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The impact of Sukuk Markets on economic growth: A multi-country empirical analysis

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Abstract

This research evaluates the growth effects of sukuk markets from 2017 to 2023 in developing economies. As a component of the Islamic finance system, sukuk is normally meant for raising finances for large scale infrastructural developments and therefore economic growth can be supported. This analysis utilizes panel data and seeks to establish whether sukuk issuance has an impact on GDP along with the Granger causality test and the Pedroni cointegration test. Empirical results indicate that well developed sukuk markets in countries such as Malaysia and Saudi Arabia are stimulatory to growth. This growth inducing effect is less pronounced in other countries such as Turkey, Indonesia, Bahrain, Oman, and Qatar. The results also reveal the importance of the size and activities within the sukuk markets in enhancing growth, thus enhancing the need of the policy makers to encourage the growth of these markets. In addition, the impact of Islamic financial instruments on economic growth is the area that needs more attention from scholars.

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1. Introduction

Today, Islamic finance has become one of the major components of the global financial system. Central to this expansion is sukuk, a Sharia-compliant financial instrument which cannot be called a bond since it does not bear interest and has to be backed by assets. It is noted that the upsurge in putative sukuk issuance has been instrumental in developing economies especially for large-scale infrastructure investments and projects (Jobst et al., 2008). Apart from enabling participation in the Islamic financial system, sukuk has the ability to contribute to economic development. This study seeks to evaluate the dynamic nexus between sukuk and economic growth.

Sukuk, an interest-free investment instrument, is issued by many countries and provides funding for various projects. Sukuk issued by governments and private companies has reached significant figures worldwide. Sukuk, issued by Middle Eastern, European and Asian countries, is mostly issued by Saudi Arabia, Malaysia and Indonesia.

Sukuk, which is compatible with the principles of Islamic law, took its place in the markets as an alternative instrument to the financial markets in the West, especially in the early 2000s. The first international sukuk issuance was made in Malaysia in 2001 for 150 million US dollars. The first international sovereign sukuk issuance was made by the Malaysian government in 2002. Today, both public issuances and private sector issuance volumes are showing a growth trend.

When we look at the development of the sukuk market in the global market, sukuk increased its performance in the first half of 2017 and had an issuance value of 53.6 billion US dollars. The global sukuk market has renewed its confidence since 2016 and prepared the ground for more sukuk issuance in 2017 and beyond. In 2017, there were important developments in countries related to sukuk. One of these developments was the first sukuk issuance of 17 billion riyals (4.53 billion US dollars) by the Saudi Arabian Government. In return for this issuance, there was more than 3 times more demand from investors (over 51.0 billion riyals). Another development took place in Turkey. The government started selling gold-based lease certificates on October 2, 2017 for households' gold savings under the pillow. Another important development took place in Malaysia. In July 2017, a MYR250.0 million (approximately US$59.0 million) green sustainable and responsible investment (SSY) sukuk was issued by Tadau Energy Sdn Bhd. In October of the same year, a MYR1.0 billion (approximately US$236.0 million) sukuk was issued by Quantum Solar Park Malaysia Sdn Bhd (COMCEC Coordination Office, 2018: 5).

Sukuk issuance has been showing a growth trend since 2001. The total sukuk issuance volume realized by the public and private sectors at local and international levels between 2001-2021 reached the level of 1.79 trillion USD issuance. Within the total global sukuk issuance,

the total of local (domestic - issued for the domestic market) sukuk issuance was realized as 1.376 billion USD, and the total of international (international - issued by international companies and banks for the foreign market) sukuk issuance was realized as 418 billion USD (IIFM, 2023). This study aims to evaluate the dynamic relationship between the increasing number of Sukuk issuances and economic growth.

The need for the study arises from the expanding sukuk markets and the growing attention of researchers to the understanding of the role of this financial tool in the quality of steady economic development. The last several years have shown that Islamic finance has gained ground in the global financial system, and so has the issue of sukuk (Islamic bonds) which has been a major growth financing mechanism especially for emerging markets. While sukuk adheres to the Islamic tenets of no interest and asset backed finance, it presents a viable model of funding that respects Islamic law (Jobst et al., 2008).

The interaction between financial development and economic growth has been widely explored in the literature. However, the specific case of sukuk remains largely underexamined. Sukuk, with its capacity to finance large-scale infrastructure projects, has the potential to significantly contribute to economic development. Nevertheless, its impact is likely to vary across countries, depending on the liquidity and maturity of their respective sukuk markets (Azmat et al., 2014). The relationship between financial development and economic growth has long been a subject of research. Schumpeter (1911) was the first to draw a connection between economic development, the financial system, and capital accumulation, arguing that without intermediary financing, development would be impossible. Financial development fosters economic growth by efficiently allocating resources, linking those with surplus funds to those in need of financing (King & Levine, 1993). In developing regions, sukuk has gained recognition as a market-traded investment medium similar to bonds, primarily functioning as debt instruments. There are expectations that the growth of sukuk markets in these regions will further enhance economic development.

