamic finance industries, focusing on FinTech innovation, regulations, and sustainability (Refinitiv, 2022).

In this context the concept of Islamic financial inclusion emerges. It represents a novel facet of financial inclusion encapsulating the intersection between Islamic finance and broader financial inclusion objectives. It implies affordable access

to Islamic financial services which are guided by principles such as prohibition of interest and adherence to ethical investment practices (Husman & Artarini, 2019). Islamic financial inclusion encompasses social inclusion fostering the active participation of individuals and businesses in the real economy (Ali, 2022).

The established link between financial inclusion and economic growth in developing countries is well documented. However, Islamic financial inclusion remains a marginalized area within the research landscape. Integrating Islamic finance metrics into a comprehensive financial inclusion index would enhance its ability to capture the multifaceted nature of financial inclusion, particularly in Islamic contexts. Thus, this study aims to bridge this gap by constructing a novel Islamic financial inclusion index. This index will encompass traditional finance, digital technologies, and Islamic finance. This broader approach will provide a robust framework for assessing financial inclusion dynamics within Islamic contexts. Additionally, by employing quantile regression the study aims to evaluate the impact of Islamic financial inclusion on economic growth in selected Islamic countries and to investigate whether the impact of Islamic financial inclusion on economic growth varies across different GDP per capita segments.

The analysis reveals that the selected countries exhibited a medium to strong level of Islamic financial inclusion in 2020. This finding suggests significant progress compared to past limitation indicating the potential for further improvement. In addition, the results indicate that Islamic financial inclusion positively impacts economic growth across all GDP per capita segments. The research underscores the importance of enhancing access to Islamic financial services and the technologies that facilitate their delivery.

II. LITERATURE REVIEW

2.1. Background Theory

The theoretical framework for this study is based on the finance-growth nexus theory which argues that financial intermediaries can boost economic growth by providing financing for entrepreneurial activities. According to King & Levine (1993) financial markets and institutions can promote economic development by mobilizing savings and facilitating transactions.

However, access to financial services is often limited due to various barriers. In Islamic countries, religious concerns further hinder access to finance due to the prohibition of interest by Shariah law, resulting in a significant portion of financial resources being excluded from the development process. In this context, according to Al-Jarhi (2017), Islamic finance which operates under Shariah law enhances the efficacy of resource mobilization for individuals committed to ethical investments and to avoid interest, thereby contributing to economic development.

2.2. Islamic Finance and Economic Growth

Numerous studies highlight the positive impact of Islamic finance on economic growth. For instance, Boukhatem & Ben Moussa (2018) examine the dynamic interactions between Islamic banking and economic growth applying pooled FMOLS regressions to data from 2000 to 2014 from selected MENA countries. They

find that Islamic financial development stimulates economic growth. Muhammadd et al. (2019) analyze the impact of Islamic finance versus conventional finance on the economic growth in Pakistan. Applying the GMM to quarterly data from 2006Q3 to 2017Q4, the study reveals that Islamic finance promotes economic growth and addresses specific needs that conventional finance does not. Ledhem & Mekidiche (2020) further extend this understanding by applying system GMM to assess the impact of the Islamic financial performance on economic growth using data from 2014 to 2018. The results indicate that Islamic finance profitability has a positive impact on economic growth. Similarly, Shah et al. (2020) explore the link between Islamic financial instruments and economic growth in Pakistan over 2005 to 2015 period. By using unit root tests, OLS and Granger causality tests, the study validates the causal relationship between Islamic financing and economic growth. Tabash & Dhankar (2014) analyzes the impact of Islamic banking on economic growth of three selected MENA countries (Qatar, Bahrain, and the UAE). The study employs cointegration testing to quarterly data from 1990 to 2010. The results reveal a long-run positive relationship between Islamic banking and economic growth. Furthermore, causality test results indicate that Islamic bank financing contributes positively to economic growth in the short run. This highlights the significant role of Islamic banking in both the short-term and long-term economic development of these three countries. Expanding on these findings, Derradj et al. (2024) investigate the role of Islamic financing in the growth of the Malaysian economy, for which they apply ARDL model to quarterly data from 2018Q1 to 2022Q4. The findings demonstrate that Islamic banking is a key driver of Malaysia's economic growth.

Overall, these studies collectively outline the role of Islamic finance in promoting economic growth across different regions and countries, illustrating its potential as a pivotal mechanism for economic development.

2.3. Financial Inclusion and Economic Growth

The growing significance of financial inclusion has spurred researchers' interest in evaluating its impact on economic development and growth across various contexts, employing diverse methodologies. Chinoda & Mashamba (2021) conduct a comprehensive analysis using panel ARDL model for the case of 23 African countries spanning the years 2004 to 2018. The study underscores the importance of financial inclusion as a catalyst for economic growth in the long-run within African countries. Emara & El Said (2021) employ GMM estimation methods to a panel of countries in the MENA region covering the period 1965 to 2016. The result highlights the potential for inclusive financial systems to drive prosperity across MENA countries. In the same light, Nkwede (2015) explore data from Nigeria over the period from 1981 to 2013, using OLS method. The results suggest that economic growth is positively influenced by financial inclusion in Nigeria. Ozturk & Ullah (2022) examine data covering 42 economies within OBRI over 2007 - 2019 period using OLS, 2SLS and GMM. The results highlight the potential of digital financial inclusion in promoting inclusive economic growth. Oanh (2024) employs Panel Vector Autoregressive models to analyze data from 45 countries. The study reveals different effects of digital financial inclusion, showing a positive impact in countries with high financial development level and a negative effect in countries

with low financial development level. Liu et al. (2021) employ a Bayesian panel VAR model for selected Chinese provinces covering the period 2011 to 2019. The findings suggest that digital financial inclusion contributes to economic growth.

