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INFORMAL ECONOMY, ISLAMIC FINANCE DEVELOPMENT, AND SUSTAINABLE DEVELOPMENT IN MUSLIM-MAJORITY COUNTRIES

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ABSTRACT

The paper focuses on the impact of informal economy and Islamic finance development on sustainable development using a panel dataset of 15 Muslim-majority countries from 2016 to 2022. The results based on the feasible GLS and panel quantile regression methods reveal that Islamic finance development has a positive impact on sustainable development. Meanwhile, the informal economy has a negative impact on sustainable development. Assessing the components of Islamic finance development, we further note that only quantitative development/financial performance and knowledge indicators are effective in achieving sustainable development. Besides these key results, GDP per capita, trade openness, and foreign direct investment emerge to be positive factors while the natural resource rents a negative factor in sustainable development. We reason that low productivity and precarious working conditions associated with informal economy may have hindered economic, social, and environmental wellbeing. The positive contribution of the Islamic finance development especially those related to Islamic financial performance and knowledge sharing to sustainable development hints the importance of further development of the Islamic financial sector in these countries.

Keywords: Sustainable development, Muslim-majority countries, Informal economy, Islamic finance.
JEL classification: Q01; O17; O16.

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I. INTRODUCTION

The global economy is presently confronted with pressing social, environmental, and economic concerns. The informal sector has a wide range of effects on the social and economic development of emerging and less developed countries, and it has emerged as a key subject in development debate (La Porta & Shleifer, 2014). In many countries, the presence of informal economy, which consists of small and medium-sized businesses and refers to economic activities that are unregistered and not subject to government regulation or taxation, is quite evident (Adeola et al., 2019). Designated as a subject area in the United Nations' Sustainable Development Goals, informal economic activities are one of the most critical obstacles to sustainable development in the twenty-first century. Because of its association with unfair competition, labor rights violations, low productivity, low income, and environmental degradation, the informal sector is linked to two vicious cycles, i.e., poverty and underdevelopment. These cycles cause degradation of the environment and depletion of resources and need to be tackled (Rogers et al., 2012). Accordingly, a sound understanding of informal economic activities is important in achieving sustainable development.

Moreover, the role of finance in growth and development cannot be overlooked (Uddin et al., 2014). Reduction of poverty and income inequality, and the management of climate challenges, as well as the recent need for the mitigation of pandemic-related risk, all form part of the need for massive financial resources and spending (Pizzi et al., 2022). Along with other risks to sustainability, the COVID-19 epidemic has harmed economies around the world by raising financial constraints. Lockdowns and isolation measures have heightened uncertainties about production and economic outcomes, while the considerable lack for long-term financial strategies remains a critical concern (Iqbal et al., 2021). Achieving sustainable development necessitates the mobilization of financial resources as well as the transfer of superior technologies to less-developed countries. The SDGs agenda has therefore prompted financial systems to review their roles and play an important role in supplementing a nation's efforts in channeling domestic public resources through the identification of novel solutions that can deliver progress toward the attainment of sustainable development (Barbier & Burgess, 2021). Because efficient use of domestic resources is vital for economic growth and development (Uddin et al., 2014), the SDGs emphasize the importance of active participation and contribution to social value creation by domestic financial market participants (van der Waal & Thijssens, 2020).

Throughout its history, Islamic finance has demonstrated significant potential to help the fulfillment of the SDGs in order to maintain environmental and human welfare (Harahap et al., 2023). Since its inception in the 1970s, the Islamic finance sector has grown steadily and significantly in a number of economies. Many nations with considerable Muslim populations have high poverty rates and low SDGs attainment rates, indicating that these countries require significant investments in infrastructure (Ahmed, 2017).

Moreover, the present economic and policy status quo can have great influence on sustainable development. The aggressiveness to generate more income for present needs might jeopardize future development through over-exhaustion of available resources (Nepal et al., 2021). This can consequently leave less resources

available for future generation, and hence, reduce sustainable development. Openness to international trade has a lot of economic benefit to the domestic economy. However, this might also pose an imminent threat to the country in terms of reducing its potential to achieve sustainable development. For instance, the pressure to supply to international markets with some raw materials and other goods for foreign exchange earnings might force the country into over-depletion of resources, thereby reducing the amount of resources available for future development and hence, impeding sustainable development. From another perspective, openness to international trade can be beneficial to sustainable development through the acquisition of foreign-produced development-aiding capital equipment, thereby improving the potentials for future growth (Zahonogo, 2016). The drive to earn resource rents might impose a resource-curse situation, as the extraction of natural resources can lead to reduction in institutional quality through the emergence of corrupt practices (Dogan et al., 2020). This can consequently reduce the potentials for sustainable development. The inflows of foreign capital also have some implications for present and future development of a country. For instance, increasing the inflow of international investment can help boost the potential of the domestic economy to achieve sustainable development through increase in domestic capital stock that can be reinvested for future growth (Din et al., 2022). It might also serve as a potential impediment to sustainable development if the inflows of foreign capital are directed at resource-extractive operations that leaves little or no resources left for future generations.

These issues have motivated the need for investigations on the roles of informal economic activities as well as Islamic finance in sustainable development. In the literature, some attempts have been made to examine how informal economy and financial development affect sustainable development. However, the existing research remains limited and has not addressed the impacts of informal economy and financial development, specifically Islamic finance development, simultaneously. In addition, this study is perhaps first to adopt an index of Islamic finance development to capture the role of Islamic finance in achieving sustainable development in a context of a panel of countries. Previous studies have simply used specific Islamic finance services such as Sukuk, Zakat, and Takaful, to capture Islamic finance development usually in a context of a single country or firms within a country. The prevailing studies have also not performed robust analysis on the subject. These gaps motivate the present study to examine the roles informal economy as well as Islamic finance development in achieving sustainable development.

The remainder of the paper is structured as follows: Section 2 deals with literature review, Section 3 provides explanation of the data and methodology, Section 4 deals with results presentation and discussion, Section 5 summarizes the study and provides conclusion and policy implications.

II. LITERATURE REVIEW

2.1. Informal Economy and Sustainable Development

Informality plays a crucial role in fostering economic growth by contributing to increased productivity, mainly because of the significant disparity in labor

productivity between the formal and informal sectors (Rada, 2010). The distinction between the formal and informal economies is often not straightforward, leading to discussions in the 1970s and 1980s on how to precisely define informality, particularly for statistical and policy purposes (Meagher, 2013). For a more comprehensive understanding of economic informality, the International Labor Organization and Women in Informal Employment: Globalizing and Organizing put forth a three-part definition: First, the informal sector refers to production and employment in unregistered enterprises. Second, informal employment encompasses employment outside of the labor protection regulations of a given society, whether in formal or informal firms. Finally, the informal economy encompasses all firms, workers, and activities that operate outside the legal regulatory framework of society, and the output that they generate (Meagher, 2013).

Economic informality is often linked to poverty as most jobs in the informal sector are characterized by low wages, irregularity, and lack of social benefits (ILO, 2019). However, establishing a strong correlation between informality and poverty is challenging due to the blurred boundaries between the formal and informal sectors, resulting from interconnections between formal and informal enterprises (Brown et al., 2014). Two contrasting viewpoints have emerged regarding the reasons for labor movements into the informal economy. One group, adopting a rational, individualistic perspective, argues that individuals choose to exit the formal economy, despite its greater social protection and higher taxes, to maximize their income and flexibility (Meagher, 2013). On the other hand, some contend that workers do not typically opt for the informal economy out of choice, and it is formal-sector employers who benefit the most (Altman, 2008; Valodia & Devey, 2011).

Özgür et al. (2021) present informality as a fundamental aspect of sustainable development and establish a strong correlation between the size of the informal sector and socio-economic indicators. In a study by Sultana et al. (2022), the informal sector is found to play an overall detrimental role in the sustainable development of developing countries, with the working poor serving as a proxy for the informal sector. Recognizing the informal economy and workforce as a significant part of the global economy, Chen (2016) suggests evaluating economic and social policies based on their impact on the informal sector and its integral components. The study by Pratap and Quintin (2006) reveals a high correlation between informal activities and the level of economic development and institutional quality, highlighting the modern model of the informal sector, which focuses on small-scale, unskilled labor-intensive, and self-financed activities, capable of accommodating the consequences of pro-growth policies and supporting a large informal sector. Rai et al. (2019) argue that addressing decent work in the informal sector and economic growth issues should receive more attention to fulfill its potential.

