

Do Global Factors Drive Sukuk Returns? Evidence from the S&P GCC Sukuk Index

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Abstract:

This study examines the impact of global financial factors on returns of the S&P GCC Sukuk Index over daily data ranging from 2015 to 2025. Using the ARDL approach as a statistical methodology, four determinants: U.S. Dollar Index (DXY), gold futures, U.S. Treasury 10-year yield and S&P 500 were considered in this study. Empirical evidence shows that dollar appreciation negatively affects sukuk returns in the short run, gold serves as only a partially effective hedge, U.S. yields have a slight adverse effect and global equity has a significant dampening impact on sukuk over the long term. The ECM speed ($\phi \approx -0.76$) implies rapid adjustment toward equilibrium also implies strong GCC Sukuk integration with international markets. The findings underline the need to follow international macro-financial developments when managing sukuk holdings and in formulating policy for market resilience.

Keywords: GCC Sukuk Returns; U.S. Dollar Index; Gold Futures; U.S. Treasury Yields; S&P 500 Index.

JEL Classification Codes : G15, F31, G11, E43, G12.

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1. INTRODUCTION

Global financial markets have recently experienced pronounced volatility due to rapid shifts in monetary policy and asset prices. The U.S. Federal Reserve moved from aggressive rate hikes toward easing, affecting global liquidity and investor sentiment and helping spur a rebound in sukuk issuance in late 2024 (Maceda, 2024). At the same time, the U.S. dollar reached near-historic highs not seen since the 1980s, influencing international capital flows (Suzuki & DiClementi, 2025), while gold prices swung sharply with changing inflation expectations and safe-haven demand. In 2024, U.S. Treasury yields and gold prices even rose together for a period—an unusual pattern underscoring the complexity of the macro-financial backdrop (Marjolin, 2025). Overlaying these developments is heightened volatility in global equity and bond markets, as investors reassess risk in the face of inflationary pressures and growth concerns.

Against this backdrop, Islamic finance, and the GCC sukuk market in particular, has increasingly been connected with the international investment universe. Once a niche product, sukuk have become a mainstream asset class for foreign investors, fueled by an increase in U.S. dollar issuance that has made the instruments available to a wider pool of investors (Crisil Coalition Greenwich, 2025). Today the six GCC countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE) are among the world's largest USD sukuk issuers, directly linking performance to global economic conditions (Saturna Capital, 2024). With the total outstanding value of global sukuk was approaching \$1 trillion milestone by end-2024 (Maceda, 2024), and with some 50% of Islamic financial assets held in the Middle East (Crisil Coalition Greenwich, 2025), GCC sukuk are no longer immune to global macro trends, and instead exposed to US interest-rate cycles, FX dynamics (especially US dollar fluctuations) and commodity trends – just like other emerging-markets asset classes.

The primary objective in this study is to examine the extent to which GCC sukuk returns are influenced by world financial factors or remain autonomous given their Islamic feature and regional context. Critical questions are whether shocks such as increases in U.S. Treasury yields or a strengthening dollar or heightened global risk aversion are directly transmitted to the performance of sukuk or whether sukuk offer protection and diversification during crises.

It is a timely subject in today's volatile financial climate. Especially if sukuk are highly correlated with global benchmarks, both investors and policymakers should be aware that sukuk are subject to global shocks. On the other hand, if sukuk are found to be robust, they may be used as good portfolio hedging instruments. Previous evidence is conflicting, with some of it showing that sukuk are positively linked with worldwide capitals, losing their safe-haven characteristics during market turmoil (Sclip & al., 2016, p. 42), and other evidence finding negative effects of the global financial turmoil, especially in bearish states (Naifar & Hammoudeh, 2016, p. 58).

With these ambiguities and the increasing speed of global macro-financial changes, empirical evidence on short- and long-run GCC sukuk return response to global factors is particularly pertinent.

This research contributes to the Islamic finance literature by providing new empirical evidence on the impact of global macro-financial factors, specifically the dollar, gold, U.S.

interest rates, and equities on GCC sukuk returns. In contrast to a large body of literature that focused on comparing sukuk with conventional bonds, crises behavior or domestic determinants such oil and liquidity, our paper places sukuk with the broader trend of global financial markets, addressing an identified research gap.

The results should have practical implications:

- An understanding of sukuk's sensitivity to global benchmark, such as the U.S. 10-year Treasury yield or the S&P 500 index, can guide investors and portfolio managers to fine-tune asset allocation and risk management decisions. Strong co-movements would suggest that the potential for diversification is limited in times of crisis, while partial decoupling could be exploited for hedging.
- For policymakers and regulators in the Gulf Cooperation Council (GCC), the findings underline sukuk's vulnerability to external shocks and, therefore, inform policy objectives, such as the expansion of the investor base and the development of local-currency sukuk to reduce dollar dependency.

Methodologically, the research contributes however in showing that ARDL is robust in teasing out short and long run relationships, a challenging issue in Islamic finance research. This study offers a novel contribution to the Islamic finance literature by examining GCC sukuk returns in the context of multiple global financial factors – namely the U.S. dollar, gold, U.S. Treasury yields, and global equities – using high-frequency daily data from 2015 through 2025, thereby encompassing the post-COVID period. Unlike prior studies that have focused on single factors or lower-frequency data, we employ the ARDL bounds testing framework, which allows us to simultaneously model and disentangle short-run dynamics from long-run equilibrium relationships. This combination of scope and methodology provides the first unified, daily-frequency evidence on how global drivers shape sukuk markets across horizons. In doing so, the paper not only addresses a clear gap in the existing literature but also offers fresh insights into the integration, efficiency, and resilience of the GCC sukuk market within the broader global financial system.

The paper is structured into five sections to ensure that the reader has a clear and logical path from theoretical development through to empirical analysis and conclusions. In Section 2 we present a review of the literature on sukuk market and global financial factors' connections. Section 3 presents the data set, variables, and econometric methodology, with emphasis on the ARDL framework and bounds testing. Empirical findings, short-run dynamics versus long-run relationship, are presented in Section 4. Last, Section 5 discusses these results in light of theory and prior studies, outlines practical and academic implications, and concludes with an integration of major contributions, limitations and suggestions for future research.