Furthermore, spatial techniques are applied by Shen et al. (2021) and reveal a positive effect of digital financial inclusion on economic development. The findings outline the importance of considering spatial dynamics in analyzing the relationship between financial inclusion and economic growth. Khera et al. (2021) use cross-sectional analysis to examine data from 52 developing countries covering the timeframe from 2011 to 2018. The findings indicate that digital financial inclusion promotes inclusive economic growth across different countries and context. Demir et al. (2022) implement quantile regressions to examine data from 140 selected countries and find that financial inclusion mediates the impact of fintech on reducing income inequality. Adding to the body of literature, Daud & Ahmad (2023) apply the dynamic panel analysis using data covering the post financial crisis period from 84 countries, demonstrating that financial inclusion fosters economic growth, while digital technology mediates the impact of financial inclusion. Thaddeus et al. (2020) use the VECM to analyze data from 22 African countries from 2011 to 2017, revealing a favorable long-run impact of digital financial inclusion on economic growth.

Despite the extensive literature on Islamic finance and economic growth on the one hand and financial inclusion and economic growth on the other hand, research specifically addressing Islamic financial inclusion and its impact on economic growth is scarce. To the best of the author's knowledge, the only study in this domain is by Novreska & Arundina (2024) where the authors examine the impact of Islamic financial inclusion on human development. By using panel data covering the period between 2014 and 2022 from 33 Indonesian provinces, the findings indicate that Islamic financial inclusion significantly enhances the human development in Indonesia.

Based on a comprehensive review of the literature this study posits three hypotheses to be empirically tested:

1. **High disparities between countries in Islamic financial inclusion:** It is hypothesized that significant variations exist in Islamic financial inclusion levels among countries within the OIC. These differences may stem from varying regulatory frameworks, institutional capacities and socio-economic factors resulting in unequal access to financial services across countries.
2. **Positive impact of Islamic financial inclusion on economic growth:** This study suggests that Islamic financial inclusion positively influences economic growth within Islamic countries. It is expected that higher levels of Islamic financial inclusion will stimulate economic activities, foster entrepreneurship and facilitate investment, thereby contributing to overall economic growth and development.
3. **The impact would be higher in low GDP countries:** Furthermore, it is theorized that the impact of Islamic financial inclusion on economic growth will be more prominent in low GDP countries compared to high GDP countries. It is anticipated that low GDP countries with greater room for improvement in financial inclusion may experience more significant economic gains from enhanced access to financial services and integration into the formal financial system.

Through rigorous empirical analysis employing fixed effects panel method and quantile regression with fixed effects approach, this study aims to test these hypotheses and provide robust evidence regarding the relationship between Islamic financial inclusion and economic growth within Islamic economies. In addition, the study constructs a novel Islamic Financial Inclusion Index (IIFI) to assess the level of Islamic financial inclusion across countries within the OIC. The IIFI allows for a comparative analysis of Islamic financial inclusion levels among countries, providing valuable insights into the disparities and opportunities for improvement within the Islamic finance landscape.

III. METHODOLOGY

3.1. Data

The dataset covers 25 countries within the OIC (see Table 2 and Table 3) spanning the period 2015 to 2020. The selection of 25 countries over the period 2015 to 2020 is based on the availability of consistent data for Islamic finance metrics necessary for robust statistical analysis.

3.1.1. Variables

As illustrated in Table 1, economic growth which is the dependent variable is proxied by GDP per capita, in line with Khera et al. (2021), Thaddeus et al. (2020), Daud & Ahmad (2023) and Liu et al. (2021). The natural logarithm transformation was applied to GDP per capita based on Oanh (2024). The main independent variable is Islamic Financial Inclusion is proxied by IFI index, which is constructed using the methodology developed by Sarma (2012). It consists of six components categorized into three dimensions: availability, accessibility to technology and Islamic finance availability. Furthermore, to mitigate the influence of other factors on economic growth, trade openness, investment size and inflation rate are included based on Khera et al. (2021), Daud & Ahmad (2023), Demir et al. (2022) and Ozturk & Ullah (2022). A dummy variable (covid19) is added to capture the impact of COVID-19 on GDP per capita assigning a value of 1 for the year 2020 and 0 for all other years.

Table 1.
Variables Definition

Variable	Sign	Measurement	Source
Dependent variable			
Economic growth	LNGDP	Natural logarithm of GDP per capita	WB
Independent Variable			
Islamic Financial Inclusion	IIFI	Index of Islamic Financial inclusion. The index is constructed following Sarma method for a multidimensional financial inclusion index. The components of IFI index are described below.	
Number of ATMs	ATM	Number of ATMs for 100.000 adults	WB
Number of bank branches	BBCH	Number of Bank Branches for 100.000 adults	WB
Number Islamic banks and windows	IBW	Number of Islamic banks and windows	Refinitiv
Mobile cellular subscriptions	MC	Mobile cellular subscriptions (percentage)	WB
Internet Users	IU	Individuals using internet (percentage of population)	WB
Control variables			
Trade Openness	TO	Ratio of volume of trade to GDP	WB
Inflation	INF	Annual consumer prices	WB
Investment	INV	Ratio Fixed Capital Formation to GDP	WB
Dummy variable			
Covid19	Covid19	Covid dummy variable	

3.2. Method

3.2.1. Constructing the Index of Islamic Financial Inclusion

Numerous researchers endeavor to construct a composite financial inclusion index employing primarily two methodological approaches. The parametric method is characterized by its reliance on principal component analysis (PCA). For instance, Oanh (2024) use the PCA to construct DFI index based on seven components. Similarly, Khera et al. (2021) refine this approach by employing a three-stage PCA analysis, encompassing different components across access and usage dimensions. The access dimension encompasses the number of ATMs and bank branches, while mobile cellular and internet subscriptions are used to represent the digital access. The usage dimension is measured by savings in financial institutions and the percentage of adults who have a mobile account. Conversely, the non-parametric method initially developed by Sarma (2008) and refined by Sarma (2012), mirrors the methodology employed in calculating the Human Development Index (HDI) with some improvement. Sarma's method is widely acknowledged

among researchers. Shen et al. (2021) construct the digital financial inclusion index using data from 105 countries following Sarma's framework. The study integrates various dimensions, including availability represented by the number of ATMs and bank branches, and usage dimension by financial institution accounts and borrowing from financial institutions. The weight for each dimension is adjusted by employing coefficients of variation. Additionally, Novreska & Arundina (2024) employ the Sarma's method to construct Islamic financial inclusion, focusing on three dimensions within Islamic finance. These dimensions include Islamic banking third-party funds, the number of Islamic banks and Islamic bank financing reflecting penetration, availability and usage, respectively.