2.2. Islamic Finance Development and Sustainable Development

Generally, financial development constitutes a crucial foundation for achieving sustainable economic growth. In the global economy, the financial sector's role in economic growth and development has been steadily increasing. Various studies

have shown a positive correlation between economic growth and environmental degradation, particularly in developing countries (Scott et al., 2013; Hunjra et al., 2022; Nguyen et al., 2022). As for the more specific impact of Islamic finance development on sustainable development, the empirical literature is sparse. The few studies that have attempted to link sustainable development with Islamic finance include Alhammadi (2022), Almadani et al. (2020), Othman et al. (2021), Adewale and Zubaedy (2019), Aassouli et al. (2018), Budalamah et al. (2019), and Yesuf and Aassouli (2020). These studies predominantly focus on the specific impacts of Islamic banking, Sukuk, Zakat, Islamic finance instruments, Islamic finance liquidity management solutions, Waqf, and Islamic fund, respectively, on sustainable development.

For instance, Alhammadi (2022) focuses on the restructuring tendency of Islamic banking towards social, economic, and environmental redevelopment based on *Maqasid Al-Shari'ah* in the Covid-19 period. He finds that Islamic banking and finance is a viable tool to help in the mitigation of the Covid-19 impact, and as well, serve as alternative financial system for the recovery of affected businesses. Almadani et al. (2020) investigate the Sukuk compliance with *Maqasid Al-Shari'ah* with respect to well-being and human development. The study finds that investment through Sukuk serves as a factor that improves overall benefits and promotes human well-being and sustainable development. Othman et al. (2021) focus on the role of Zakat distribution in the achievement of SDGs in the state of Kedah, Malaysia. They find that the distribution of Zakat is in line with SDGs, and it has the potentials to improve the SDGs. Adewale and Zubaedy (2019) investigate the impact of Islamic finance instruments on sustainable higher education in Nigeria. The study finds that Sukuk, Waqf, and Zakat are Islamic finance instruments that have potentials to improve sustainable higher education attainment.

Furthermore, Aassouli et al. (2018) investigate the role of Islamic finance institutions' liquidity management solution in sustainable development and financial stability. Employing qualitative research, the study demonstrates the role of financial innovation in meeting sustainable development and financial stability objectives. Budalamah et al. (2019) conduct a study on how Waqf (value-based financing) can be harnessed to achieving SDGs. The study develops theoretically the linkages between Waqf and SDGs and concludes that Waqf can be used to fund municipal initiatives that can contribute to achieving SDGs. The study by Yesuf and Aassouli (2020) examines the synergies between Islamic funds and socially responsible investment to achieving SDGs. The findings show that including ESG/SDG concerns into Islamic fund investing decisions has no negative impact on their outcomes. Rather, it increases their beneficial impact and contribution to closing the finance gaps for the SDGs.

The reviewed literature shows that previous empirical attempts have largely focused on instruments of Islamic finance and have not considered the role of Islamic finance development on sustainable development. Moreover, the studies have not attempted to examine the potential of the informal economy in economies with large Islamic finance sector in the achievement of sustainable development. These voids in the literature motivate the present study.

III. METHODOLOGY

3.1. Data

This study employs a panel dataset encompassing 15 selected Muslim majority nations, which include Bahrain, Brunei, Bangladesh, Indonesia, Jordan, Kuwait, Malaysia, Maldives, Nigeria, Oman, Pakistan, Qatar, Saudi Arabia, Sudan, and United Arab Emirate. The period covers 2016 to 2022. The study focuses on these countries where, alongside other developing nations, concerns of sustainable development abound and cross-country variation in the level of informal economic activities and financial sector policy is striking. The study's data are annual obtained from the Sustainable Development Goals Report, World Bank's World Development Indicators (WDI) database, and the Islamic Corporation for the Development of the Private Sector (ICD)-Islamic Development Bank (ISDB) Group-Refinitiv Islamic Finance Development Reports. Table 1 contains the definition for all variables and their specific sources.

Table 1.
Variable Description

Variable Name	Acronym	Description	Supporting literature	Data Source
Sustainable Development Score	sds	Sustainable development score is the average of each country's score on all sustainable development goals (SDGs 1 to 17). The score ranges from 0 (worst) to 100 (best) achievement of sustainable development goals.	Sachs et al. (2023) and Lafortune et al. (2020)	Sustainable Development Solutions Network (SDSN) and Dublin University
Informal Economy	ie	Multiple indicators Multiple Causes (MIMIC) method (% of GDP)	Medina & Schneider, (2018)	World Development Indicators (WDI)
Islamic Finance Development	ifdi	A country's overall score regarding Islamic finance development. It has 5 indicators which are quantitative development/financial performance (qd), governance (gov), knowledge (knw), corporate social responsibility/ sustainability (csr), and awareness (awr).	-	Islamic Corporation for the Development of the Private Sector (ICD)-Islamic Development Bank (ISDB) Group-Refinitiv Islamic Finance Development Reports.
Income per capita	gdpp	GDP per capita (constant 2015 US$)	Nepal et al. (2021)	World Development Indicators (WDI)
Foreign Direct Investment	fdi	Foreign direct investment, net inflows (BoP, current US$)	Din et al. (2022)	World Development Indicators (WDI)
Natural resource abundance	nr	Total natural resources rents (% of GDP)	Dogan et al. (2020)	World Development Indicators (WDI)
Trade Openness	to	Trade (% of GDP)	Zahonogo (2016)	World Development Indicators (WDI)

Source: Authors' Compilation

3.2. Model

The following regression model is specified to achieve the aims of this study.

$$sds_{it} = \beta_0 + \beta_1 ie_{it} + \beta_2 ifdi_{it} + \beta_3 lngdpp_{it} + \beta_4 to_{it} + \beta_5 nr_{it} + \beta_6 fdi_{it} + \epsilon_{it} \quad (1)$$

where sds is sustainable development score as our dependent variable. The explanatory variables are informal economy (ie), Islamic financial development (ifdi), natural log of GDP per capita (lngdpp), trade openness (to), natural resource endowment (nr) and foreign direct investment (fdi). ϵ represents the disturbance term.

Following the methodology provided by Lafortune et al. (2020) and Sachs et al. (2023) in computing SDGs index, this study measures sustainable development for each country by averaging its scores on all 17 SDGs. The index tracks the annual progress of UN member countries towards achieving sustainable development goals. Scores are computed for each of the 17 goals based on each country's performance in the indicators specified by the UN to achieve the targets of each goal. 17 scores are generated, and a simple average of these scores is taken to arrive at an overall SDG index.

Informal economy is measured following the estimation of Medina and Schneider (2018), which is based on the multiple indicators and multiple causes (MIMIC) method. The MIMIC modeling is a theory-based approach for confirming the influence of a group of exogenous causal variables on a latent variable (in this case, the informal economy) (Almenar et al., 2020). It can also be used to examine how the informal economy affects macroeconomic indicator variables. The MIMIC is a variant of structural equation modelling that helps to generate an index based on the observed relationships that exist among the multiple indicators and causes. This index is then calibrated to be expressed as the share of informal economy in overall GDP.

As for Islamic finance development, although some attempts have been made by previous studies to come up with an overall index for the performance of Islamic finance in a country (for example, Ascarya & Masrifah, 2023; Naja et al., 2023), the index is usually not available for different periods and is sometimes available for only one country. This study, therefore, uses Islamic finance development index published in the joint reports by Islamic Corporation for Development (ICD), Islamic Development Bank (IsDB) group, and Refinitiv. Following the reports, Islamic finance development is therefore, measured by Islamic finance development index score (ifdi). The Islamic finance development index is a simple average of each country's scores in five (5) Islamic finance development indicators to help assess the overall performance of the Islamic finance industry in accordance with its intrinsic faith-based aims. These five (5) indicators include Quantitative Development (changed to Financial Performance) of Islamic finance (qd), Governance of Islamic finance institutions (gov), Corporate Social Responsibility (csr), Knowledge of Islamic finance (knw) and Awareness of the availability of Islamic finance (awr). For robustness purpose, the different indicators of Islamic finance development index are also employed to examine their individual contribution and ascertain which aspect of Islamic finance development affects sustainable development in the selected countries.