2. Literature Review

2.1 Theoretical Frameworks:

There are several theories that are used as foundational for explaining why the global financial variables impact sukuk return. Modern Portfolio Theory (Markowitz, 1952) holds that investors construct “optimal” portfolios based on securities with low correlations returns to minimize risk for a given level of return (Sclip & al., 2016, p. 34). This implies that assets such

as gold or sukuk that have low correlation with conventional stocks or bonds can further improve the diversification benefits (Maghyereh & al., 2019, p. 19). International Capital Flow Theory implies that international investors rebalance their portfolio in reference to interest rate differentials or perceived risk in other countries. We see from the push–pull framework how push factors (such as low interest rates in the U.S. or high global risk appetite) make it more likely that capital will flow into emerging markets, (while higher U.S. rates or risk aversion reverse these flows) reversing these flows. Hence, changes in U.S. monetary conditions or global risk appetite matter to emerging market bond and sukuk demand (Fratzscher, 2012, p. 341). The Term Structure Theory (expectations hypothesis) also holds that long-term interest rates (e.g., 10-year government bond yield) reflect expectations of future short rates and risk premia. An increase in U.S. long-term yields may indicate higher anticipated global borrowing costs, which have implications for other fixed-income markets, such as Islamic bonds (Campbell & Shiller, 1991, p. 495). Lastly, here, I want to introduce the notion of safe haven assets based: a safe haven is something that holds its value or grows during market turmoil. For instance, gold and U.S. Treasuries have historically served as safe havens to which investors retreat during times of distress, in what is known as a flight-to-quality response. Together, these frameworks imply that movements in world currency values, commodity prices, interest rates, and exchange market returns are likely to influence sukuk returns by channels of portfolio-rebalancing, capital flows, and investors' safe-haven behavior (Baur & Lucey, 2010, p. 217).

2.2 Transmission Channels: Global Factors and Sukuk Returns:

Theoretical frameworks suggest that GCC sukuk returns are influenced by global factors via portfolio rebalancing, capital flows, and safe-haven/risk sentiment effects. This section synthesizes empirical evidence and identifies the research gap.

2.2.1 U.S. Monetary Policy & Dollar Channel:

The stance of U.S. monetary policy—proxied by the 10-Year Treasury yield (DGS10)—and the U.S. Dollar Index (DXY) forms a dual channel that affects emerging market debt, including sukuk. Higher U.S. interest rates usually strengthen the dollar, inducing portfolio rebalancing away from riskier assets toward U.S. securities (Fratzscher, 2012, p. 341). For the GCC, dollar pegs and the predominance of USD-denominated sukuk amplify this channel (Saturna Capital, 2024, p. 19). While the peg reduces currency mismatch risk, a stronger dollar raises the real burden for borrowers and diminishes returns for investors in non-USD currencies (Al-Raeai & al., 2018, p. 336). Empirically, (Hassan & Masih, 2018, p. 4) find a negative link between U.S. rates and global sukuk prices.

This duality implies that rate hikes and dollar appreciation are not independent shocks: they amplify each other's impact on EM debt through yield-differential, valuation, and balance-sheet channels. This mechanism is consistent with International Capital Flow Theory and the global financial cycle, whereby tighter U.S. conditions trigger outflows from risk assets and raise required premia in dollar-linked markets.

Hypothesis 1: DXY and DGS10 negatively affect GCC sukuk returns in the short run (portfolio rebalancing / capital flows), while long-run effects are expected to be weaker after equilibrium adjustment.

2.2.2 Gold: Safe-Haven Asset and Shariah-Compliant Hedge:

Gold is a well-established safe-haven asset (Baur & Lucey, 2010, p. 223) and is Shariah-compliant, making it relevant for Islamic portfolios. (Maghyereh & al., 2019, p. 26) show that gold hedges sukuk risk in the short/medium term. However, (Naifar & Hammoudeh, 2016, p. 63) reveal that gold's effect is state-dependent, activating mainly during stress periods. Recent industry reports highlight stronger gold–sukuk linkages in volatile regimes (Saturna Capital, 2024, p. 19).

This discrepancy suggests that gold's role as a hedge is not automatic but contingent on the prevailing market regime—a nuance our modelling approach aims to capture by separating short- from long-run dynamics and allowing for potential nonlinearities.

Hypothesis 2: A positive, potentially nonlinear relationship between gold and sukuk returns, stronger during crises, aligning with the safe-haven concept outlined in the theoretical framework.

2.2.3 Global Equities & Portfolio Substitution:

Global equity performance, captured by the S&P 500, influences fixed-income instruments via portfolio substitution. In bull markets, investors shift toward equities, depressing bond/sukuk demand. During sell-offs, flight-to-quality benefits fixed income. Sukuk show hybrid behavior: diversification benefits in stable times (Sclip et al., 2016, p. 43), but closer correlation with equities under stress (Aloui et al., 2015, p. 78). Recent work (Syed, 2022, p. 12) using TVP-VAR confirms that equities transmit shocks to sukuk during COVID-19.

Our findings challenge the perception of sukuk as simple safe-haven assets. Instead, we show that their correlation with global equities increases significantly during stress periods, reflecting the dominant role of global risk sentiment and liquidity conditions.

Hypothesis 3: A negative long-run link between the S&P 500 and sukuk returns via portfolio-substitution and risk-appetite channels, with asymmetric short-run effects across regimes.

2.3 Synthesis and Research Gap:

A synthesis of the literature (summarized in Table 1.) reveals three persistent gaps. First, prior work often centers on comparisons with conventional bonds or on regional determinants (e.g., oil) or crisis episodes, leaving global financial factors as secondary. Second, most studies treat DXY, DGS10, gold, and global equities separately, lacking a unified framework that controls for their joint, potentially interacting effects. Third, there is limited use of methods that explicitly disentangle short-run dynamics from long-run equilibrium, especially with daily data extending through the post-COVID period.

Table 1. Synthesis of Literature and Gaps

Dimension	What literature shows	Remaining gap
Focus of prior studies	Comparisons with conventional bonds; emphasis on oil or crises.	Few papers center on global financial factors as <i>primary drivers</i> of sukuk.
Treatment of global factors	Often analyzed separately, not jointly.	Lack of a unified framework combining DXY, DGS10, gold, and equities.
Time horizon	Many ignore the distinction between short- vs long-run dynamics.	Limited use of ARDL/ECM to disentangle these effects.
Data coverage	Some studies end pre-COVID or early 2020s.	Scarcity of daily data extending to 2025 across crisis and recovery phases.