In contrast to Novreska & Arundina (2024) who rely solely on Islamic finance metrics, our study adopts a more comprehensive approach by incorporating traditional financial inclusion, digital adoption and Islamic finance metrics into the index. This comprehensive approach enables us to capture all facets of financial inclusion ensuring a thorough assessment of financial inclusion in the Islamic context.

To develop a comprehensive measure of Islamic financial inclusion, we have chosen to employ the methodology developed by Sarma (2012). This method is noted for its simplicity and ease of calculation making it readily applicable by a wide range of organizations and researchers (Sarma, 2012). Additionally, a key advantage of the Sarma method over the Principal Component Analysis (PCA) is that it preserves valuable information about the variation within each dimension of financial inclusion. The PCA, while it is a powerful technique, can sometimes lead to information loss during dimension reduction.

The process of constructing this composite measure involves several sequential steps. Initially, each dimension undergoes normalization with a weighting factor (represented as *w*) assigned to each dimension. This process is outlined in equation 1.

$$\boldsymbol{d_i = w_{i^*} \frac{A_i - m_i}{M_i - m_i}} \tag{1}$$

Where,
d_i is the dimension i.
w_i = the weight assigned to the dimension i.
A_i = the current value of the dimension i.
m_i = lower limit of the dimension i.
M_i = upper limit of the dimension i.

Following this, the subsequent step applies the Euclidean distance between the dimensions and their lowest level set to zero, and the distance between the dimensions and their weights. Equation 2 and equation 3 illustrate the second phase.

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

$$X_2 = 1 - \frac{\sqrt{(w_1 - d_1)^2 + (w_2 - d_2)^2 + \cdots + (w_n - d_n)^2}}{\sqrt{w_1^2 + w_2^2 + \ldots + w_3^2}} \tag{3}$$

Where,
X_1 = Euclidian distance from 0.
X_2 = Euclidian distance from w_i.

Finally, the composite index is obtained by computing the mean of x1 and x2 as described in equation 4. This final step integrates the diverse dimensions into a unified measure of Islamic financial inclusion.

$$IIFI = \frac{1}{2}[X_1 + X_2] \tag{4}$$

In this study we incorporate six distinct variables categorized into three dimensions. The first dimension is availability encompassing number of ATMs and bank branches, consistent with Sarma (2012) and Shen et al. (2021). The second dimension focuses on accessibility and technological adoption utilizing mobile cellular and internet subscriptions metrics based on Khera et al. (2021). Lastly, a distinctive feature of our Islamic Financial Inclusion Index (IFII) lies in the representation of Islamic financial services availability proxied by the number of Islamic bank branches and Islamic windows based on Novreska & Arundina (2024).

Following Sarma (2012)'s approach, the initial step involved determining the values of *mi* and *Mi*. We initially set the value of *mi* to zero, while *Mi* is determined as the 90th percentile from the empirical data within the dataset covering the period from 2015 to 2020. Opting for the 90th percentile aids in mitigating the influence of outliers. However, this approach may result in some d_i values exceeding 1 although they should ideally fall between 0 and 1. Consequently, any d_i values surpassing 1 are adjusted downwards to 1 to maintain consistency within the index. Subsequently, each dimension of the index is calculated separately followed by the computation of the overall index using equation 2, equation 3 and equation 4. The IFI index is then added to the dataset as an independent variable (see Table 1).

3.3. Model Development

Selecting an appropriate methodology hinges on factors such as the nature of the data and the study's objectives. Given the longitudinal data, we employ a panel analysis in our study. The basic model is written as follows:

$$\boldsymbol{LGDP_{i,t} = \alpha_0 + \alpha_1 IIFI_{i,t} + \sum_{k=1}^{k} \beta_k X_{k,i,t} + u_{i,t}} \quad (5)$$

Where $LGDP_{i,t}$ refers to economic growth of country i in period t, $IIFI_{i,t}$ represents the Islamic financial inclusion index and $X_{k,i,t}$ denotes a set of control variables. See variables definition and Table 1. Finally, $u_{i,t}$ is the error term.

Three methods; Pooled OLS, random effects and fixed effects are considered. To select the appropriate model, we conducted tests for fixed effects, random effects and pooled OLS. Furthermore, to evaluate the impact of Islamic financial inclusion across varying levels of GDP per capita we applied quantile regression analysis based on Machado & Silva (2019)'s approach.

Quantile panel is represented in the following equation:

$$\boldsymbol{Q_{y_{it}}(\tau|x_{it}) = x'_{it}\beta + \eta(\tau)_i} \quad (6)$$

$$with\ i = 1, \dots, n; t = 1, \dots, T$$

While fixed effects are crucial in mean regression, estimating quantile regression with fixed effects is challenging. This difficulty arises because there is no transformation available to eliminate incidental parameters. As a simplified alternative solution, Machado & Silva (2019) suggest using the quantiles-via-moments estimator considering the following location-scale model for panel data:

$$\boldsymbol{y_{it} = \alpha_i + x'_{it}\beta + (\delta i + x'_{it}\gamma)u_{it}} \quad (7)$$

$$\eta(\tau)_i = \alpha_i + \delta i Q_u(\tau), \qquad \beta(\tau) = \beta + \gamma Q_u(\tau),$$

$$where\ x_i\ and\ u_i\ are\ independent\ and\ \Pr\big((\delta i + x'_{it}\gamma) > 0\big) = 1$$

This approach involves performing two fixed effects regressions and then computing a univariate quantile.