In the computation method, the score for quantitative development/financial performance indicator for a country is largely based on the number of Islamic banks or Islamic banking windows in a country. Takaful, Islamic funds, Sukuk, and Other Islamic Financial Institutions (OIFIs) are also used to compute the quantitative development/financial performance score. As for the governance indicator score, performance on regulations of Islamic banking, Shariah governance, and corporate governance are used. Corporate social responsibility of Islamic finance sectors and their alignment with environmental, social, and governance activities are employed to compute the CSR/sustainability indicator score. As for the knowledge indicator, countries performance on education (i.e., number of Islamic finance degrees and courses providers) and research (i.e., number of research studies on Islamic finance and number of Islamic finance journals) are used to compute its score. Awareness indicator score is computed through the number of events (such as seminars and conferences) and number of exclusive news made available on Islamic finance. Table 2 presents the summary of these indicators and sub-indicators that make up the Islamic finance development index.

Table 2.
Components of Islamic Finance Development Index Computation

Index	Indicators	Sub-Indicators
Islamic Finance Development Index	Quantitative Development/ Financial Performance of the Islamic Finance Sector	Islamic banking (return on assets, total number of institutions, total assets, listed institutions).
		Takaful (return on assets, total number of institutions, total assets, listed institutions).
		Other Islamic financial institutions (OIFIs) (return on assets, total number of institutions, total assets, listed institutions, and number of Islamic FinTechs).
		Sukuk (number and volume of Sukuk outstanding and issued, listed Sukuk)
		Islamic funds (cumulative performance, number of assets managers and number of funds, number of outstanding funds).
	Governance in the Islamic finance sector	Regulations (on Islamic banking, FinTech sandbox, Islamic funds, Sukuk, Takaful, Shariah governance, and specific accounting).
		Shariah governance (institutions with three or more Shariah scholars, scholars with six or more board memberships, scholars with at least one board membership, and presence of centralised Shariah committee).
		Corporate governance (corporate governance mechanisms like non-executive chairs of audit and risk management committees and independent board chairperson, independent directors, and disclosure index score).

Table 2.
Components of Islamic Finance Development Index Computation (Continued)

Index	Indicators	Sub-Indicators
	Corporate social responsibility/sustainability in the Islamic finance sector	CSR (disclosed CSR index, Zakat and Qardh al hasan, funds disbursed to charity).
		ESG (ESG reporting index score, sustainability guidelines because of Islamic finance presence, value and number of ESG Islamic funds outstanding, and value and number of ESG Sukuk outstanding).
	Knowledge sharing about Islamic finance	Education (Degree and course providers in Islamic finance).
		Research (Islamic finance journals and research papers produced).
	Awareness creation about Islamic finance	Event (number of online events, conferences, and seminars).
		News (number of regional and exclusive news).

Source: ICD-Refinitive Islamic Finance Development Report

Other variables include GDP per capita (gdpp) measured at constant 2015 US dollars; trade openness (to), measured by the percentage share of total trade (exports and imports) in GDP; natural resource rents (nr), measured by its percentage share in GDP; and foreign direct investment (fdi), measured by its percentage share in GDP. The inclusion of GDP per capita stems from the view that the quest to generate more income for present needs have some implications for future incomes and development, and subsequently on sustainable development. Trade openness is included to account for the degree of sustainable development that can be achieved when countries are open to international trade. Natural resources rent has an implication for sustainable development from the viewpoint of the resource-curse hypothesis. Increase in resource rents may pave ways to corruption practices that can circumvent the development process of an economy. Foreign direct investment is included for the need to reveal the extent to which capital inflows can help achieve sustainable development.

To estimate the model, we employ the feasible GLS (FGLS). Generally, problems related to serial and cross-sectional correlations, and heteroskedasticity are significant issues in panel regression models. There are two main techniques for dealing with these issues. The first technique is to employ the ordinary least squares (OLS) regression with a robust standard errors (Arellano, 1987; Newey & West, 1987; White, 1980). The second option is to utilize the generalized least squares estimator (GLS), which explicitly accounts for heteroskedasticity as well as serial and cross-sectional correlations in the estimation (Bai & Liao, 2017; Chernozhukov et al., 2017). It is well acknowledged that GLS is more efficient than OLS (Bai et al., 2020). For this reason, the feasible GLS method was adopted for use in this study.

In addition to the FGLS method, we also use the quantile regression for robustness. The Least squares estimation is a useful method for estimating

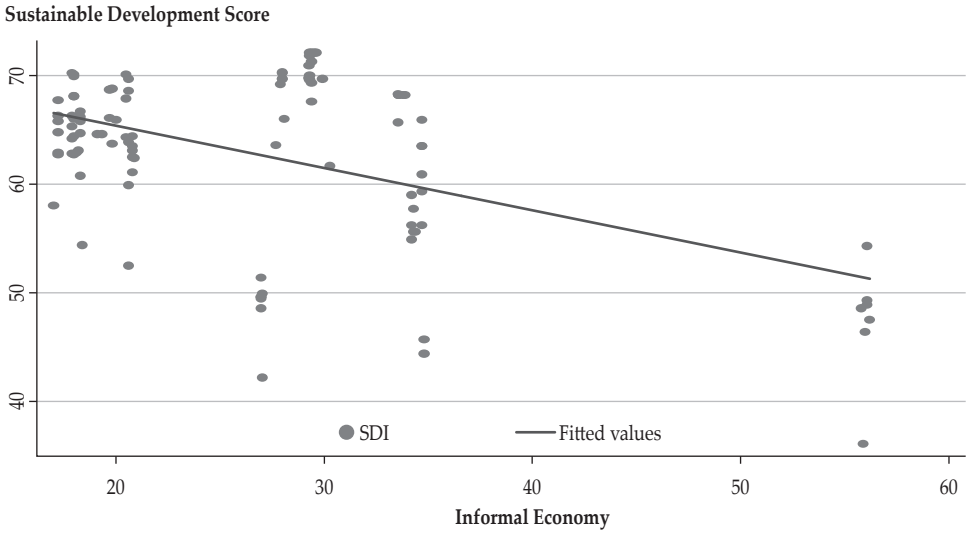
conditional mean models. Quantile regression is an equally useful method for estimating models for conditional quantile functions (Goswami et al., 2021; Koenker & Hallock, 2001). In this paper, we adopt the quartiles method, where the distribution of the dependent variable is divided into four equal parts, resulting the estimation at the 25th, 50th, and 75th quantiles to show whether the empirically relationships of interest differ at these different quantiles.