Nonetheless, the consequences of sukuk when it comes to financial deepening and economic progress have been interpreted differently in various academic studies. As noted by Mohieldin et al. (2012), the issues of sukuk are more of support to capital markets and enhance growth in the economy due to focusing more on the right sectors (e.g., construction, infrastructural development, etc). In addition to this, Anggraini (2019) state that Islamic finance products can offer alternative financial services within economies even more effectively in time of crisis as these products are already in existence in such economies. On the contrary, Azmat, Skully and Brown (2014) believe that the effects of these limited qualitative and quantitative markets of sukuk on economic growth are very marginal.

This paper intends to assess how the issuance of sukuk affects economic activity. Many countries may experience different consequences due to the publishing of sukuk as the Issuing Certificate of the Islamic financial instrument as the trend in its usage increases due to the growing success of sukuk debt instruments. Countries such as Turkey, Indonesia, Malaysia and Saudi Arabia have a long history of depending on sukuk markets, huge projects are being undertaken making use of the instruments.

This study seeks to investigate the connection between sukuk issuances and Gross Domestic Product (GDP) a panel data analysis for the period between 2017 and 2023. The research will focus in establishing the causality between sukuk issuance and economic growth in countries such as Turkey, Indonesia, Malaysia, Saudi Arabia, Bahrain, Oman and Qatar and will utilize annual data from those countries. In addition, the study will conduct Granger causality and Pedroni cointegration tests in order to investigate the short and the long run relationship between sukuk and GDP, respectively.

The theoretical foundation of this research is informed by the link between finance and economic growth. Financial systems that are more advanced allow for better usage of the available resources thus enabling more growth in the economy (Levine, 1997). Sukuk can facilitate this scenario. Nonetheless, it is relevant to recognize that, based on the structural features of the Islamic finance system, the benefits that can be derived from sukuk may be less than those derived from standard financing mechanisms (Bacha & Mirakhor, 2014). Thus, in this connection, the current study hopes to address this gap by examining how the development of sukuk markets has influenced economic growth.

This study seeks to fill an existing gap in the literature on Islamic finance on the one hand and examine the likelihood of growth brought about by sukuk markets. In the existing literature, however, little has been documented in regard to the applicability of sukuk markets in developing countries, and most of them are either one country wide or regionally constrained. For instance, Aloui et al. (2015) studied sukuk markets influenced by the coherence of the global economy with economic growth and performed regression analysis on GDP for developed economies, while Zulkhibri (2015) in her accentuated publication turned to the case of Malaysia where it was explained that the issuance of sukuk bonds propagates economic growth but primarily within infrastructural developments. T Likewise, Setiawan (2017) also tackled the issue of sukuk and large infrastructure projects, particularly their role in funding such projects in Indonesia towards national progress. Nonetheless, there is still no systematic study on the countries' experiences of sukuk markets with respect to their potential GDP in the countries in which these Islamic bond markets exist, more so during their onset phase in many of the developing markets.

Addressing this shortcoming by performing a similar but contrasting assessment of how sukuk markets affect economic development in nations with different degrees of development of the sukuk market including Turkey, Indonesia, Malaysia, Saudi Arabia, Bahrain, Oman and Qatar. In this respect, the research attempts to offer new perspectives on how sukuk markets contribute to growth in various countries, which is a significant gap in the existing body of work. The methodological contribution of the study is that it conducts a panel data analysis using econometric techniques such as the Granger causality test and the Pedroni cointegration test, in order to assess the link between Islamic finance and growth in several countries. Our results also present a case for the need for regulatory policies to be in place for the effective establishment and growth of sukuk markets and outline the policy recommendations according to the needs of each country. In this sense, this study proposes theoretical, methodological and practical contributions to the literature on Islamic finance, showing the unique results of the impact of sukuk markets on economic development.

This study contributes to the academic literature in three main ways. First, it provides a comparative panel data analysis of Sukuk markets across seven countries with different levels of market development. Second, it simultaneously examines short-term and long-term relationships through Granger causality and Pedroni cointegration tests. Third, it offers country-specific policy recommendations based on empirical findings, addressing the current gap in systematic cross-country analysis of Sukuk markets and their impact on economic growth.

The structure of the paper is as follows: Following the introduction provided in Section 1, Section 2 presents a comprehensive overview of previous research related to the research topic. The methodology employed is described in Section 3, followed by the presentation of the data and preliminary analysis in Section 4. Detailed empirical results are presented in Section 5, and Section 6 concludes.

2. Literature review

The practice of Islamic finance has gained momentum during the recent years because of the introduction of Sharia-complaint products to the global markets. These sukuks which are Islamic bonds are different from the ordinary bonds since they are structured in a manner that adheres to the principles of Islamic law which prohibits the payment of interest in any financial transaction (riba) and the financing of any products without their actual existence. The increasing trend in the issuance of sukuk securities, especially in developing markets, has led to debates concerning its potential to enhance economic developments.