Source: Research Findings

3. Research Methodology

3.1 Data description:

This study is based on daily data covering the period from May 1, 2015 to May 1, 2025, totaling approximately 2,500 observations. The dependent variable is the S&P GCC Sukuk Index, obtained from the S&P Global platform. This index is designed to measure the performance of Shariah-compliant, U.S. dollar-denominated, investment-grade sukuk issued by entities in the Gulf Cooperation Council (GCC) (S&P Global, 2025)

Daily returns on the index were computed using the continuously compounded log-return formula:

$$Return_t = \ln\left(\frac{Index_t}{Index_{t-1}}\right)$$

This specification is widely used in financial studies because it allows for continuous compounding and facilitates additive properties across time periods (Hull, 2022, p. 338). To mitigate the impact of extreme shocks and outliers, a Winsorization procedure was applied at the 1st and 99th percentiles. This approach is widely employed in financial research to reduce the influence of outliers and improve the stability of the statistical distribution without removing original observations (Davis, 2025).

The independent variables were obtained from investing and the Federal Reserve Economic Data (FRED) databases, and include:

- **DXY:** The U.S. Dollar Index, which measures the value of the U.S. dollar against a basket of six major currencies (euro, Japanese yen, British pound, Canadian dollar, Swedish krona, and Swiss franc) (ICE Futures U.S., 2015)
- **GOLD_FUTURES:** Gold futures prices, which represent standardized contracts to buy or sell a specific amount of gold at a predetermined price and future date (BullionVault, n.d.).
- **DGS10:** the 10-Year U.S. Treasury Constant Maturity Rate, which serves as a proxy for the long-term risk-free interest rate. This variable captures market expectations about future economic conditions and monetary policy stance. It is widely used in financial and macroeconomic research to assess the impact of global interest rate movements on asset returns, particularly in emerging and Islamic financial markets (FRED, 2025).
- **S&P 500:** A U.S. stock market index that tracks approximately 500 of the largest publicly traded companies, widely considered a benchmark for overall equity market

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performance(Kenton, 2024).

All independent variables were log-transformed prior to analysis. Logarithmic transformation is a standard practice in economic and financial research as it helps stabilize variance (reduce heteroskedasticity), improves distributional properties, and brings variables closer to a normal distribution. It also allows interpreting changes in percentage terms, making the results economically meaningful (Wooldridge, 2012, p. 41). This preprocessing ensures that the series are more stable and less affected by potential non-stationarity at levels.

Consequently, the winsorized returns of the GCC Sukuk Index were used as the dependent variable, while the log-transformed values of the U.S. Dollar Index, gold prices, U.S. 10-year yield, and the S&P 500 index served as explanatory variables, prepared for econometric modeling using ARDL framework, as shown in Table 2.

Table 2. Variables description

Variable Description	Variable
Daily returns of the S&P GCC Sukuk Index, cleaned from outliers using 1% winsorization	GSI_WIN
Logarithm of the US Dollar Index (DXY), reflecting USD strength against major global currencies	LNDXY
Logarithm of global gold prices (USD/ounce), proxy for safe haven assets	LNGOLD
Logarithm of 10-Year U.S. Treasury Constant Maturity Rate, proxy for Long-Term Risk-Free Interest Rate	LNDGS10
Logarithm of the US stock market index, reflecting global equity market movements	LNSP500

Source : Research Findings

Table 3. presents descriptive statistics for the study's main variables, including the winsorized returns of the GCC Sukuk Index (GSI_WIN) as the dependent variable and the log transformation of the explanatory variables (the US dollar index (LNDXY), gold price (LNGOLD), 10-Year U.S. Treasury Constant Maturity Rate (LNDGS10), and the S&P500 index (LNSP500)).

The mean of the GCC Sukuk returns is very close to zero zero (0.000113), which is consistent with the expected mean of daily financial returns. The standard deviation (0.0013) indicates relatively low daily volatility. Of note, after winsorizing the returns at the 1% and 99% quantiles, the kurtosis equals 4.58 and indicating reduced extreme values than on the original data. The Skewness is slightly negative (-0.22), indicating mild left-tail asymmetry.

The predictive and explanatory variables average natural logarithm two for the US dollar index (LNDXY) is about 4.59 and displays small standard deviation (0.051), which suggests a high level of steadiness. Distribution shows mild positive skewness (0.32) and almost normal kurtosis (2.43).

Gold prices (LNGOLD) have a mean logarithmic value of 7.38 with a moderate standard deviation (0.258). The skewness value (0.47) shows a moderate positive asymmetry, whilst

kurtosis (2.49) is just below the normal distribution standard, indicating moderate deviations from normality.

The natural logarithm of the 10-Year U.S. Treasury Constant Maturity Rate (LNDGS10) has a mean of 0.83 and a standard deviation of 0.50, which shows a modest level of spread. The variable is moderately negative skewed (skewness = -0.75) indicating a longer tail towards the left side of the distribution. The kurtosis of 3.25 is a bit higher than the kurtosis of a normal distribution (3), indicating a distribution that is leptokurtic with tails somewhat fatter than a normal distribution. The variable significantly deviates from normality (Jarque-Bera test statistic = 241.98, $p < 0.01^*$).

The transformed S&P 500 index (LNS&P_500) is centered at an average of 8.10, it is moderately variable as the standard deviation is equal to 0.326. This is a low value of skewness (0.09), which means that it is almost symmetric. Kurtosis (1.84) signifies lighter tails comparing to a normal distribution so that the influence of the extreme movements of the market is dampened in the log transformed space.

All the variables have their Jarque-Bera test statistics significant at the level of 1%, which indicates the rejection of the null hypothesis about normality. Yet the distributional characteristics of these variables have been improved through the employment of winsorization and log transformations which has made them more compatible with econometric modeling based on ARDL frameworks.

Table 3. Descriptive statistics

Variables	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
GSI_WIN	0.000113	0.004012	-0.004228	0.001300	-0.225541	4.581146	281.6144***
LNDXY	4.587384	4.737163	4.484019	0.051000	0.320212	2.432472	76.27400***
LNGOLD	7.382297	8.138944	6.956164	0.258136	0.474972	2.486103	121.5088***
LNDGS10	0.830563	1.605430	-0.653926	0.497987	-0.751817	3.249202	241.9807***
LNSP500	8.101196	8.723256	7.511579	0.326094	0.085075	1.842014	142.6961***

Notes: ***Indicates significance at 1%.