IV. RESULTS AND ANALYSIS

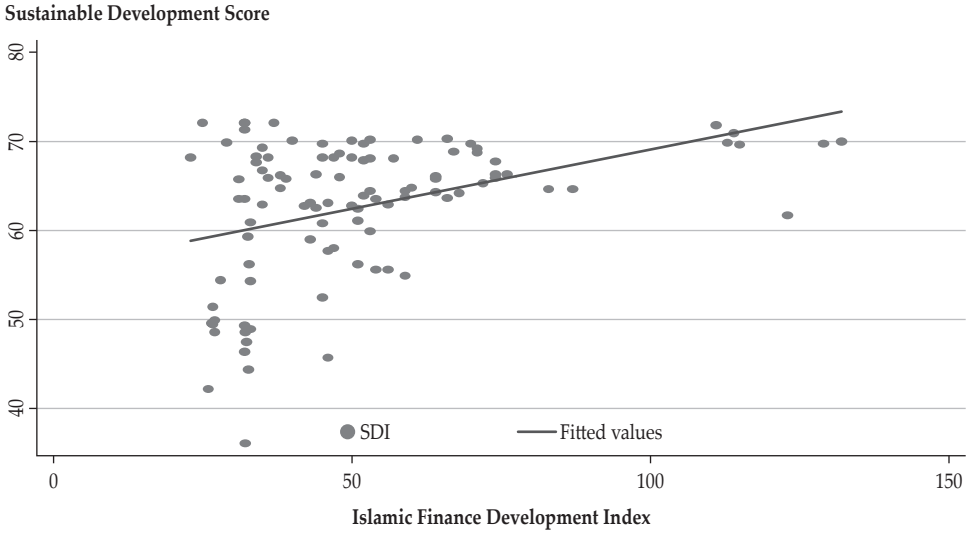
4.1. Graphical Description of Variables

Figure 1 provides the scatter plots between sustainable development and informal economy, Islamic finance development and its components. From the plots, we may note that sustainable development is negatively correlated with the informal economy, suggesting that higher levels of sustainable development are associated with lower levels of informal economy and vice versa. Meanwhile, the correlation between sustainable development and overall Islamic finance development score is positive. Furthermore, the sustainable development is also positively associated with all components of Islamic finance development except the CSR/sustainability component. This implies that in general Islamic finance development is positively related with sustainable development.

Figure 2 reveals that countries with high Islamic finance development tend to have high sustainable development score. For instance, Malaysia has the highest Islamic finance development score as well as one of the highest levels of sustainable development. Likewise, Bahrain, Indonesia, and Saudi Arabia have high Islamic finance development with high sustainable development index. As revealed in Figure 3, Malaysia consistently perform better than every other country in each Indicator of Islamic finance development except in the knowledge indicator. In knowledge of Islamic finance, Indonesia performs the best among all countries. In fact, Indonesia earns its high overall Islamic finance score thanks to its knowledge indicator. It performs much lower in other indicators, suggesting that the country is more emphatic in the provision of degrees and courses as well as research on Islamic finance. Most Gulf countries such as Bahrain, Kuwait, Saudi Arabia, Oman, Qatar, and United Arab Emirate perform better in the awareness indicator of Islamic finance development than other indicators. Bangladesh, Brunei Darussalam, Maldives, and Pakistan focus more on the governance aspect of Islamic finance while Nigeria is more emphatic on CSR/sustainability indicator.

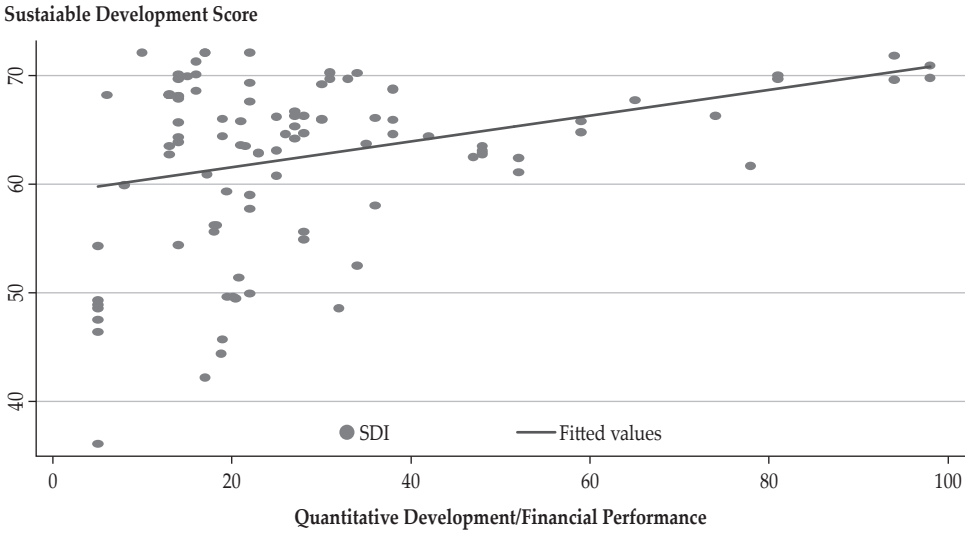


Source: Authors' Plot using Stata 14



Source: Authors' Plot using Stata 14

Figure 1.
Scatter Plot of Relationship between SD and each of IE, IFDI and components of IFDI Respectively



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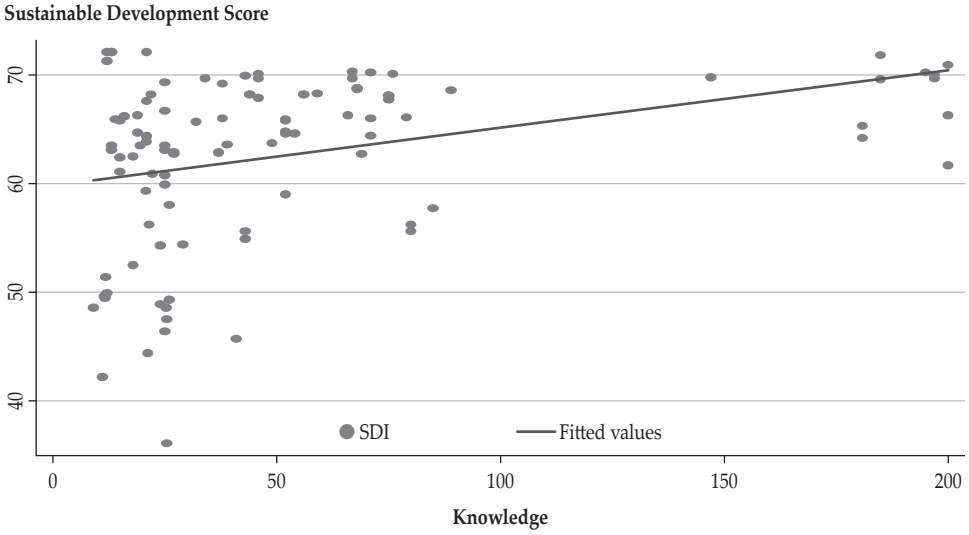
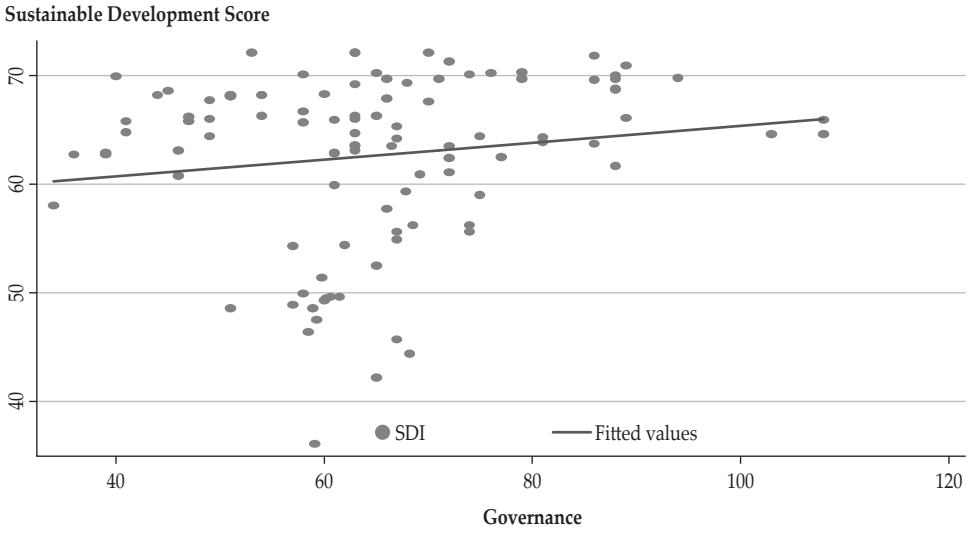


Source: Authors' Plot using Stata 14

Figure 1.
Scatter Plot of Relationship between SD and each of IE, IFDI and components of IFDI Respectively (Continued)