IV. RESULT AND DISCUSSION

4.1. The Level of IFII

According to Sarma (2012) classification, countries can be categorized based on their level of financial inclusion into three tiers. Countries with an index ranging from 0 to 0.3 are classified as low, those with an index between 0.3 and 0.6 fall into the medium category and those with an index above 0.6 are classified as high. As shown in Table 2 and Table 3 the selected 25 OIC countries fall into two categories: high and medium financial inclusion. Specifically, 12 countries exhibit a high level of financial inclusion while 13 demonstrate a medium level.

IIFI results indicate that there is still disparity between countries, attributed to the significant progress in financial inclusion achieved by Gulf countries with the highest Islamic Financial Inclusion Index value of 0.84 recorded in Saudi Arabia

in 2020, contrasted with the considerable lag experienced by African nations with the lowest Islamic Financial Inclusion Index value of 0.19 recorded in Djibouti in 2015. Factors contributing to this discrepancy include differences in economic development, government policies and political stability. Despite the disparity, an observable trend across almost all selected countries is a significant increase in their financial inclusion index (IIFI) from 2015 to 2020 indicating a notable governmental emphasis on promoting financial inclusion.

Table 2.
IIFI Values in Countries with High IIFI Level, 2015-2020

Country	2015	2016	2017	2018	2019	2020
Brunei Darussalam	0,63595331	0,65634242	0,64758042	0,66025593	0,66230877	0,66240388
Indonesia	0,65668486	0,68025628	0,70650889	0,67873429	0,69813763	0,70866658
Kazakhstan	0,52634443	0,53159244	0,53904422	0,63981905	0,63818196	0,63945411
Kuwait	0,66828434	0,68814992	0,69654582	0,71051296	0,71458594	0,71479001
Malaysia	0,72132933	0,72013702	0,71567608	0,71457852	0,73634288	0,72837208
Morocco	0,54260434	0,54068009	0,60359404	0,61122581	0,64932989	0,65251194
Oman	0,61834788	0,6179425	0,61825495	0,61297693	0,62926752	0,6397475
Qatar	0,64994917	0,63160692	0,61773017	0,5962439	0,60888911	0,60193471
Saudi Arabia	0,83753677	0,83397826	0,83590947	0,83531275	0,83399839	0,8402564
South Africa	0,68991589	0,6928339	0,70512114	0,72005195	0,73246585	0,74261612
Turkey	0,6040066	0,60307943	0,6131389	0,62618353	0,63481512	0,63453715
United Arab Emirates	0,80363803	0,81137089	0,80509423	0,79807213	0,76857489	0,72987133

Table 3.
IIFI Values in Countries with Medium IIFI Level, 2015-2020

Country	2015	2016	2017	2018	2019	2020
Algeria	0,31429496	0,33423049	0,34336481	0,3542476	0,38645568	0,4279757
Bangladesh	0,43098848	0,44394297	0,44983024	0,46401306	0,47431529	0,49800198
Djibouti	0,19636534	0,21923084	0,3126508	0,31297577	0,3280865	0,33484314
Egypt	0,37630545	0,39805269	0,42211813	0,41578924	0,466812	0,48501277
Gambia	0,3045085	0,30840984	0,31350215	0,32976088	0,29386784	0,30256323
Iraq	0,29651698	0,35383635	0,36214278	0,39493389	0,42670782	0,43665287
Jordan	0,50411851	0,45792917	0,4688954	0,46182191	0,45114455	0,4660838
Kenya	0,28216202	0,28090177	0,2837072	0,30900409	0,32197302	0,33430784
Lebanon	0,54982867	0,54698156	0,55569452	0,56621481	0,55863731	0,55251587
Pakistan	0,38973194	0,39257232	0,40070747	0,41621336	0,41757617	0,42432694
Palestine	0,27069678	0,28652938	0,29961091	0,3093594	0,3189388	0,32344876
Singapore	0,57617911	0,57418474	0,57509237	0,58489944	0,57917237	0,55889288
Tunisia	0,51594141	0,52509338	0,54733643	0,56996294	0,57755674	0,59200441

All the selected 25 OIC countries fall into either high or medium financial inclusion. This indicates significant progress in the region, as no countries fall into the low-level financial inclusion category. Moreover, the descriptive statistics presented in Table 4 reveal a general improvement in IIFI levels during this period with the mean rising from 0.51 in 2015 to 0.56 in 2020. In addition, the decrease in the standard deviation suggests a reduction in disparities between countries signaling an overall enhancement in this aspect. Therefore, contrary to our initial hypothesis, the analysis reveals that while there are discernible disparities between countries with the highest levels of Islamic Financial Inclusion (IIFI) and those with the lowest IIFI, the standard deviation across all countries is moderate. This suggests that the magnitude of disparities may not be as significant as originally posited.

Table 4.
Descriptive Statistics of IIFI for All Countries (2015-2020)

	2015	2016	2017	2018	2019	2020
Mean	0,51848932	0,52519462	0,53755406	0,54772657	0,55632568	0,56127168
Max	0,83753677	0,83397826	0,83590947	0,83531275	0,83399839	0,8402564
Min	0,19636534	0,21923084	0,2837072	0,30900409	0,29386784	0,30256323
Std.dev	0,17688523	0,17178668	0,1640576	0,15982186	0,15752057	0,1511669

4.2. Descriptive Statistics

The descriptive statistics presented in Table 5 show that the maximum GDP per capita is $101972 recorded in Qatar, while the minimum is $1889.138 in Gambia indicating a significant range. The mean GDP per capita is $26353.66 with a standard deviation of $27209.2 resulting in a high coefficient of variation. This suggests substantial dispersion and disparities between countries regarding GDP per capita.