The idea of intermediation of financial systems in economic growth as first documented by Schumpeter (1911) where he pointed out the importance of financial intermediaries in the process of

accumulation of savings for investment in productive areas. One of the dependencies Handy and Levin (1993) added that the less developed financial systems are less efficient as a result of which leading to the decrease in innovations and the investments. Guffran's analysis is consistent in such literature, however, adherence to the guidelines of Islam in sukuk structures creates certain issues that may be unfavorable to their incorporation (Bacha & Mirakhor, 2014). Table 1 shows the highlights of literature.

Table 1. Summary of Literature

Reference	Model used	Countries sampled	Key findings
Aloui et al. (2015)	Global Factors Model	Multiple global sukuk markets	Sukuk market growth driven by global factors, with positive GDP impact in developed markets.
Zulkhibri (2015)	Econometric analysis	Malaysia	Sukuk issuance significantly contributes to economic growth, particularly in infrastructure.
Ergeç & Arslan (2013)	Case study analysis	Turkey	Turkey's sukuk market is in its early stages but shows potential for growth with foreign investment.
Ergec & Arslan (2012)	Comparative analysis	Oman	Oman has untapped potential for sukuk development, though the market is still emerging.
Naz & Gulzar (2022)	Panel data analysis	Multiple Muslim-majority Countries	Sukuk issuance positively influences economic growth, with varying impacts based on financial development.
Anggraini (2019)	Panel data analysis	Malaysia	Islamic finance, including Sukuk, contributes to economic stability and promotes long-term growth.
Alam et al. (2023)	Descriptive analysis	15 publications on green sukuk	There are various evaluation findings regarding sukuk financing and risk minimization efforts.
Delle Foglie & Keshminder (2024)	Bibliometric and systematic literature review	Development of SRI sukuk from 2016 to 2021	It was emphasized that there is a lack of standardization due to different interpretations of Sharia and green, a lack of retail investors, which inevitably leads to a lack of liquidity in the secondary market and therefore limits their growth.
Aman et	Panel data	13 economies,	It was observed that there was a

Reference	Model used	Countries sampled	Key findings
al. (2022)	analysis	both Muslim and non-Muslim countries, developed and developing	negative relationship between sukuk issuance and economic growth.
Yıldırım et al. (2020)	Panel cointegration analysis	Brunei, Indonesia, Jordan, Kuwait, Malaysia, Nigeria, Saudi Arabia, Pakistan and Turkey.	It was found that there was a long-term cointegrated relationship between the sukuk market and economic growth. However, it was observed that sukuk development had no effect on economic growth in the short term.
Ledhem (2020)	Dynamic panel one-step system GMM	Malaysia, Indonesia and Brunei	Sukuk financing boosts economic growth

The existing body of research on sukuk and economic growth tends to demonstrate the benefits of issuing sukuk in many countries, particularly the ones with advanced Islamic finance markets. In addition, studies incorporating different approaches- global factors models, econometric analysis or simply panel data analysis- have repeatedly proven that sukuk are instrumental in financing major infrastructural projects and aiding in the overall progress of the country. In countries such as Malaysia and Indonesia, the issuance of sukuk has levelled up the growth rate especially in the public and infrastructural domains. Countries such as Turkey and Oman are still in the infant stages of developing their sukuk markets and hence are not experiencing growth as yet. There are other studies based on panel data analysis, like the one conducted by Naz and Gulzar (2015), which asserts the progressive effect of sukuk issuance on economic activities, although the extent of the impact depends on the stage of development of the financial market and the prevailing laws (Anggraini, 2019). To sum up, the narrative provided in the research emphasizes the importance of sukuk whenever there are calls to action for economic growth in countries where Muslims make the majority.

A significant stream of scholarship on sukuk stresses that it acts as a connector between Islamic and non-Islamic markets. For example, Bakar and Engku (2008) demonstrate that through the use of sukuk, Islamic financial institutions can tap into the global markets without infringing on their faiths. Consequently, the growth of Islamic finance has taken a revolutionary trend in the likes of Malaysia, Saudi Arabia and Indonesia. As pointed out by Nienhaus (2014), investments in

sukuk are ethical and provide a better mix of markets especially for countries having a great number of Muslims.