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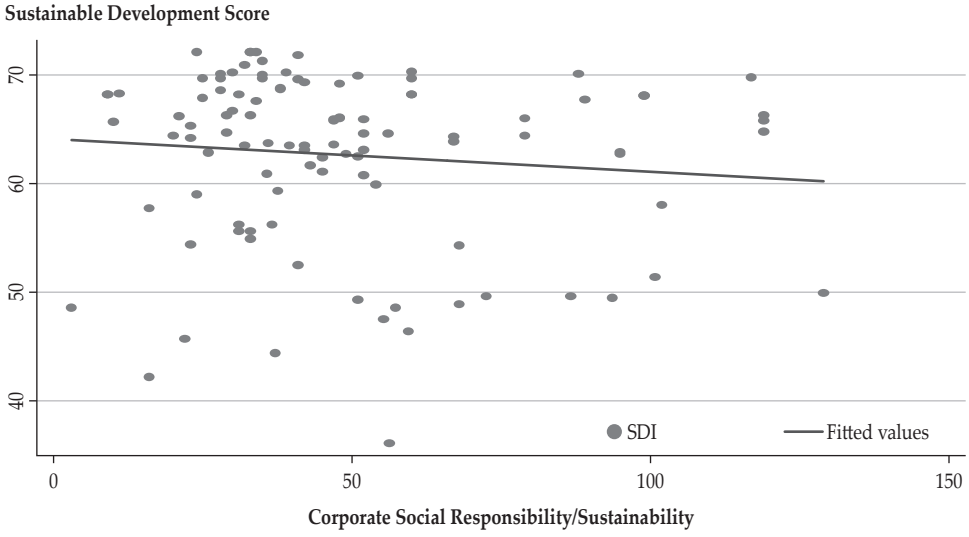
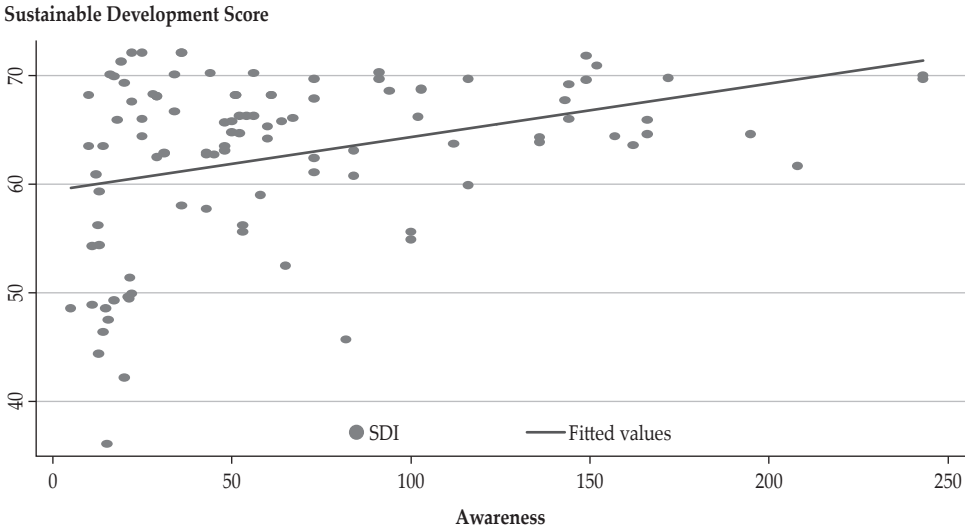


Source: Authors' Plot using Stata 14

Figure 1.
Scatter Plot of Relationship between SD and each of IE, IFDI and components of IFDI Respectively (Continued)



Source: Authors' Plot using Stata 14

Figure 1.
Scatter Plot of Relationship between SD and each of IE, IFDI and components of IFDI Respectively (Continued)

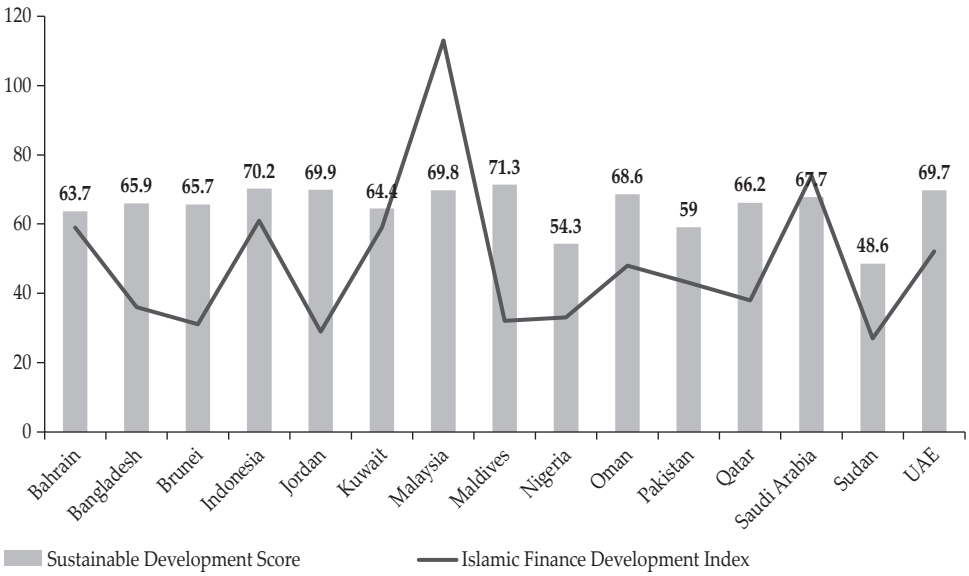


Figure 2.
Combo Chart (Column and Line) of Sustainable Development and Overall Islamic Finance Development

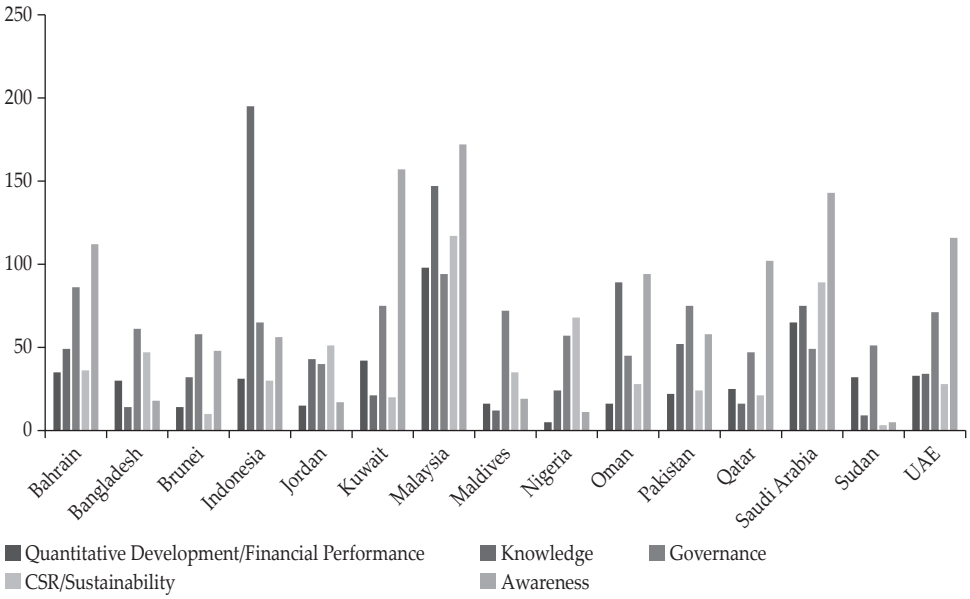


Figure 3.
Column Chart for the Indicators of Islamic Finance Development

4.2. Summary Statistics and Pairwise Correlation

From the descriptive statistics in Table 3, the mean sustainable development score is 62.64. This shows that on average Muslim-majority countries in the sample have achieved about 62.64 percent of the targets of all 17 SDGs, a sign that some progresses have been made as the halfway to the deadline of achieving SDGs closed in. despite this progress, the average also signifies that a considerable share of SDG targets still need to be met as the deadline approaches. The informal economy's share of GDP has a mean of 27.0 percent; Islamic finance development indicator has a mean of 51.51 score out of 100; while its components of quantitative development, knowledge, governance, corporate social responsibility, and awareness each has a mean of 28.96, 52.91, 64.89, 48.55, and 65.34 scores respectively. This means that Islamic finance development in these countries is on an average performance, with corporate governance and awareness contributing the most to Islamic finance development. Furthermore, with considerable level of Islamic financial development in these countries, and if effectively utilized, it is expected to translate to more sustainable development by making cleaner energy alternatives available to engender capacity to mitigate climate change (Singh & Dhadse, 2021).