Table 5.
Descriptive Statistics of Variables

Variable	Mean	Std. dev.	Min	Max
GDP per capita	26353.66	27209.2	1889.138	101972
IIFI	.5410937	.1617562	.1963653	.8402564
Inflation	4.103745	7.904913	-3.749145	84.86433
TO	88.80874	70.35852	24.70158	332.7738
Inv	24.43217	7.34932	7.769075	43.07444

Table 6 indicates that the independent variables exhibit low correlations with each other suggesting that multicollinearity is not a concern. This assertion is further reinforced by the variance inflation factor (VIF) results with values within 1.01 to 1.13 range indicating the absence of multicollinearity. Additionally, Table 6 highlights a strong positive correlation between GDP and IIFI.

Table 6.
Correlation Matrix of Variables

	LNGDP	IIFI	Inflation	TO	Inv
LNGDP	1.0000				
IFII	0.7456*	1.0000			
Inflation	-0.1627*	-0.1006	1.0000		
TO	0.3654*	0.0678	-0.2353*	1.0000	
Inv	0.1718*	0.0570	-0.2581*	0.0915	1.0000

*Significant at 0.05 level

4.3. Model Selection

The detailed test results for the selection of fixed effects, random effects and pooled OLS tests are presented in Table 7.

Table 7.
Tests for Model Selection

	Test	Prob	Interpretation
Pooled OLS vs Random effects	Breush Pagan LM test	<0.05	Random effects is appropriate
Pooled OLS vs Fixed effects	F test for individual effects	<0.05	Fixed effects is appropriate
Fixed effects vs Random effects	Hausman test	<0.05	Fixed effects is appropriate
Overall	Fixed effect is appropriate		

Firstly, we apply fixed effects method, then used the F-test for individual effects. The test yields a p-value less than 0.05 indicating statistical significance and confirming the presence of individual effects. Additionally, to further validate our findings we conduct pooled OLS estimation and apply the Breush Pagan LM test resulting in a p-value less than 0.05 affirming the presence of individual effects in the model. Subsequently, to ascertain whether these effects are best represented as fixed or random, we apply random effects method and then conduct the Hausman test. The p-value of Hausman test is below 0.05 suggesting that the fixed effects model is appropriate.

4.4. Assumption Testing

To assess for heteroscedasticity and cross-sectional dependence, the modified Wald and Pesaran tests are used. The results shown in Table 8 indicate the presence of both issues. Accordingly, cluster-robust standard error is applied to the fixed effects to address heteroskedasticity and cross-sectional dependence issues.

Table 8.
Testing Assumptions

	Test	Prob	Interpretation
Homoscedasticity	Modified Wald test	<0.05	There is problem of heteroskedasticity
Cross-sectional dependence	Pesaran test	<0.05	There is cross-sectional dependence

4.5. Estimation Results of the Fixed-Effect Model with Robust Standard Errors

Table 9 presents the results from the fixed-effects panel model. The estimation results as indicated in Table 9 reveal a positive and statistically significant relationship between Islamic financial inclusion and economic growth. Specifically, a one-percent increase in the Islamic financial inclusion index is associated with a 0.669% rise in GDP per capita. This finding aligns with the existing literature which emphasizes the critical role of Islamic finance and financial inclusion in driving economic growth within OIC countries. This supports our second hypothesis indicating a positive relationship between Islamic financial inclusion and economic growth.

Inflation exhibits statistical significance. The coefficient of - 0.0015 suggests that a 1% increase in the inflation rate corresponds to a 0.15% decrease in GDP per capita. This negative correlation between inflation and GDP per capita stems from the diminishing of purchasing power. Permanently rising prices decrease the country's purchasing power, influencing consumer behavior towards reduced consumption and investment, consequently resulting in lower GDP per capita. Similarly, investment represented by gross capital formation also exhibits statistical significance. The positive coefficient of 0.0041 indicates that a 1% enhancement in fixed asset investment leads to a 0.41% increase in GDP per capita. This relationship underscores the critical role of investment in economic growth. Moreover, it's noteworthy to mention that the result suggests that trade is not statistically significant in the context of the model being examined. The lack of statistical significance indicates that variations in trade levels do not have a significant impact on the relationship between financial inclusion and economic growth within the selected Islamic countries. This finding underscores the need for further investigation. Finally, the Covid dummy variable for the year 2020 yielded a statistically significant coefficient of -0.027 indicating a decrease in GDP per capita of 2.7% on average in 2020 compared to non-2020 years. This finding aligns with the expected negative economic impact of the COVID-19 pandemic.

Table 9.
Robust Standard Error estimations

	Coefficient	Prob	Interpretation
IFI	0.699	<0.05	Statistically significant positive impact
TO	- 0.0003	>0.05	Statistically not significant impact
INV	0.0041	<0.05	Statistically significant positive impact
INF	- 0.0015	<0.05	Statistically significant negative impact
Covid19	-.0276782	<0.05	Statistically significant negative impact
R-squared			0.5647

4.6. Panel Quantile Regression Results

Due to disparities between countries regarding GDP per capita as indicated in Table2 we proceed to employ quantile regression with fixed effects to examine whether the influence of Islamic financial inclusion on economic growth varies between lower and higher income countries following Machado & Silva (2019) approach that is particularly useful for panel data models featuring individual effects which is the case of our data.

The result illustrated in the visual representation of the coefficient of IIFI across different quantiles in Figure 1. reveals that trade, investment, inflation and the Islamic index of financial inclusion demonstrate a downward trend for higher quantiles. However, results reported in Table 10 indicate that this trend is not statistically significant as the coefficient remains within the confidence interval of the fixed effects regression as presented.