Source: Elaborated by the authors depending on EViews 13 outputs

The figure 1. illustrates the evolution of the five variables during the period from May 2015 to May 2025, with the daily data (about 2500 observations).

- **GSI_WIN:** The series exhibits the characteristic pattern of financial returns, fluctuating around a mean close to zero of the series is a characteristic of financial returns, it has no clear trend. Spikes in volatility are more pronounced post-2020, demonstrating the sensitivity of sukuk returns to global market volatility and significant economic events.
- **LNDXY:** The plot reveals the presence of alternating effects of oscillation and up-and-down movements driven by global macroeconomic events (e.g., the pandemic, geopolitical crises) that display non-stationarity in the long run.
- **LNGOLD:** The series shows a very significant upward tendency supporting gold as a safe haven during financial instability.
- **LNDGS10:** The chart shows a sharp drop around 2020, and then a slow climb back up, in line with changes in Fed policy and market expectations for interest rates.
- **LNSP500:** The broad trend is upward in the long run, interspersed with sharp shocks during crises (most recently, the coronavirus crisis) and recoveries, and, hence, renewed

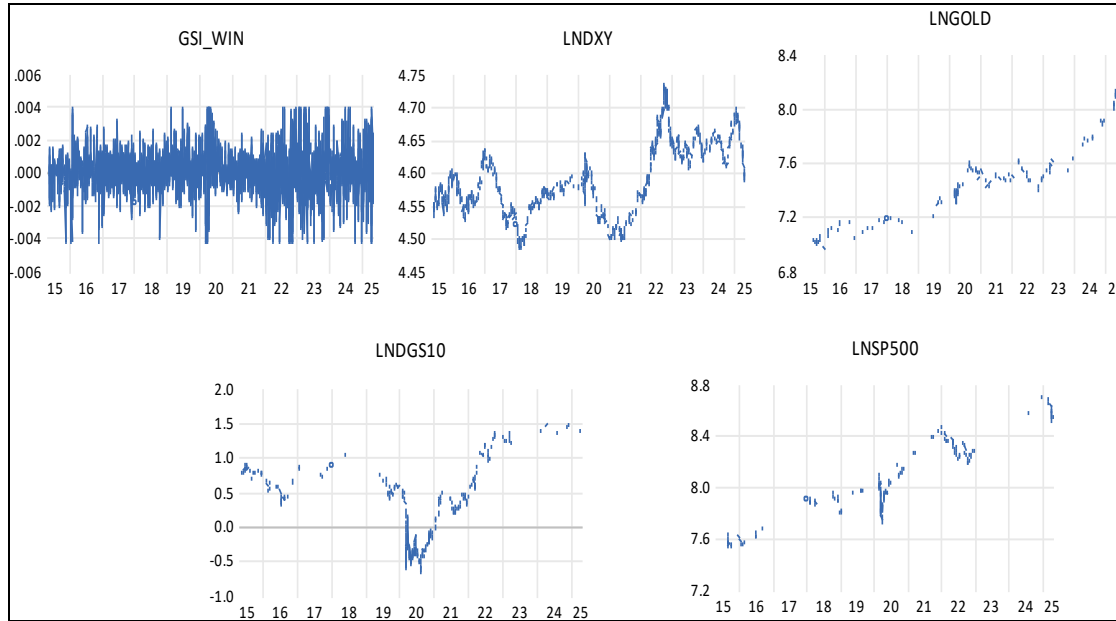
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volatility.

These graphs stress the necessity for testing stationarity (ADF, PP, ...) and the properties of each series; and for finding the best econometric method (ARDL). They also highlight the application of Winsorization to reduce the influence of extreme values for enhancing the better distributional features and hence the accuracy of later econometric analysis.

Figure 1. Daily Dynamics of GCC Sukuk Returns and Global Financial Variables (2015 – 2025)



Source: EViews 13 outputs

3.2 Econometric Modeling:

This study employs the Autoregressive Distributed Lag (ARDL) framework to examine the short-run dynamics and long-run association between global financial indicators and GCC sukuk returns. The ARDL approach developed by (Pesaran et al., 2001, p. 290) offers two main advantages in this context:

- a) **Flexibility with mixed integration orders:** The model allows consistent estimations of long-run relationships with mixed order of integration, $I(0)$ and $I(1)$ variables ($I(2)$ variables are not allowed). This is particularly useful since sukuk returns, interest rates and commodity prices have varying time-series properties.
- b) **Error Correction Mechanism (ECM):** The reparametrized form disentangles short-run shocks from long-run equilibria, detecting both immediate effects (i.e., dollar index changes) as well as how fast sukuk returns adjust back to equilibrium after deviations.

Lagged terms also capture the persistence and delayed effects which are commonly observed in financial time series. The error-correction term allows some observations on market efficiency and integration. To verify robustness of the analysis, diagnostic and stability tests are used.

Overall, ARDL methodology provides the study with a robust and powerful instrument, best able to disentangling transient versus permanent world impacts on the GCC sukuk markets.

- c) The general ARDL (p, q_1, q_2, q_3, q_4) model for the sukuk return specification can be

expressed as:

$$\begin{aligned} \text{GSI_WIN}_t = & \beta_0 + \sum_{i=1}^p \varphi_i \text{GSI_WIN}_{t-i} + \sum_{j=0}^{q_1} \delta_{1j} \text{LNDXY}_{t-j} + \sum_{k=0}^{q_2} \delta_{2k} \text{LNGOLD}_{t-k} \\ & + \sum_{l=0}^{q_3} \delta_{3l} \text{LNDGS10}_{t-l} + \sum_{m=0}^{q_4} \delta_{4m} \text{LNSP500}_{t-m} + \varepsilon_t \end{aligned}$$