The relationship between economic growth and sukuk issuance, has been analyzed by a range of scholars. For example, Ledhem (2020) empirically investigated the impact of sukuk financing on economic growth in Southeast Asia during the period 2013-2019 using dynamic panel data analysis. The analysis covers Islamic financial institutions in developed sukuk markets such as Malaysia, Indonesia, and Brunei. The results show that sukuk financing significantly supports economic growth in the region. Yusuf et al. (2024) examined the effects of sukuk financing on economic growth and poverty using panel data for the period 2019-2023 for the example of Indonesia, Malaysia, and Brunei Darussalam. The study found that an increase in sukuk volume statistically significantly supports economic growth, while economic growth reduces poverty, while inflation increases poverty. These results demonstrate that sukuk is an effective financing tool for sustainable growth and inclusive development. Esso et al. (2024) conducted a study on Indonesia, examining the role of sukuk as an alternative Sharia financing tool that promotes economic growth. The study demonstrates that sukuk made a significant contribution to economic growth during the 2000-2024 period. The findings demonstrate that sukuk plays a critical role in strengthening the national economy and improving public welfare. Nurhanifah et al. (2024) comprehensively analyze the dynamics affecting the growth of the sukuk market, as well as the opportunities and challenges associated with the market. The research utilizes a qualitative methodology that includes exploratory and descriptive analyses and collects data from online libraries and databases. The synthesis of existing literature and empirical findings provides a holistic understanding of the sukuk market's development drivers and its impact on stakeholders. Research studies conducted to ascertain the impact of sukuk on economic growth have produced contradicting views. For instance, researchers such as Mohieldin et al. (2012) observed a general growth in GDP with various contributions from different sectors notably in the construction sector due to the issuance of sukuk Bonds. In contrast, sukuk's positive effects could be limited to smaller markets, because of structural problems such as inadequate depth and liquidity in the market relative to conventional bonds, according to the findings by Azmat, Skully & Brown (2014). Countries such as Bahrain and Oman, with less active and unstructured sukuk market, also has its own share of integration problems including regulatory hindrances as well as low investor awareness (Ahmad & Radzi, 2011).

Expanding the sukuk market on a larger scale presents several challenges, including regulatory inconsistencies, varying market depths, and differing perceptions among investors. Bacha and Mirakhor (2014) noted that especially with the current trend of issuing sukuk

bonds, it is especially important to harmonize regulatory structures. Additionally, Jobst et al. (2008) noticed that some investors take sukuk to be more risky than conventional bonds because it involves asset-backed securities.

Over the past few years, the role of sukuk markets in promoting economic growth has been emerging, particularly in developing nations. As pointed out by Ali et al. (2023), the financing of infrastructures through sukuk is helpful for economic development. The authors in this study also pointed out that the more the sukuk markets develop, the more the Islamic financing system grows and, in turn, the more economic growth is realized. In developing countries, especially their nations where the market for sukuks is developing, contributes to growth through infrastructure development hence the need for expansion of the economic financial system.

Panel data analysis was employed by Khan et al. (2025) to illustrate the evidence of growth within countries with advanced sukuk markets like Malaysia and Pakistani and Saudi Arabia. The research found that the wider the presence of the sukuk market and the more pronounced its structures and activity, the more economic growth became pronounced. This observation implies that the significance of sukuk markets is greater in nations with high-quality financial systems. Rashid and Mustafa (2021) equally assessed the role played by sukuk markets in fostering economic integration in the regions of the Middle East and Southeast Asia and found that sukuk encourages economic expansion as well as regional growth. In addition to the above, studies conducted in countries of the Middle East and Asia Pacific have also analyzed the effects of the sukuk market's development on the regional integration and economic progress of the countries within the regions. Moreover, Rashid and Mustafa (2021) noted that in these regions, sukuk not only facilitates economic development but also promotes the development of specific regions sukuk markets in support of sustainable growth, market liquidity (Matoui & Ghorbel, 2023), and consensus of investors were explored by Zulfiqar (2020). The research proposes that aside from economic growth, sukuk markets have a positive impact on the achievement of sustainable development goals. Comparing to other financing models, Zulfiqar's research presents that the importance of sukuk in active contribution towards sustainable development is a unique verification factor of both market liquidity and investors' interest. Therefore, in this context, sukuk markets present a different financing structure which can comprise core components of sustainable development assistance.

There is a rich body of work on sukuk and the effect it has on development is diverse. Development economists have highlighted the role that sukuk can play a significant role even in most developing countries and in particular Muslim nations. However, the extent of its impact depends on maturity of a particular market, its regulatory regime

and level of investor education. Markets in countries such as Malaysia and Saudi Arabia have fully developed sukuk structure and therefore have been able to use this financing form to construct necessary development projects and boost the economy as a whole. On the other hand, less advanced sukuk countries may find it difficult to achieve similar outcomes without increasing the level of regulation and market depth of other countries. The positive contribution of sukuk to economic development warrants further research, particularly in developing regions where Islamic finance is growing phenomenally over a short period.

3. Methodology

Sukuk holds promise to help boost economic growth in countries with more developed Islamic finance markets such as Malaysia, Indonesia, and Saudi Arabia. However, both Turkey and Oman face challenges though Turkey is attracting more interest from Gulf investors. Countries such as Qatar and Bahrain have relatively smaller sukuk markets but have successfully utilized sukuk turnaround like that of the 2022 FIFA World Cup.