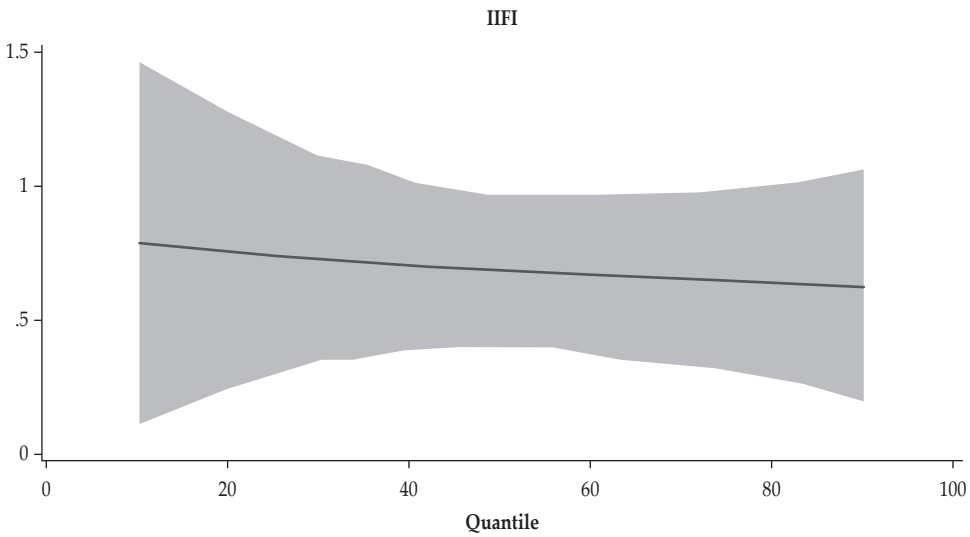
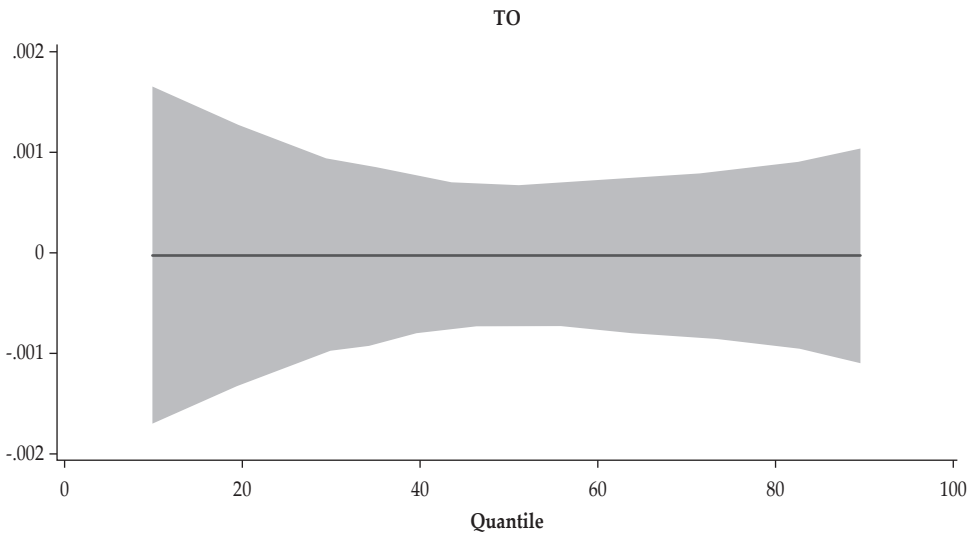


Figure 1.
IIFI Coefficient Across Different Quantiles



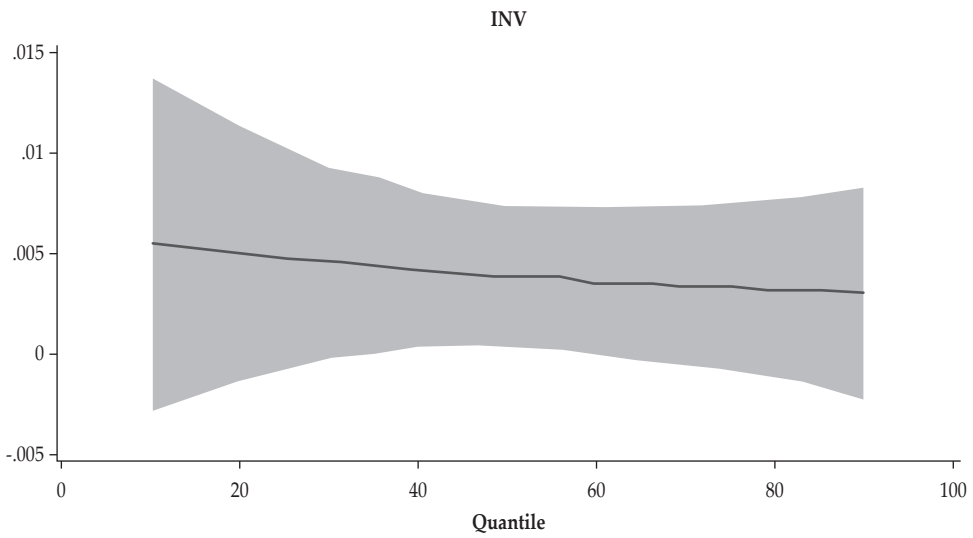


Figure 1.
IIFI Coefficient Across Different Quantiles (Continued)

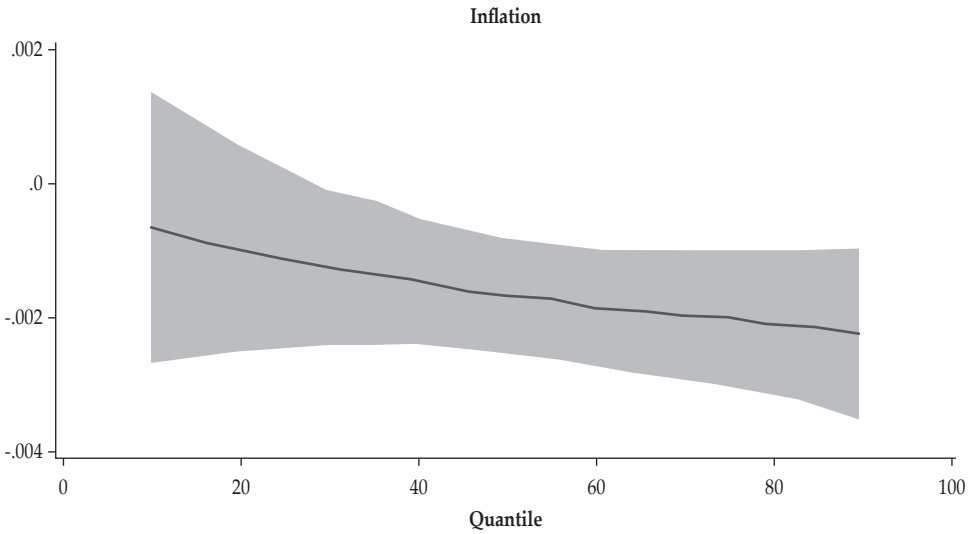


Figure 1.
IIFI Coefficient Across Different Quantiles (Continued)