The corresponding Error Correction Model (ECM), derived from the ARDL specification, is given by:

$$\begin{aligned} \Delta \text{GSI_WIN}_t = & \beta_0 + \sum_{i=1}^{p-1} \lambda_i \Delta \text{GSI_WIN}_{t-i} + \sum_{j=0}^{q_1-1} \gamma_{1j} \Delta \text{LNDXY}_{t-j} + \sum_{k=0}^{q_2-1} \gamma_{2k} \Delta \text{LNGOLD}_{t-k} \\ & + \sum_{l=0}^{q_3-1} \gamma_{3l} \Delta \text{LNDGS10}_{t-l} + \sum_{m=0}^{q_4-1} \gamma_{4m} \Delta \text{LNSP500}_{t-m} + \varphi \text{EC}_{t-1} + u_t \end{aligned}$$

where Δ denotes the first-difference operator. The error-correction term EC_{t-1} is defined as:

$$\text{EC}_{t-1} = \text{GSI_WIN}_{t-1} - (\alpha_0 + \alpha_1 \text{LNDXY}_{t-1} + \alpha_2 \text{LNGOLD}_{t-1} + \alpha_3 \text{LNDGS10}_{t-1} + \alpha_4 \text{LNSP500}_{t-1})$$

The estimation follows a two-stage procedure. First, the presence of a long-run cointegrating relationship is tested using the bounds testing approach (Pesaran et al., 2001, p. 290). The null hypothesis of no cointegration (i.e., all long-run coefficients δ_1 to δ_4 are jointly zero) is tested against the alternative hypothesis of a long-run relationship (i.e., at least one $\delta \neq 0$). If the calculated F-statistic exceeds the upper critical bound, the null is rejected, confirming cointegration. If it falls below the lower bound, the null cannot be rejected. An inconclusive result is indicated if the statistic falls between the bounds.

Upon establishing cointegration, the model is estimated in its Error Correction Model (ECM) form, which incorporates both short-run dynamics and the speed of adjustment towards long-run equilibrium. In this formulation, the γ coefficients capture the short-run effects, while the δ coefficients represent the long-run elasticities in the cointegrating relationship. The error correction term (EC_{t-1}) must exhibit a negative and statistically significant coefficient (φ), confirming convergence to equilibrium following a short-run shock.

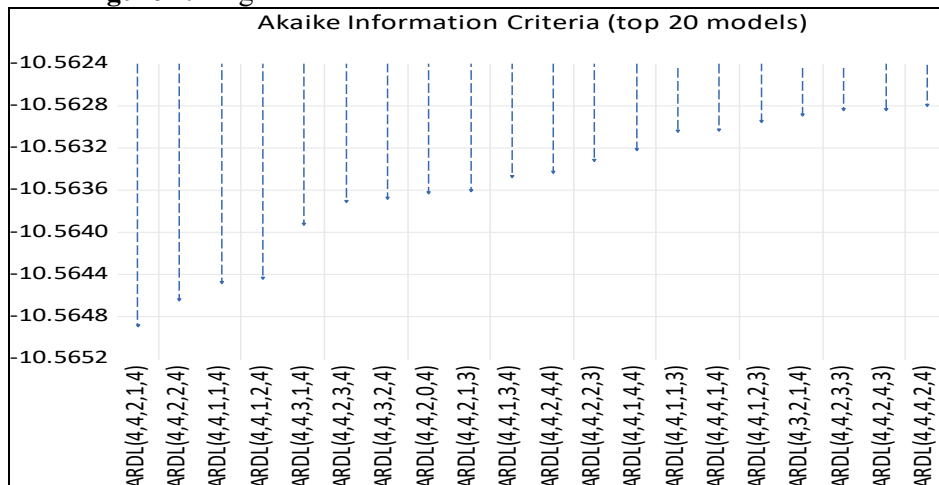
Optimal Lag Length for ARDL Model:

Based on the results of the Akaike Information Criterion (AIC), a total of 2500 ARDL models were evaluated to identify the optimal specification for capturing the relationship among the variables. The figure 2. displays the top 20 models in terms of statistical performance. It is evident that the ARDL (4,4,2,1,4) model is the most efficient, achieving the lowest AIC value of -10.5624. According to the AIC criterion, this model is considered the best due to its balance between goodness of fit and parsimony in the number of parameters used. Although the differences in AIC values among the top models are minimal, the model with the lowest AIC is typically preferred. Consequently, the ARDL (4,4,2,1,4) specification was selected for the subsequent econometric analysis, as it offers the most accurate dynamic representation of the relationships among the studied variables.

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Figure 2. Lag Order Selection for ARDL Estimation Based on AIC



Source: EViews 13 outputs

4. Results and Discussion

4-1 Stationarity Tests:

Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) procedures were applied to test the stationarity of all the variables in three different specifications, that is, no-intercept, intercept, and intercept with trend. The results in table 4. show that the dependent variable (GSI_WIN) is $I(0)$ in all cases with p-values lower than 1%, indicating a rejection of the null hypothesis of unit root at 1% level. Therefore, GSI_WIN is integrated of order zero $I(0)$.

The explanatory variables (LNDXY, LNGOLD, LNDGS10, LN500) instead are not stationary at level and the p-values are high, suggesting that the null hypothesis of unit root cannot be rejected. However, after first differencing, all these variables are stationary, which means that they are integrated of order one, $I(1)$. Such results are robust as they appear consistently from ADF to PP tests. By combining this integrated mixture ($I(0)$, $I(1)$) and with the lack of an $I(2)$, the ARDL model may be used as the most preferred method for these relationships.

Table 4. Unit root test results

Unit root test table (ADF)						
<u>At level</u>		GSI_WIN	LNDXY	LNGOLD	LNDGS10	LN500
None	t-Statistic	-27.35877	0.057932	2.003518	-0.179218	1.355043
	Prob.	(0.0000)	(0.7012)	(0.9897)	(0.6217)	(0.9564)
		***	no	no	no	no
Intercept	t-Statistic	-27.63057	-1.982000	0.263043	-0.983864	0.290659
	Prob.	(0.0000)	(0.2950)	(0.9764)	(0.7610)	(0.9778)
		***	no	no	no	no
Trend & Intercept	t-Statistic	-27.61841	-2.441275	-2.258199	-1.282160	-1.990001
	Prob.	(0.0000)	(0.3579)	(0.4563)	(0.8917)	(0.6058)
		***	no	no	no	no
<u>At First Difference</u>		d(GSI_WIN)	d(LNDXY)	d(LNGOLD)	d(LNDGS10)	d(LN500)
None	t-Statistic	-26.99505	-47.52183	-48.61816	-48.17530	-14.11385
	Prob.	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0000)
		***	***	***	***	***