Furthermore, GDP per capita averages about US$17,182, suggesting that the countries in this region are upper-middle income nations, on the average. Although, the sample contains some lower-middle income countries as shown by the minimum value of US$1,308. Trade openness has a mean of 82.7 percent; natural resource rents' share of GDP has a mean of 11.71 percent; and foreign direct investment' share of GDP has a mean of 2.435 percent.

From the pairwise correlations on Table 4, sustainable development is significantly and negatively related to the informal economy. It is positive and significantly correlated with Islamic finance development index, as well as its components, namely, quantitative development/financial performance, knowledge, and awareness. However, it is not significantly correlated with governance and corporate social responsibility/sustainability indicators of Islamic finance development. It is also significantly and positively correlated with GDP per capita, trade openness and foreign direct investment. It can bee seen from Table 4 that sustainable development is not significantly correlated with natural resource rents. More importantly the correlation results reveal a weak relationship, i.e., less than 0.8, among the explanatory variables (except in the cases of the components of Islamic finance development, which are not included together in a single regression model). Thus, multicollinearity should not be a major concern.

Table 3.
Summary Statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables	**N**	**mean**	**sdev**	**min**	**max**	**skew**	**kurt**	**p25**	**p50**	**p75**
sds	105	62.64	7.82	36.1	72.1	-1.14	3.63	59.3	64.6	68.2
ie	105	27	9.992	17	56.2	1.467	5.132	18.3	26.98	33.57
ifdi	105	51.51	23.5	23	132	1.587	5.56	33	47	60
qd	105	28.96	21.19	5	98	1.676	5.516	15	22	34
knw	105	52.91	51.18	9	200	1.888	5.634	21	37	67
gov	105	64.89	14.93	34	108	0.505	3.428	57	63	72
csr	105	48.55	27.42	3	129	1.082	3.646	31	41	59.5
awr	105	65.34	54.65	5	243	1.277	4.062	22	50	91
gdpp	105	17,182	17,047	1,308	64,233	1.182	3.681	2,527	10,753	24,872
to	105	82.7	47.95	2.699	172.8	0.144	1.876	33.01	88.95	117.8
nr	105	11.71	10.84	0.0026	45.15	0.791	2.865	1.303	9.293	18.89
fdi	105	2.435	3.119	-1.686	17.13	2.155	8.608	0.543	1.529	3.721
countries	15	15	15	15	15	15	15	15	15	15

Source: Authors' Computations using Stata 14

Note: sds is sustainable development score; ie is informal economy; ifdi is Islamic finance development indicator; qd is quantitative development/financial performance indicator of Islamic finance development; knw is knowledge indicator of Islamic finance development; gov is governance indicator of Islamic finance development; csr is corporate social responsibility/sustainability aspect of Islamic finance development; awr is awareness of Islamic finance development; gdpp is GDP per capita; to is trade openness; nr is natural resource rents; and fdi is foreign direct investment.

Table 4.
Pairwise Correlation Matrix

Variable	sds	Ie	ifdi	qd	knw	gov	csr	awr	lngdpp	to	nr	fdi
sds	1											
ie	-0.497***	1										
ifdi	0.40***	-0.22**	1									
qd	0.321***	-0.29***	0.80***	1								
knw	0.346***	-0.131	0.80***	0.57***	1							
gov	0.148	0.033	0.55***	0.37***	0.35***	1						
csr	-0.104	-0.127	0.094	0.194**	-0.064	-0.24**	1					
awr	0.344***	-0.22**	0.84***	0.61***	0.51***	0.57***	-0.054	1				
lngdpp	0.584***	-0.44***	0.25***	0.26***	-0.033	0.040	-0.034	0.42***	1			
to	0.714***	-0.3***	0.41***	0.29***	0.145	0.37***	-0.137	0.52***	0.74***	1		
nr	0.137	-0.34***	0.040	0.215**	-0.246**	-0.092	0.083	0.18*	0.71***	0.242**	1	
fdi	0.412***	-0.013	-0.051	-0.125	-0.011	0.123	-0.138	-0.024	0.114	0.49***	-0.24***	1

Source: Authors' Computations using Stata 14

Note: *** p<0.01, ** p<0.05, * p<0.1 sds is sustainable development score; ie is informal economy; ifdi is Islamic finance development indicator; qd is quantitative development/financial performance indicator of Islamic finance development; knw is knowledge indicator of Islamic finance development; gov is governance indicator of Islamic finance development; csr is corporate social responsibility/sustainability aspect of Islamic finance development; awr is awareness of Islamic finance development; gdpp is GDP per capita; to is trade openness; nr is natural resource rents; and fdi is foreign direct investment.

4.3. Regression Analysis

Tables 5 and 6 present the results from the feasible GLS and Quantile regression estimation. The results we obtained from the two methods or robustness purpose and their results are largely in agreement. As may be noted from both tables, the informal economy carries significant and negative coefficients of approximately -0.2 in most of the equations. This indicates that the informal economy has a negative impact on sustainable development. From the estimated coefficients, we may infer that the increase in informal economic activities by a percent of overall economic activities is related to a decline in sustainable development score by 0.2 points.

Islamic finance development has positive coefficients, mostly significant at 1% and 5% significance levels (indicated by *** and ** respectively). With the estimated coefficient of 0.1, an increase in Islamic finance development score by one point will be associated with a rise in sustainable development index by 0.1 points. As for the component indicators of Islamic finance development, quantitative development/financial performance of Islamic finance shows some significant positive coefficients (0.115 and 0.0652), especially from the quantile regression results. This conforms with the positive coefficients revealed by the overall Islamic finance development index. The result indicates that an increase in the quantitative development and financial performance of Islamic finance institutions by a point will lead to an increase of approximately 0.1 percent points in sustainable development score. Similarly, the knowledge indicator is reported with significant positive coefficients (0.0601, 0.0408, and 0.0271) under the quantile regression. This indicates that increasing Islamic finance knowledge sharing by a point will cause a rise in sustainable development score by approximately 0.06 percent point (for 25th quantile), 0.04 percent points (for 50th quantile), and 0.03 percent points (for 75th quantile).

Further results on component indicators of Islamic finance are shown in Table 6. Governance indicator shows insignificant coefficients throughout the methods used. Similarly, the awareness indicator has insignificant coefficients. CSR/sustainability's coefficients are also largely insignificant except for the one presented under the 25th quantile regression which shows a significant negative value. As such, CSR/sustainability is presumed to have a negative or at least insignificant effect on sustainable development.