Table 10.
IIFI Under Quantile Regression with Fixed Effects vs Fixed Effects Estimation

	Coefficient	Prob	95% Conf. Interval	
Q.25	.742	<0.05	.2900528	1.195341
Q.5	.683	<0.05	.4005891	.9658718
Q.75	.648	<0.05	.3092149	.9887754
Fixed effects estimation	.669	<0.05	.2934619	1.10538

According to the result illustrated in the visual representation of the coefficient of IIFI across different quantiles in Figure 1. it is evident that like investment and inflation the index of Islamic Financial Inclusion demonstrates a slight downward trend for higher quantiles. Notably, despite this slight divergence in coefficient within different quantiles, the coefficient remains within the confidence interval of the fixed effect regression as presented in Table 10.

Contrary to our third hypothesis, this suggests a remarkable consistency in coefficient across various quantiles highlighting that the Islamic Finance Inclusion exerts a uniform impact on economic growth across both lower and higher income countries within the OIC countries. Islamic financial inclusion is essential for all GDP per capita segments as it ensures broader access to financial services, mobilizes idle resources and enhances economic participation especially for those excluded from conventional systems due to religious beliefs. By offering Sharia-compliant products Islamic finance stimulates entrepreneurship, promotes ethical practices and supports sustainable growth, fostering equitable development and resilience across all economic levels.

This study enhances the existing literature by employing quantile regression with fixed effects to evaluate the differential impact of Islamic financial inclusion

across varying levels of GDP per capita following the (Machado & Silva, 2019)'s approach. The study holds significant importance as it pioneers the exploration of the impact of the critical intersection between Islamic finance and financial inclusion on economic growth within OIC countries. By elucidating this relationship, this study provides valuable insights for policymakers aiming to promote sustainable economic growth in the OIC countries.

V. CONCLUSION AND RECOMMENDATIONS

While finance is crucial for economic growth, a significant proportion of individuals and businesses in developing countries are financially underserved. In OIC countries, religion poses a substantial barrier in addition to other fundamental obstacles. To assess the impact of financial inclusion on economic growth in the unique context of Islamic countries, the Islamic Financial Inclusion Index (IIFI) is designed to capture the specific challenges and opportunities related to financial inclusion in the Islamic context. The index has been constructed to measure the level of financial inclusion within the OIC countries taking into consideration the access to traditional, digital and Islamic financial services.

By employing the quantile regression with fixed effect approach this study sheds light on the significant impact of Islamic financial inclusion on economic growth within countries belonging to the OIC. The findings reveal a positive relationship indicating that improvements in Islamic financial inclusion are associated with higher levels of economic growth. Specifically, a one-percent increase in the index of Islamic Financial Inclusion (IIFI) is associated with a 0.669% rise in GDP per capita. This underscores the importance of promoting Islamic financial inclusion as a key strategy for driving economic development across OIC member states. This finding underscores the potential of fostering Islamic financial inclusion as a pivotal strategy for driving economic development across OIC nations, particularly for lower IIFI countries that exhibit greater scope for improvement.

Moreover, the quantile analysis conducted in this study indicates consistency across different quantiles suggesting that the positive relationship between Islamic financial inclusion and economic growth holds true regardless of GDP levels. This implies that all nations within the OIC have equal opportunities to enhance their GDP through improvements in financial inclusion. Therefore, policymakers should prioritize initiatives aimed at bolstering Islamic financial inclusion across all member states to unlock their full economic potential.

In terms of policy implications, this study urges policymakers to prioritize initiatives aimed at expanding the network of Islamic banks and enhancing technological infrastructure for financial access. Measures such as promoting digital payment systems, improving internet connectivity and fostering innovation in financial technology can amplify the impact of Islamic finance on economic growth. Additionally, establishing regulatory frameworks conducive to digital Islamic financial services is crucial for creating a supportive environment.

This study provides a foundation for understanding the impact of Islamic financial inclusion on economic growth within the OIC. However, several areas warrant further investigation. Firstly, conducting comparative studies between

Islamic and conventional financial systems could highlight the unique advantages and challenges of each, providing a nuanced view of their respective contributions to economic growth. Additionally, qualitative case studies of individual OIC countries could uncover contextual factors and unique pathways through which Islamic financial inclusion influences economic growth. Finally, with the increasing adoption of digital financial services, future research could explore the role of financial technology in enhancing Islamic financial inclusion.

REFERENCES

Ahmed, H. (2017, November). Contribution of Islamic finance to the 2030 agenda for sustainable development. In *High-level conference on financing for development and the means of implementation of the 2030 agenda for sustainable development* (pp. 1-53).

Al-Jarhi, M. A. (2017). An economic theory of Islamic finance. *ISRA International Journal of Islamic Finance, 9*(2), 117–132.

Ali, A. E. S. (2022). Empowering the poor through financial and social inclusion in Africa: An Islamic perspective. Cham, Switzerland: Palgrave Macmillan.

Boukhatem, J., & Ben Moussa, F. (2018). The effect of Islamic banks on GDP growth: Some evidence from selected MENA countries. *Borsa Istanbul Review, 18*(3), 231–247.

Chinoda, T., & Mashamba, T. (2021). Financial inclusion, bank competition and economic growth in Africa. *Journal of Economic and Financial Sciences, 14*(1), 1-9.