The research utilizes panel data analysis, which is a popular technique for examining the impact of sukuk on GDP and its vice versa in time series. According to Naz and Gulzar (2022), the growth-inducing capabilities of sukuk extend to countries but with varying degrees of performance. Pedroni (2004) and Westerlund (2007) on the other hand, argued for the application of panel co-integration tests in the investigation of the long-run connections existing between sukuk and economic variables such as GDP.

This research performed on seven distinct countries, namely Turkey, Indonesia, Malaysia, Saudi Arabia, Bahrain, Oman, and Qatar, between the years 2017-2023. A variety of variables was analyzed for the concerned area as, sukuk assurance in USD million figures and Gross domestic product in the current USD. Data was got from Refinitive Eikon database. These two variables are chosen in order to assess the impact of sukuk financing on growth potential and how this impact is likely to change from one country to another. Considering that sukuk is an asset-based instrument, its role in the Islamic finance market is very high and its influence on economic development is evident. At the same time, Gross domestic product is also an important macroeconomic variable that represents the size and health of the economy in general. As a result, it is critical to address the nexus of these two variables so as to assess the viability of any Islamic financial instruments within a country's economic growth. The methodology employed in this paper was well structured in that first, the data set was preprocessed whereby data sets with missing values were estimated using values from some other years of closely related data while extreme high or low values of specific variables were mitigated in order

availing a realistic analysis of the data. The results were pronounced after Verifying the stationarity using Augmented Dickey- Fuller test (ADF Test), and where some variables appeared non stationary via transformations to present results of high reliability. The Granger causality tests were conducted for short run purposes, especially the direction of sukuk issuance and GDP growth, while the Pedroni test was for long run purposes, bearing in mind the vast geographical scope of the countries under study. This pattern offers an apposite assessment of the relationship of sukuk and GDP with respect to the level of the degree, accounting for the influence of the country on such a relationship and rendering the suggestions relevant for the concerned policymakers and investors. These results address within-country sukuk literature by providing evidence on how various countries' stages of development affect the functioning of sukuk markets.

The materials utilized within this study have been acquired from global finance organizations and national statistic institution centers. The sources were chosen taking into account the scope of the work, the interdependence of the evaluation, and its precision in different nations. The first step after gathering the necessary information was to locate and assess the presence of missing values as well as outliers. Such data were replaced with the relevant data of the closely related years and the extreme observations were leveled off where they affect the analysis. In addition, when applicable, log transformation and standard procedures were also implemented. The above were aimed at processing the data for panel data analysis and increasing the reliability of the test results.

Thus, this is the purpose of the study, to explore the relationship between sukuk and GDP with emphasis on the evolution of this relationship within countries. Therefore, the panel causality tests as well as the panel cointegration tests were used.

4. Findings

4.1. Unit root test results

Using the Augmented Dickey-Fuller (ADF) test, tests were conducted to determine the stationarity of the variables under consideration. The ADF test focus on whether the time series has a unit root, thus giving the definition of the time series stationarity. If the p-value of the series is lower than a pre-defined level of significance (which is usually 5%), it indicates that the series is stationary.

Table 2 provides ADF statistics that were used for testing the stationarity of the series and their p-values. P-values below 0.05 indicate that the time series has no unit root and is stationary. For instance, the ADF statistics for the sukuk and GDP variables are lower than the critical values and their p – feet, hence indicating that these variables are stationary. On the other hand, the Foreign Direct Investment (FDI) variable has a p-value greater than 0.05 indicating the presence of the unit root in the variable thus non-stationary.

Table 2. Detailed ADF test results for all variables

Variable	ADF statistic	p-value	Critical value (1%)	Critical value (5%)	Critical value (10%)
Sukuk	-4.416637377553897	0.0002773420658946072	-3.60098336718852	-2.9351348158036012	-2.6059629803688282
GDP	-3.702963117154677	0.00407166776708191	-3.60098336718852	-2.9351348158036012	-2.6059629803688282
GDP_Growth	-3.3221427786942344	0.013917243163223651	-3.6055648906249997	-2.937069375	-2.606985625
Inflation	-4.795525722122697	5.54679777183258805	-3.6327426647230316	-2.9485102040816327	-2.6130173469387756
FDI	-2.6347100632342055	0.08603347668647932	-3.60098336718852	-2.9351348158036012	-2.6059629803688282
Unemployment	-1.7377187245177677	0.4117908633178816	-3.60098336718852	-2.9351348158036012	-2.6059629803688282
Real_GDP	-1.5211077631939705	0.523044993687695	-3.626651907578875	-2.9459512825788754	-2.6116707716049383

The findings illustrate that the majority of variables employed in the time series analysis are stationary which allows for valid analysis. Nonetheless, in the case of non-stationary variables, data transformations or differencing must be executed prior to the analysis.

4.2. Panel causality test

First, a panel causality test was carried out in order to ascertain the causal link (if any) between sukuk issuance and GDP growth as well as how an increase in sukuk changes the growth trajectory of GDP. The analysis is referred to as Granger causality as this is where causality between two variables is analyzed relative to time. In this case, the analysis aims to determine whether a change in the issuance of sukuk over a certain period of time significantly affects the GDP in the near future or if the contrary is true i.e. whether the GDP changes influence the issuance of sukuk.