Table 5.
Panel Regression Results for Direct Impact

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DV: sds		**Quantile Regression**				**Quantile Regression**				**Quantile Regression**		
	FGLS	**25th**	**50th**	**75th**	**FGLS**	**25th**	**50th**	**75th**	**FGLS**	**25th**	**50th**	**75th**
ie	-0.241***	-0.120	-0.254***	-0.200***	-0.243***	-0.121	-0.24***	-0.212***	-0.232***	-0.172**	-0.236***	-0.199***
	(0.0493)	(0.106)	(0.0664)	(0.0690)	(0.0609)	(0.0978)	(0.0580)	(0.0760)	(0.0500)	(0.0774)	(0.0630)	(0.0614)
ifdi	0.0720***	0.105**	0.0674**	0.0321								
	(0.0252)	(0.0486)	(0.0305)	(0.0317)								
qd					0.0411	0.115**	0.0652**	0.0214				
					(0.0416)	(0.0461)	(0.0273)	(0.0358)				
knw									0.0307	0.0601***	0.0408***	0.0271**
									(0.0281)	(0.0148)	(0.0120)	(0.0117)
lngdpp	3.010***	4.261**	2.756**	2.768**	3.139***	3.936**	2.424**	2.912**	3.028***	3.392**	2.612**	1.999*
	(0.570)	(2.052)	(1.287)	(1.338)	(0.818)	(1.886)	(1.119)	(1.465)	(0.723)	(1.478)	(1.202)	(1.173)
to	0.0240*	0.000993	0.0223	0.0248	0.0306*	0.0251	0.0360	0.0277	0.0295	0.0227	0.0231	0.0282
	(0.0140)	(0.0466)	(0.0293)	(0.0304)	(0.0184)	(0.0406)	(0.0241)	(0.0315)	(0.0197)	(0.0310)	(0.0252)	(0.0246)
nr	-0.164***	-0.173	-0.169*	-0.249**	-0.177***	-0.155	-0.222**	-0.286**	-0.131***	-0.0131	-0.0852	-0.165*
	(0.0292)	(0.157)	(0.0985)	(0.102)	(0.0566)	(0.144)	(0.0855)	(0.112)	(0.0403)	(0.118)	(0.0960)	(0.0936)
fdi	0.328***	0.761*	0.481*	0.378	0.288*	0.639*	0.510**	0.230	0.367**	0.824***	0.592**	0.509**
	(0.111)	(0.422)	(0.265)	(0.275)	(0.174)	(0.371)	(0.220)	(0.288)	(0.162)	(0.291)	(0.236)	(0.231)
Constant	35.57***	19.00	40.19***	44.11***	36.79***	21.92	44.24***	44.79***	36.90***	26.94**	40.85***	49.83***
	(5.381)	(16.25)	(10.19)	(10.59)	(7.678)	(14.79)	(8.776)	(11.49)	(5.925)	(11.46)	(9.324)	(9.095)
Observations	105	105	105	105	105	105	105	105	105	105	105	105
No. of countries	15	15	15	15	15	15	15	15	15	15	15	15
Pseudo R-sq		0.494	0.418	0.329		0.502	0.423	0.326		0.549	0.456	0.368
Chi^2 stat	253.1***				179.8***				261.2***			

Source: Authors' Computations using Stata 14

Note: *** p<0.01, ** p<0.05, * p<0.1; Robust standard errors in parentheses; sds is sustainable development score; ie is informal economy; ifdi is Islamic finance development indicator; qd is quantitative development/financial performance indicator of Islamic finance development; knw is knowledge indicator of Islamic finance development; gdpp is GDP per capita; to is trade openness; nr is natural resource rents; and fdi is foreign direct investment.

Table 6.
Panel Regression Results for Direct Impact (cont'd)

	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
DV: sd		**Quantile Regression**				**Quantile Regression**				**Quantile Regression**		
	FGLS	**25th**	**50th**	**75th**	**FGLS**	**25th**	**50th**	**75th**	**FGLS**	**25th**	**50th**	**75th**
ie	-0.246***	-0.158	-0.286***	-0.205***	-0.269***	-0.219**	-0.264***	-0.219***	-0.261***	-0.159	-0.288***	-0.212***
	(0.0540)	(0.0954)	(0.0748)	(0.0636)	(0.0555)	(0.0918)	(0.0657)	(0.0620)	(0.0547)	(0.0980)	(0.0715)	(0.0589)
gov	0.0252	-0.0601	-0.0525	-0.00763								
	(0.0287)	(0.0714)	(0.0560)	(0.0476)								
csr					-0.00164	-0.0638**	-0.0265	-0.0154				
					(0.00769)	(0.0305)	(0.0218)	(0.0206)				
awr									0.0005	-0.014	-0.0074	0.0022
									(0.005)	(0.020)	(0.015)	(0.012)
lngdpp	3.388***	2.216	1.496	3.317**	3.342***	1.846	1.701	3.050**	2.980***	2.967	1.678	3.857***
	(0.783)	(2.047)	(1.606)	(1.365)	(0.802)	(1.766)	(1.264)	(1.192)	(0.828)	(1.907)	(1.392)	(1.146)
to	0.0278	0.0818*	0.0682*	0.0474	0.0465**	0.0554	0.0586**	0.0408*	0.0375**	0.0650	0.0616*	0.0306
	(0.0196)	(0.0468)	(0.0367)	(0.0312)	(0.0185)	(0.0364)	(0.0261)	(0.0246)	(0.0188)	(0.0440)	(0.0321)	(0.0265)
nr	-0.160***	-0.0591	-0.176	-0.294***	-0.230***	-0.0840	-0.167*	-0.282***	-0.153***	-0.0756	-0.180*	-0.328***
	(0.0412)	(0.146)	(0.114)	(0.0970)	(0.0567)	(0.136)	(0.0977)	(0.0921)	(0.0518)	(0.147)	(0.107)	(0.0882)
fdi	0.206	0.462	0.217	-0.0336	0.287	0.471	0.308	-0.0137	0.218	0.468	0.219	0.0462
	(0.153)	(0.367)	(0.288)	(0.245)	(0.175)	(0.336)	(0.240)	(0.227)	(0.186)	(0.394)	(0.288)	(0.237)
Constant	33.75***	40.36**	56.52***	41.45***	35.81***	47.80***	52.13***	44.93***	39.09***	31.91**	52.30***	37.70***
	(7.781)	(17.47)	(13.71)	(11.65)	(6.935)	(13.78)	(9.867)	(9.304)	(7.044)	(14.70)	(10.73)	(8.838)
Observations	105	105	105	105	105	105	105	105	105	105	105	105
No. of countries	15	15	15	15	15	15	15	15	15	15	15	15
Pseudo R-sq		0.484	0.396	0.315		0.488	0.396	0.318		0.483	0.389	0.316
Chi^2 stat	201.1***				121.6***				170.2***			

Source: Authors' Computations using Stata 14

Note: *** p<0.01, ** p<0.05, * p<0.1; Robust standard errors in parentheses; sds is sustainable development score; ie is informal economy; ifdi is Islamic finance development indicator; gov is governance indicator of Islamic finance development; csr is corporate social responsibility/sustainability aspect of Islamic finance development; awr is awareness of Islamic finance development; gdpp is GDP per capita; to is trade openness; nr is natural resource rents; and fdi is foreign direct investment.

GDP per capita has significant positive coefficients across all regressions. The estimated coefficients range from approximately 2 to 4. The coefficients are also mostly significant at the 1% and 5% significance levels. The results therefore reveal that a percent increase in GDP per capita is related to the increase in sustainable development between 2 and 4 points. There is some evidence of significant positive coefficients for trade openness as well. Its significant coefficients range between approximately 0.02 and 0.08, signifying that a percent point increase in the share of trade in GDP will lead to between 0.02 and 0.08 points increase in sustainable development index. Similarly, there is some evidence that foreign direct investment has significant positive impact on sustainable development. This is shown by its coefficients in Table 5 ranging between approximately 0.3 and 0.8. Therefore, a percent point increase in the share of FDI in GDP will cause between approximately 0.3 and 0.8 points increase in sustainable development index. As for natural resource rents, its coefficients are largely negative and statistically significant with values ranging between approximately -0.1 and -0.3. This means that a percent point increase in the share of natural resource rents in GDP will exert a decline in sustainable development index by between approximately 0.1 and 0.3 percent points.

Checking the overall significance of the models, we note that the Chi-squared statistics the FGLS results are significant. The Pseudo-R-squared values for the quantile regressions are also significantly higher than zero. These results mean that the included factors well explain variations in the sustainable development across times and countries.

4.4. Discussion

The results provide evidence that the informal economy largely hinders sustainable development. This finding is in line with Islam (2019) for South Asian countries, and Khuong et al. (2021) for emerging economies. The outcome also mirrors the findings of Sultana et al. (2022) for developing countries. As an implication, the presence of informal economy in these Muslim-majority nations has perhaps resulted in lower overall productivity and hindered the existing social and environmental wellbeing due to the precarity of most informal economic activities. It has also reduced the potentials of the public sector to provide more economic and social infrastructures, as there would be tax revenue for the public sector.