Intercept	t-Statistic	-26.97728	-47.51093	-48.67195	-48.16991	-14.17798
	Prob.	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0000)
		***	***	***	***	***
Trend & Intercept	t-Statistic	-26.95232	-47.49678	-48.70165	-48.15812	-14.17278
	Prob.	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
		***	***	***	***	***
Unit root test table (PP)						
<u>At level</u>		GSI_WIN	LNDXY	LNGOLD	LNDGS10	LNSP500
None	t-Statistic	-50.65599	0.068747	2.130548	-0.079121	2.131016
	Prob.	(0.0001)	(0.7046)	(0.9925)	(0.6563)	(0.9925)
		***	no	no	no	no
Intercept	t-Statistic	-50.27637	-1.810778	0.388285	-0.864164	-0.340412
	Prob.	(0.0001)	(0.3756)	(0.9825)	(0.7998)	(0.9165)
		***	no	no	no	no
Trend & Intercept	t-Statistic	-50.26643	-2.264272	-2.132507	-1.168421	-3.541796
	Prob.	(0.0000)	(0.4529)	(0.5267)	(0.9155)	(0.0353)
		***	no	no	no	**
<u>At First Difference</u>		d(GSI_WIN)	d(LNDXY)	d(LNGOLD)	d(LNDGS10)	d(LNSP500)
None	t-Statistic	-232.7988	-47.98729	-48.66898	-48.26198	-54.45367
	Prob.	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
		***	***	***	***	***
Intercept	t-Statistic	-235.2928	-47.97559	-48.74575	-48.26192	-54.52309
	Prob.	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
		***	***	***	***	***
Trend & Intercept	t-Statistic	-246.3771	-47.96043	-48.79675	-48.25105	-54.51532
	Prob.	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
		***	***	***	***	***
Order of integration		I(0)	I(1)	I(1)	I(1)	I(1)

Note: ***, **, and *: the level of significance of 1%, 5%, 10% respectively. And (no) Not Significant.

Source: Elaborated by the authors depending on EViews 13 outputs.

4.2 Co-integration test:

In order to test for the existence of a long-run equilibrium relationship between Sukuk returns (dependent variable) and its explanatory variables, we follow the (Pesaran et al., 2001, p. 290) ARDL bounds testing for cointegration approach. This approach is valid for models with both I(0) and I(1) mixed variables, provided that none of the time series is integrated at order 2 or higher. In this setting, the model consists of four explanatory variables: the log of US dollar index (LNDXY), the log of gold prices (LNGOLD), the log of 10-year US treasury yields (LNDGS10) and the log of the S&P 500 index (LNSP500). The restricted intercept no trend (Case 2) bounds test was applied using a sample of 2064 daily observations. As shown in Table 5., the calculated F-statistic is 64.8699, which is way above the upper bound critical value at the 1 % level of significance (4.370). This strongly rejects the null hypothesis of no level relationship confirming the existence of a long-run cointegrating relationship between Sukuk returns and the chosen macroeconomic and financial variables.

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Table 5. ARDL Bound Test Results

Calculated F-statistics	64.869912		
Significance	Lower Bound I(0)	Upper Bound I(1)	Decision
10%	2.200	3.090	Cointegration
5%	2.560	3.490	Cointegration
1%	3.290	4.370	Cointegration

Note: I(0) and I(1) are respectively the stationary and non-stationary bounds.

Source: Elaborated by the authors depending on EViews 13 outputs.

4.3 ARDL model findings:

The long-run coefficients obtained from the ARDL model indicate a time-series relationship between the log sukuk returns (GSI_WIN) and the explanatory variables as shown in Table 6. The U.S. Dollar Index (LNDXY) coefficient is positive (0.000593) but statistically insignificant ($p = 0.5529$), which indicates that the shifts in the dollar do not affect sukuk returns in the long run over our sampled period. Likewise, the 10-Year U.S. Treasury Rate (LNDGS10) has an inconsequential coefficient ($-1.74\text{E-}05$; $p = 0.8609$), which suggests that shifts in long-term U.S. interest rates lack significant long-run relationship with sukuk performance. In contrast, gold prices (LNGOLD) appear to have a slightly significant positive influence on sukuk returns at 10 percent level (coefficient = 0.000773; $p = 0.0715$), suggesting that gold acts as a safe haven that can drive Islamic fixed-income securities, especially during crises. Most importantly, S&P 500 Index (LNSP500) has statistically significant negative coefficient (-0.000698 ; $p = 0.0381$), implying that at long-run, higher stock market returns in U.S. are linked with lower returns in sukuk possibly due to portfolio substitution effect or investor risk attitudes change. The constant term (C) is also statistically insignificant ($p = 0.5190$), there is no strong base trend of the dependent variable after adjusting for the independent variables. As a whole, the long-term relationship indicates that the U.S. stock market (S&P 500) has the strongest impact on Sukuk returns among the considered macroeconomic variables, whereas the remaining variables exhibit no significant long-term association.

Table 6. ARDL Long-Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDXY(-1)	0.000593	0.000999	0.593572	0.5529
LNGOLD(-1)	0.000773*	0.000429	1.802982	0.0715
LNDGS10(-1)	$-1.74\text{E-}05$	$9.91\text{E-}05$	-0.175307	0.8609
LNSP500(-1)	-0.000698^{**}	0.000336	-2.075212	0.0381
C	-0.002667	0.004134	-0.645020	0.5190

Note: ** and *: the level of significance of 5% and 10% respectively.

Source: Elaborated by the authors depending on EViews 13 outputs.

The model contains a restricted constant and no deterministic trend (Case 2) and was estimated employing HAC (Newey-West) standard errors in order to allow for autocorrelation and heteroskedasticity. The error-correction term ($\phi \approx -0.7583$) is also significant at $p < 0.01$ and negative and indicates the existence of a stable long-run relationship between the variables. This coefficient indicates that deviations from long-run equilibrium are corrected by about 76% in one trading day, suggesting a relatively rapid adjustment process. Short-run dynamics, as

shown in Table 7. reveal that:

- Past changes in GSI_WIN have a significant negative impact on current changes, suggesting a mean-reversion behavior.
- Changes in the U.S. Dollar Index (LNDXY) show a statistically significant negative effect in the current period ($p = 0.0029$), as well as at the second and third lags, confirming its contractionary effect on Sukuk returns in the short run.
- Gold price variations (LNGOLD) are statistically significant and positive in the short run ($p < 0.01$), providing evidence for the safe haven behavior of the precious metal.
- The long-term U.S. interest rate (LNDGS10) has a weak negative ($p = 0.0315$) influence, indicating that as interest rates increase, the attractiveness of Sukuk is decreased.
- The S&P 500 index (LNSP500) is consistently and positively important across all lags, indicating a significant degree of co-movement between the U.S. equity markets and Sukuk returns.