Daud, S. N. M., & Ahmad, A. H. (2023). Financial inclusion, economic growth and the role of digital technology. *Finance Research Letters, 53*, 103602. https://doi.org/10.1016/j.frl.2022.103602

Demir, A., Pesqué-Cela, V., Altunbas, Y., & Murinde, V. (2022). Fintech, financial inclusion and income inequality: A quantile regression approach. *The European Journal of Finance*, *28*(1), 86-107.

Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2022). The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19. *World Bank Publications*.

Derradj, Y., Mekki, H., & Medjden, H. K. (2024). Impact of Islamic finance on economic growth: Malaysian experience. In N. Mansour & L. Bujosa (Eds.), *Islamic Finance* (pp. 51–60). Cham: Springer Nature Switzerland.

Emara, N., & El Said, A. (2021). Financial inclusion and economic growth: The role of governance in selected MENA countries. *International Review of Economics & Finance, 75*, 34-54.

Husman, J., & Artarini, S. (2019). Technical Note on Financial Inclusion and Islamic Finance. *IFSB*.

Imam, P., & Kpodar, K. (2016). Islamic banking: Good for growth?. *Economic Modelling, 59*, 387-401.

Khera, P., Ogawa, M. S., & Sahay, M. R. (2021). Is digital financial inclusion unlocking growth?. *International Monetary Fund*, Washington.

King, R. G., & Levine, R. (1993). Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics, 108*(3), 717–737.

Klapper, L., El-Zoghbi, M., & Hess, J. (2016). Achieving the sustainable development goals: The role of financial inclusion. *Washington: DC: Consultative Group to Assist the Poor*.

Ledhem, M. A., & Mekidiche, M. (2020). Economic growth and financial performance of Islamic banks: A CAMELS approach. *Islamic Economic Studies, 28*(1), 47–62.

Le, T.-H., Chuc, A.T., & Taghizadeh-Hesary, F. (2019). Financial inclusion and its impact on financial efficiency and sustainability: Empirical evidence from Asia. *Borsa Istanbul Review, 19*(4), 310–322.

Liu, Y., Luan, L., Wu, W., Zhang, Z., Hsu, Y. (2021). Can digital financial inclusion promote China's economic growth? *International Review of Financial Analysis, 78*, 101889. https://doi.org/10.1016/j.irfa.2021.101889

Lyman, T., & Lauer, K. (2015). What is digital financial inclusion and why does it matter? *CGAP Blog, March* 10, 2015. Retrieved from: https://www.cgap.org/blog/what-is-digital-financial-inclusion-and-why-does-it-matter (accessed 7.15.23).

Machado, J. A., & Silva, J. S. (2019). Quantiles via moments. *Journal of Econometrics, 213*(1), 145–173.

Mhlanga, D. (2022). *Digital financial inclusion: Revisiting poverty theories in the context of the fourth industrial revolution*. Cham: Springer International Publishing.

Muhammadd, M., Khan, A., & Rehman, H. A. (2019). Islamic finance and economic growth. *Islamic Banking and Finance Review, 6*, 23–38.

Nkwede, F. (2015). Financial inclusion and economic growth in Africa: Insight from Nigeria. *European Journal of Business and Management, 7*(35), 71-80.

Novreska, S., & Arundina, T. (2024). The role of Islamic financial inclusion on poverty, income inequality, and human development in Indonesia. *Journal of Islamic Monetary Economics and Finance*, *10*(1), 135-154.

Oanh, T. T. K. (2024). Digital financial inclusion in the context of financial development: environmental destruction or the driving force for technological advancement. *Borsa Istanbul Review, 24*(2), 292-303.

OECD. (2020). How Islamic finance contributes to achieving the Sustainable Development Goals. *OECD Development Policy Papers Vol. 30*. https://doi.org/10.1787/ac1480ca-en

Ozturk, I., & Ullah, S. (2022). Does digital financial inclusion matter for economic growth and environmental sustainability in OBRI economies? An empirical analysis. *Resources, Conservation and Recycling, 185*, 106489.

Refinitiv. (2022). ICD – Refinitiv Islamic Finance Development Report 2022 Embracing Change. Refinitiv.

Sarma, M. (2008). Index of financial inclusion (No. 215). *Indian Council for Research on International Economic Relations, New Delhi.*

Sarma, M. (2012). Index of financial inclusion – A measure of financial sector inclusiveness. (*Working Paper No. 07/2012). Competence Centre on Money, Trade, Finance and Development, Berlin*.

Shah, S. M. A. R., Raza, K., & Shaherbano. (2020). The role of Islamic finance in achieving economic growth: An econometric analysis of Pakistan. In A. Elzahi Saaid Ali, K. M. Ali, & M. Hassan Azrag (Eds.), *Enhancing financial*

inclusion through Islamic finance, Volume II (pp. 241–258). Springer International Publishing. https://doi.org/10.1007/978-3-030-39939-9_10

Shen, Y., Hu, W., Hueng, C. J. (2021). Digital financial inclusion and economic growth: A cross-country study. *Procedia Computer Science, 187*, 218–223. https://doi.org/10.1016/j.procs.2021.04.054

Tabash, M. I., & Dhankar, R. S. (2014). The flow of Islamic finance and economic growth: An empirical evidence of Middle East. *Journal of Finance and Accounting, 2*(1), 11-19.

Thaddeus, K. J., Ngong, C. A., Manasseh, C. O. (2020). Digital financial inclusion and economic growth: Evidence from Sub-Saharan Africa (2011-2017). *The International Journal of Business & Management*, *8*(4), 212-225.

World Bank (2022). Financial Inclusion. World Bank. Retrieved from: https://www.worldbank.org/en/topic/financialinclusion/overview (accessed 6.19.23).

World Bank & Islamic Development Bank Group. (2016). *Global Report on Islamic Finance 2016: A Catalyst for Shared Prosperity?* Washington, DC: World Bank. https://doi.org/10.1596/978-1-4648-0926-2

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