As expected, Islamic finance development index largely shows positive relationship with sustainable development. This is in conformity with the evidence found in most studies investigating the financial development-growth nexus (see Hunjra et al., 2022; Nguyen et al., 2022). The finding also corroborates the findings of studies specifically conducted on the role of Islamic finance instruments on sustainable development (see, Aassouli et al., 2018; Adewale & Zubaedy, 2019; Alhammadi, 2022; Almadani et al., 2020; Budalamah et al., 2019; Othman et al., 2021; Yesuf & Aassouli, 2020). The positive impact of Islamic finance development index extends to some of its indicators, including the quantitative development and financial performance, and knowledge indicators. This implies that the improvement in sustainable development as a result of Islamic finance development is largely on the basis of the improvement in Islamic banking and

the availability of Islamic finance instruments such as Sukuk, Takaful, and Islamic funds, among others. The improvement in the achievement of SDGs also stems from the rise in the provision of Islamic finance education and research productivity. This means that the provision of funds through Islamic finance instruments and the performance of Islamic finance institutions (Alhammadi, 2022; Almadani et al., 2020; Yesuf & Aassouli, 2020), alongside boosting human capital with respect to Islamic finance are very vital to achieving sustainable development.

On the other hand, governance, corporate social responsibility and sustainability, and awareness dimensions of Islamic finance development are mostly not significant in impacting sustainable development. Surprisingly, corporate social responsibility and sustainability has a negative impact on sustainable development. This is contrary to the expected relationship between Islamic finance development with sustainable development. It also contradicts the findings of previous studies as highlighted above. This may be because the corporate social responsibility is a self-regulation by Islamic finance institutions and usually not evaluated by an external body. As a result, it gives one of the lowest performances in score of Islamic finance development as seen from the summaries provided in Figure 3 and Table 3. This low performance may be responsible for the unexpected effect of corporate social responsibility on sustainable development. Overall, the undesired results attributed to governance, corporate social responsibility, and awareness indicators of Islamic finance development imply that Islamic finance sectors in these countries are still falling short of making some aspects of their operations impactful in achieving sustainable development as desired, and hence, their operations in these regards need further improvement. Specifically, their regulations, Shariah governance, and corporate governance, as well as their corporate social responsibility and obligations specifically to economic, social and environment, and their attempts to portray Islamic finance as a useful tool to achieving meaningful development need further improvement for their full benefits to be realized.

Furthermore, there is strong evidence for the positive effect of foreign direct investment on sustainable development. As in implication, the inflows of foreign capitals are helpful for these countries to achieve sustainable development with several positive implications for social and environmental wellbeing (Din et al., 2022; Kardos, 2014; Narula, 2012). Moreover, there is also strong evidence that increase in income per capita and trade openness helps to boost the achievement of SDGs. As for the expected positive impact of income per capita, economic wellbeing is largely reliant on income level, and the higher the income, the higher the likelihood of countries to achieve sustainable development. This is particularly true as several reports (Lafortune et al., 2020; Sachs et al., 2023) almost entirely put high income countries at the top of countries with best performance in achieving the SDGs.

Openness to international trade has also been beneficial to these countries in achieving the SDGs, in agreement with some previous findings (Khodaparast et al., 2020; Singh, 2010). On one hand, it means that the production of goods bound for exports have largely been inclusive, allowing for participation across age, gender, geographical location, and employment status. On the other hand, goods imported are those that can partly contribute to domestic production

process, thereby, further boosting economic wellbeing and the possibility of achieving SDGs. Natural resource rent is reported to cause a decline in sustainable development. This negative influence of natural resource rent is backed by the resource-curse hypothesis and the findings of previous studies such as Dogan et al. (2020) and Wang et al. (2021), implying that the volume of rents generated from natural resources impedes growth and development, as a result of countries' tendencies to rely on the mining sector at the expense of the development in other sectors, and hence, causing a fall in inclusive growth and sustainable development.

V. CONCLUSION AND RECOMMENDATIONS

Sustainable development play an important in addressing three main problems developing countries are mostly facing with. In a bid to encourage sustainable consumption and production activities, an SDG is assigned to promoting work and sustainable growth through lending supports to labour-intensive sectors and small enterprises. This makes small businesses, many of which are in the informal sector, an important centerstage in issues surrounding sustainability. The financial sector has also been saddled with the responsibilities of providing sustainable finance to help increase investment in cleaner energy alternatives, in order to reduce the negative externalities associated with pollutions from existing energy sources widely used in most developing countries. These issues form the motivation for this study, which sets its aim to examine the impact of informal economy and Islamic finance development on sustainable development in Muslim-majority countries. Employing a panel data for the 15 countries, the study reveals several findings.

First, the presence of informal economy has negative consequences for sustainable development. This is usually through their small nature and association with lower productivity, which hinders the growth of economic wellbeing, a necessary condition for sustainable development. It may also be through the precarious condition and environment in which informal operators are subjected to, causing a decline in both social and environmental wellbeing of the society. Therefore, any attempt to reduce the informal economic activities has an implication for sustainable development, in that, the set SDGs can be well achieved if informal economic activities and their underlying precarities are reduced. Secondly, the operations of Islamic finance sector in these countries have been helpful to engender sustainable business activities. The intended goal of having Islamic finance is to support and facilitate socially responsible investment and consequently sustainable development.

Third, certain Islamic finance indicators seem to be effective than others. Quantitative development/financial performance of Islamic finance institutions and knowledge sharing regarding Islamic finance help to boost the development of the sector, making them potent tools to achieving sustainable development. Governance, CSR/sustainability, and awareness have largely been impotent in the achievement of sustainable development. This leaves only the quantitative development/financial performance and knowledge sharing segment of Islamic finance development as the main drivers of the achievement of sustainable development. And finally, sound economic conditions in form of sound income

position, sustainable foreign investment and international trade are required for the achievement of sustainable development. Reliance on natural resources triggers a resource-curse situation that hinders sustainable development. Therefore, achieving sustainable development is heavily reliant on sustainable trade and investment activities, alongside well-developed Islamic finance sector and a reduced informal economic activity.

These findings entails important recommendations especially for Islamic finance development. To help improve countries' sustainable development, the governments and regulators in Muslim-majority countries should use their regulatory frameworks to guide the operations of the Islamic finance sector in order to instill a sense of safety and credibility in the citizenry to boost their use of its several instruments such as the Sukuk, Takaful, and Zakat among others. Increase in the use of Islamic finance instruments is expected boost financial performance of Islamic finance institutions and consequently help in the achievement of sustainable development. Also, the governments should help provide social infrastructure that can guarantee conducive academic environment for the establishment of institutions and platforms that can provide knowledge on Islamic finance through courses, degrees, and research outputs. Furthermore, regulations guiding Islamic finance governance should be readdressed by regulators in order to strengthen such vital mechanism to oversee Islamic finance operations. Specifically, for Bank of Indonesia, the finding that Indonesia performs well in Islamic finance knowledge sharing but is significantly lagging many other countries in other Islamic finance development indicators implies that more needs to be done to improve the country's Islamic finance operations.

Islamic finance practitioners can and should play a role in the knowledge provision aspect of Islamic finance development through investing in platforms that can render such services. This will boost countries' performance in Islamic finance knowledge indicator. They should also be actively engaged in the awareness aspect by initiating various campaigns to disseminate Islamic finance-related news and organise workshops and seminars aimed at sharing information about the trends and opportunities in the Islamic finance sector. Islamic finance practitioners should also put-up initiatives aimed at bringing institutions in the sector closer to the society through various social donations and contributions to their immediate environment. This will boost their corporate social responsibility and consequently, the sustainability of the operations in their environment.

As for future research, the limitations of this study to only Muslim-majority countries necessitate that future studies should consider an investigation for different set of countries across regions, continents and even economic cooperation. This will give more room for comparisons and generalization of findings. Also, subsequent studies should expand the scope of the study in terms of periods covered, given future expansion in data availability, as the present study is limited to short time series. As this study only focuses on overall achievement of SDGs, future investigation should be expanded to cover the impact of informal economy and Islamic finance on achieving each of the specific 17 SDGs. This will help in proffering more specific policy recommendations tailored towards achieving each goal.

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