The model is well fitted ($R^2 = 0.520$), which shows that more than 52% of the variation in Sukuk returns is explained by the independent variables and its lags, which is acceptable given the nature of financial data. Given that the values for the information indices (AIC, SC, HQ) are quite low, this model may be considered appropriate. The high F statistics (Prob < 0.000) that was significant provides evidence that the model as a whole is statistically significant.

Table 7. ARDL Short-Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GSI_WIN(-1))	-0.246879***	0.033906	-7.281303	0.0000
D(GSI_WIN(-2))	-0.139836***	0.029265	-4.778283	0.0000
D(GSI_WIN(-3))	-0.080838***	0.021077	-3.835291	0.0001
D(LNDXY)	-0.019802***	0.006653	-2.976542	0.0029
D(LNDXY(-1))	-0.009324	0.006411	-1.454349	0.1460
D(LNDXY(-2))	-0.013288**	0.006381	-2.082479	0.0374
D(LNDXY(-3))	-0.015631**	0.006310	-2.477319	0.0133
D(LNGOLD)	0.023225***	0.002896	8.019579	0.0000
D(LNGOLD(-1))	0.005192*	0.003077	1.687447	0.0917
D(LNDGS10)	-0.002240**	0.001041	-2.152596	0.0315
D(LNSP500)	0.006847***	0.002296	2.981750	0.0029
D(LNSP500(-1))	0.021768***	0.002483	8.766019	0.0000
D(LNSP500(-2))	0.006541***	0.002396	2.729574	0.0064
D(LNSP500(-3))	0.005073**	0.002355	2.153734	0.0314
ECM(-1)	-0.758344***	0.038392	-19.75276	0.0000
R-squared: 0.520255		F-statistic: 158.7157		
Adjusted R-squared: 0.516977		Prob. : 0.0000		
S.E. of regression: 0.001222		DW = 1.990971		
Sum squared resid: 0.003059				

Note: ***, **, and *: the level of significance of 1%, 5% and 10% respectively. And (no) Not Significant.

Source: Elaborated by the authors depending on EViews 13 outputs.

Our findings for the S&P 500 differ across horizons in a way that is theoretically coherent once the time dimension is made explicit. In the long run (Table 6.), the S&P 500 carries a negative and statistically significant coefficient, consistent with a portfolio substitution

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mechanism: sustained U.S. equity outperformance induces investors to rebalance away from fixed-income instruments—such as GCC sukuk—toward higher-return equities, yielding an inverse long-run relationship. By contrast, the short-run estimates (Table 7.) exhibit positive and highly significant coefficients on contemporaneous and lagged changes in the S&P 500, revealing co-movement at daily frequencies. This short-term positive correlation is driven by common global risk factors and liquidity shocks: during risk-on phases or broad liquidity injections, capital simultaneously flows into U.S. equities and sukuk; during risk-off episodes or liquidity withdrawals, both markets experience synchronized drawdowns. Crucially, the large and highly significant error-correction coefficient ($\phi \approx -0.7583$, $\approx 76\%$) indicates that such short-run deviations from the long-run equilibrium are rapidly corrected, so the transient co-movement does not overturn the longer-term portfolio reallocation. Hence, there is no contradiction: sukuk and U.S. equities can move together in the short run due to common shocks and sentiment while still displaying a negative long-run relation driven by strategic asset allocation decisions. This duality underscores the sukuk market's short-run integration with global conditions and its long-run diversification potential.

Together, these findings indicate that while global dollar strength (DXY) and the 10-year U.S. yield (DGS10) exert transitory negative pressures on sukuk returns at daily horizons (Table 7.), they do not shape the long-run equilibrium (Table 6.). This short-run/long-run separation is consistent with the large and highly significant speed of adjustment ($\phi \approx -0.7583$).

Analysis of the short-to-long-term effect ratio in Table 8. reveals that LNDGS10 (U.S. 10-year treasury) ranks highest in impact priority, with a ratio of approximately 128.73. It shows that long-term U.S. interest rate change carries a large and immediate impact on sukuk returns. That is consistent with term structure theory, which suggests that movements in benchmark yields affect the valuation of fixed income securities, including sukuk, via changes in discount rates (Rey, 2015, p. 13). LNDXY (U.S. Dollar Index) comes in the second position with a substantial negative ratio of -97.88 , which implies that sukuk returns are highly responsive to the exchange rate changes, especially in the short-term. This is in line with international finance literature, where a strong Currency, and particularly a strong U.S. dollar, reduces the attractiveness of EM assets through two main channels. First, it increases the real burden of foreign currency-denominated debt, the phenomenon so labelled 'original sin' (Eichengreen et al., 2005, p. 16). Second, it triggers reversals of capital flows by constraining global liquidity and risk appetite (Rey, 2015, p. 27). The empirical findings support that a USD appreciation lowers cross-border lending to EMs and raises default risk of dollar-indebted firms, which amplifies financial fragility (Avdjiev et al., 2019, p. 158)

LNSP500 ranks third with a value of -57.63 , which shows a significant inverse relationship between the U.S. stock market performance and sukuk returns. This phenomenon reflects portfolio reallocation behavior where equity markets are thriving, investors may rebalance from fixed income assets to higher-yielding equities reducing sukuk demand (Andersson et al., 2008, p. 150).

Finally, LNGOLD is at the fourth position (36.76), also suggesting that it has short-term amplifying effect which is relatively moderate compared to its long-term influence. Gold as a

safe-haven during financial instability seems to support sukuk returns, but it is a smaller effect compared to the global interest rates or the currency movements (Baur & Lucey, 2010, p. 219). In sum, these findings suggest that global macro-financial variables (dominated by U.S. interest rates and the dollar index) are decisive factors in the short-run volatility of sukuk returns, with alternative assets like gold and stock markets playing a secondary though still significant role. This highlights the importance for sukuk market participants to carefully consider global monetary policy cues and currency moves into account when adjusting for short-term price fluctuation exposure.