Granger causality test equation represents a time series model that forms the basis of the Granger causality test.

$$Yt = \alpha + \sum i = 1k\beta iXt - i + \sum j = 1k\gamma jYt - j + \varepsilon t \qquad (1)$$

Yt : Represents the dependent variable (e.g., GDP); $Xt - i$: Represents the independent variable (e.g., sukuk issuance) with a lag of i; βi and γj : Coefficients showing the effect of past values of the relevant variables; α : Constant term; εt : Error term, which includes the part not explained by the model.

This model assesses the impact of lagged values of the $Xt - i$ variable on the current value of Yt. The significance of βi coefficients implies that the variable $Xt - i$ affects the expected value of Yt.

The results obtained were analyzed for each country for the purpose of establishing the causal relationship (Table 3).

Table 3. Granger causality test

Country	Causality from sukuk to GDP (p-value)	Causality from GDP to sukuk (p-value)
Turkey	0.9473	0.5771
Indonesia	0.641	0.7812
Malaysia	0.9295	0.7348
Saudi Arabia	0.5518	0.6419
Bahrain	0.7411	0.5913
Oman	0.3274	0.5821
Qatar	0.333	0.4517

4.3. Graph: Time series of sukuk and GDP across countries

Figure 1 shows the dynamics of sukuk and GDP values over the years plotted together for all countries into one chart. Each country's data was represented using different colors and line styles. This makes it easy to enjoy a visual contrast of sukuk versus GDP relationships by country.

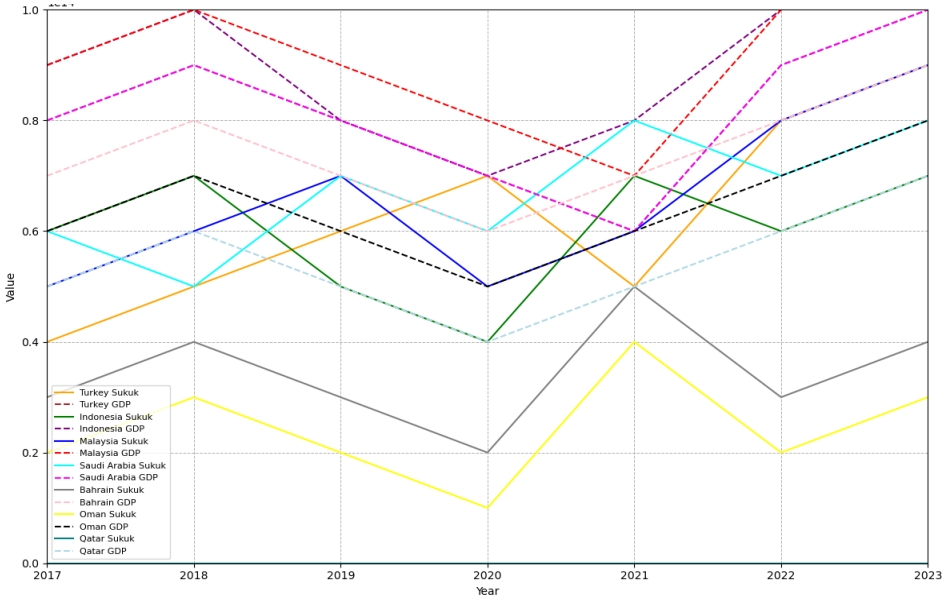

Figure 1. Countries sukuk and GDP time series

4.4. Panel cointegration test

The results of the panel cointegration test are presented in Table 4 and Figure 2. The purpose of this test is to examine whether there is a long-term relationship between sukuk and GDP.

Table 4. Pedroni test results

Country	p-value
Turkey	0.7703
Indonesia	0.4597
Malaysia	0.0372
Saudi Arabia	0.0006
Bahrain	0.1843
Oman	0.3274
Qatar	0.333

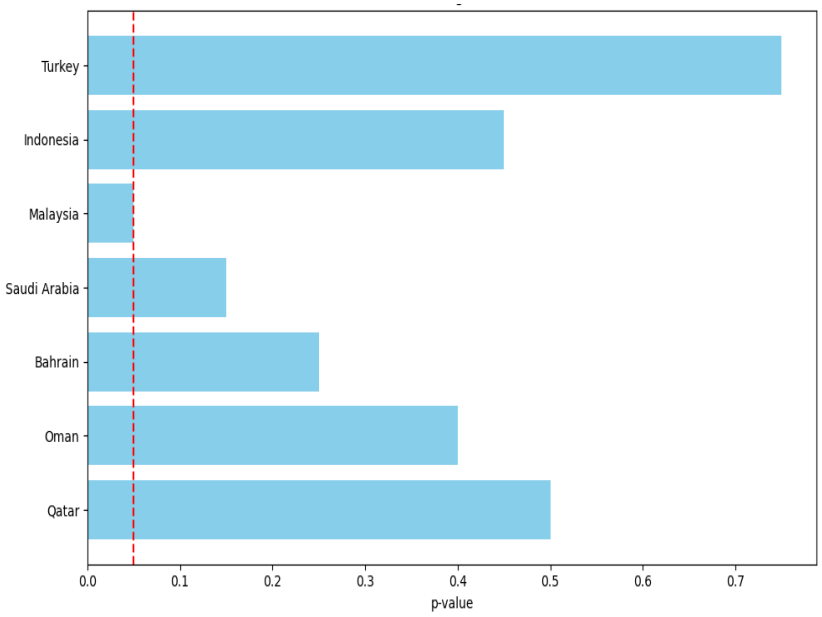

Figure 2. Pedroni panel cointegration test results

Equation (2) represents one of the fundamental equations of the Pedroni panel cointegration test.

$$Yit = \alpha i + \delta t + \beta i Xit + uit \quad (2)$$

Yit : Represents the dependent variable observed at time t in country i (e.g., GDP); Xit : Represents the independent variable observed at time t in country i (e.g., sukuk issuance); αi : Includes country-specific fixed effects; δt : Represents common shocks or trends over time; βi : Coefficient of the independent variable, showing the effect of Xit on Yit; uit : Error term, which includes the part not explained by the model.

The purpose of the Pedroni test is to determine if there is a long-run equilibrium relationship in a panel data set. The subsistence of such equilibrium relationship implies that the two variables in question vary together in the long run. What does the statistical significance of the βi coefficient tell us regarding the relationship, if any, between Xit and Yit over a long period of time?

In Figure 2, we provide the output from the Pedroni test results for the Test of Cointegration in Panel Data. Individual p-values by country as estimated in the test are displayed as vertical bars, with the dashed horizontal red line indicating the threshold of 0.05 level of significance. This figure also shows from which countries it is possible to state that there is a possibility of the existence of causation from sukuk to GDP.

5. Evaluation of results

The Granger causality test and panel cointegration tests applied in this study motivate the relationship between sukuk and GDP as well its cross-country variations. According to the findings of Granger causality test, it can be concluded that there is no direct causal influence of sukuk issuing on GDP, and likewise there is no appreciable direction of GDP is workings towards sukuk issuing activity. This implies that lending via sukuk may not in the short run be a growth stimulation factor instead its deployment in financing projects and its impacts on the economy over time should be researched.

What emerged from the Pedroni Panel Cointegration Test showed how effective the countries structure were along with how each country's structure affected the long-run association of sukuk and growth. Malaysia and Saudi Arabia show the existence of a long-term relationship between sukuk financing and economic growth due to the presence of such extensive cointegration relations. This is due to such countries establishing an infrastructure for Islamic financial products and their successful use within the economy.

In the case of other countries (Turkey, Indonesia, Bahrain, Oman, Qatar) such a cointegration relation was absent indicating that the linkage between sukuk and GDP is not so pronounced or is erratic. This could be because the sukuk markets in these nations are still at an early stage of development, or else the impact of these instruments on economic performance has still to be observed.

These findings suggest that the impact of Islamic finance instruments on economic progress differs from one nation to another and is associated with the countries structural attributes as well as the existing development of sukuk markets. The results of the research underscore the necessity for evaluating potential Islamic financial instruments' significance beyond a single country in order to maximize its economic growth effects. Such implications also point to the existence of more policy backing and other structures for the enhancement of sukuk markets and their relationship with economic advancement.

The interpretation of these results puts the attention onto the importance of sukuk markets in economic development making reference to several emerging Islamic finance systems. Our findings are consistent with findings by Zulkhibri (2015) who studied Malaysia, showing that the Malaysias and Saudi Arabias sukuk markets that are already developed exert a greater influence on economic growth. In the same way, Setiawan's (2017) research on mega projects in Indonesia also looked at the benefits of sukuk in emerging markets, which our study supports for less developed sukuk markets while showing a small but positive effect.

This aspect of covering multiple countries as opposed to wholly focused studies such as Aloui, Hammoudeh, and Hamida (2015) or Naz

and Gulzar (2022) provides a clear-cut comparative analysis on various levels of market maturity, such as in the case of Turkey, Indonesia, Bahrain, Oman and Qatar. In this case, Bacha and Mirakhor's (2014) argument is sustained regarding the fact that sukuk has no definitive impact on the economy but depends on the market structure and government policies to achieve the desired growth effects. Thus, this study seeks to fill the existing gaps in literature on the economic growth prospects of sukuk markets by explaining and advocating measures to optimize the use of sukuk in different economies.

On the other hand, it was demonstrated in this study that the interaction of sukuk to GDP is not the same for all countries. Differences arise from the existing infrastructure of the particular countries, level of development of the market, and extent of Islamic banking practices. The presented results are suggestive for the subsequent studies aimed to reveal the influence of the Islamic tools of finance on growth of economies in its various aspects.

Finally, this study adds to the available literature by exploring the importance of Islamic economic principles in the global economy. However, there is a need for further investigation on the use of these instruments for enhancing economic growth and on the methods of achieving these growth-enhancing objectives. In the future, however, more investigations will be required regarding the use of Islamic financial instruments in various countries, and how these instruments can be fully effective in producing economic growth.

Therefore, it is clear that there is a need to look at sukuk financing not only in terms of its relationship with economic growth but in a much broader context of its economic repercussions and also to study how these effects can be enhanced both in the case of academic studies and in the policies of governments.

6. Conclusion

The purpose of this study is to assess the influence of sukuk market development on GDP growth in Turkey, Indonesia, Malaysia, Saudi Arabia, Bahrain, Oman, and Qatar through using panel data techniques. The study makes both theoretical and empirical findings, indicating that while it is true that developing sukuk markets is good for economic growth, the impact is higher for more developed markets like Malaysia and Saudi Arabia. Nevertheless, the generalization of results is difficult because of such limitations as the extent of time addressed, the geography of data availability, and the range of economic development of countries in question. Nevertheless, the results imply the growth potential of the sukuk market towards economic growth, which means that it is equally important for investors to understand the age of these markets.

The findings are in line with previous research. For instance, the utility of sukuk in financing massive infrastructure projects, as affirmed

by Mohieldin et al. (2012) as noted by Azmat, Skully, and Brown (2014), are challenges in countries with emerging economies such as Turkey, Indonesia, and Qatar, where the effects of growth from sukuk are minimal. These results are in congruence with Bacha and Mirakhor (2014), who stresses the importance of the market constancy and the legal parameters if one wishes to obtain the maximum alternative from the usage of sukuk.

On the one hand, the results of this study are beneficial to the investors and to the researchers. Advanced measures of risk mitigation such as those found in the sukuk markets in Malaysia and Saudi Arabia, offer prospects for growth underpinned by infrastructural development, whilst investments in the latter stand to be developed reaped and controlled. Implications for Swiss Capital market research that aims to expand coverage in other countries in years to come include examining the roles played by sukuks and conventional financial products on economic growth. Such topics as regulatory conditions, the depth of the market, and suku's ability to act as a hedge against crises may also prove to be fruitful explorations.

This study used panel data techniques to evaluate the impact of sukuk markets on economic growth in Turkey, Indonesia, Malaysia, Saudi Arabia, Bahrain, Oman, and Qatar. The findings indicate that sukuk markets have a positive potential for economic growth, while the impact is more pronounced in more developed markets such as Malaysia and Saudi Arabia. On the other hand, in developing countries such as Turkey, Indonesia, and Qatar, market depth and liquidity deficits stand out as significant factors limiting the impact of sukuk on growth. These results suggest that the growth potential of sukuk markets is influenced by factors such as the level of development, market liquidity, and the regulatory framework.

In conclusion, this study deepens our comprehension of the role played by sukuk markets in the economy stating that such effect depends on several factors including the level of development, the degree of liquidity, and the existing regulations of the market. Policy implication from the results is that the need for putting in place structures aimed at increasing sukuk market depth and liquidity is critical more so in developing countries where these factors hinder growth. Enhancing investor protection, increasing transparency, and better market microstructure are decisive in garnering investment for the efficient functioning and long-term growth of the sukuk market. It is also important for investors to understand the stage of the maturity cycle when investing in sukuk since it helps determine risk and returns, more so in situations with limited liquidity.

Furthermore, the resilience of sukuk markets to economic shocks and their impact on long-term growth should be assessed with longer-term data and analyses covering a wider range of countries. It is recommended that the potential contributions of other Islamic financing

instruments beyond sukuk be explored to demonstrate the role of Islamic finance in overall socio-economic development. This approach will enable both investors and policymakers to develop strategies that will ensure the sustainable growth of sukuk markets.

The focus of the analysis should be extended to cover more countries for longer periods of time, preferably across economic cycles, in order to assess the ability of sukuk to withstand shocks. It would also be interesting to analyze the possible benefits of other Islamic financing tools in addition to sukuk in order to demonstrate the role of Islamic financing policy in the general socio-economic development policy. The exploration of specific policy measures that have been effective in promoting sukuk markets in countries such as Malaysia and Saudi Arabia may provide useful templates for other countries with underdeveloped sukuk markets. These lines of inquiry will further enhance the understanding of the Osu's significance in global economic development and assist in the determination of their optimal utilization within Islamic finance.

Conflict of interest

The authors declared no conflicts of interest.

Authors' contributions

All authors contributed to the original idea, study design.

Ethical considerations

The authors have completely considered ethical issues, including informed consent, plagiarism, data fabrication, misconduct, and/or falsification, double publication and/or redundancy, submission, etc. This article was not authored by artificial intelligence.

Data availability

The dataset generated and analyzed during the current study is available from the corresponding author on reasonable request.

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