Table 8. The ratio of the short-term effect to the long-term effect

Variable	LNDXY	LNGOLD	LNDGS10	LNSP500
Short-run coefficient	-0.058045	0.028417	-0.002240	0.040229
Long-run coefficient	0.000593	0.000773	-0.0000174	-0.000698
Short/Long Ratio (%)	-97.90	36.76	128.74	-57.64
Impact priority	2	4	1	3

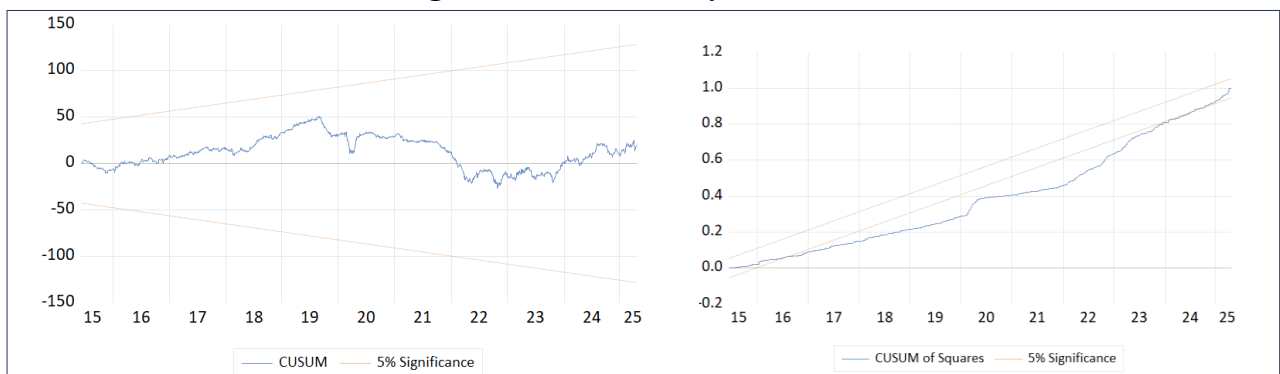
Source: Elaborated by the authors depending on EViews 13 outputs.

4.4 The stability tests:

For further analysis of the stability of the estimated ARDL model, both CUSUM and CUSUMSQ tests were used (Figure 3.). The CUSUM test (first graph) based on recursive residuals shows that the cumulative sum of recursive residuals does not go beyond the 5% significance bounds for the whole sample period. This evidence shows that the estimated coefficients are robust while no break points are identified. Despite some slight fluctuations around periods 19–21, the statistic does not exceed the critical values, indicating temporary as opposed to persistent instability.

For the CUSUM of Squares test (second graph), despite the fact that in certain parts of the sample period it did not stay between the confidence bands, stability is confirmed if either the CUSUM or CUSUMSQ test is passed (Mouffok & al., 2025, p. 13). Thus the findings substantiate that the estimated model exhibits stability in both coefficient consistency and error variance for the estimated model used here. This adds confidence in the model's estimate accuracy and its potential explanation on sukuk return dynamics across the sample period.

Figure 3. Model stability results



Source: EViews 13 outputs

5. CONCLUSION

This study provides novel evidence on the dynamic interplay between global financial factors and GCC sukuk returns, with a primary contribution in identifying a distinct time-scale asymmetry in their relationship. Specifically, we document that the S&P 500 displays a negative

and statistically significant long-run association, consistent with portfolio substitution whereby sustained equity outperformance draws capital away from fixed-income instruments such as sukuk. By contrast, the short-run dynamics show positive and highly significant coefficients for contemporaneous and lagged changes in the S&P 500, indicating daily co-movement driven by common global risk factors and liquidity conditions. There is therefore no contradiction: synchronized responses to global shocks explain the short-run co-movement, whereas strategic asset reallocation governs the long-run inverse relation.

Equally important, the speed of adjustment is remarkably high: the error-correction coefficient ($\phi \approx -0.7583$, $\approx 76\%$) implies that most disequilibria are eliminated within one trading day. This rapid convergence underscores the efficiency, liquidity, and international integration of GCC sukuk markets. Finally, while the U.S. dollar (DXY) and 10-year Treasury yield (DGS10) exert transitory negative effects at daily frequencies (Table 7), they are not material in the long-run equilibrium (Table 6). For investors and policymakers, these findings imply that sukuk can co-move with global markets in the short run yet still provide long-horizon diversification—highlighting the value of monitoring global liquidity and policy signals when managing near-term exposure without losing sight of long-run allocation objectives.

Academic Contribution. In light of this gap in extant literature, this paper contributes by presenting current evidence on how broad international factors spill over into Islamic fixed income in the GCC. Beyond that, unlike analyses that narrow in on comparisons with or local determinants like oil and regional liquidity, we highlight the dollar, gold, global interest rates and U.S. equities – linking Islamic capital markets to the heartbeat of the world economy.

In methodological terms, we illustrate the application of ARDL for separating short-run deviations from long-run equilibria in sukuk analysis. The results in their entirety demonstrate that GCC sukuk are now integrated — albeit imperfectly — within the world financial system.

Practical Implications :

- **Portfolio construction.** The inverse long-run relation with U.S. stocks alerts that sukuk's diversification into safe havens can wane in global equity upturns; managers must rebalance over market cycles and not rely on the 'all-weather' property of sukuk.
- **Defensive positioning.** The (mild) positive relationship with gold and stability at longer horizons indicates that sukuk may be used as a partial defensive allocation in times of uncertainty.
- **Global risk management.** With dollar and rate sensitivity today, investors should use appropriate hedges (e.g., currency overlays or duration management) and invest in a diversified set of currencies and assets.

Policy Recommendations for the GCC:

- **Broaden investor base and issuance mix.** The market's vulnerability to global shocks — through foreign investors and USD funding — suggest a focus on developing domestic demand and promoting local-currency sukuk to reduce reliance on dollars.
- **Strengthen hedging tools and local liquidity.** Authorities can also encourage Shariah-compliant hedges (i.e. profit rate swaps) and promote secondary-market liquidity to better buffer against external volatility.

- **Align issuance with global cycles.** In view of how the U.S. rate shifts affect short-term global financing costs, sovereign and quasi-sovereign issuers need to choose offering times when global rates are not at their peak and spread refinancing risk across different maturities.

Future Research:

- **Broader drivers.** Integrate other factors (eg, oil and world uncertainty measures such as VIX) to map a richer risk landscape
- **Regime sensitivity.** Contrast quiet vs. crisis times or use regime-switching/time-varying models to identify structural breaks in the sukuk–world links.
- **Cross-market and instrument heterogeneity.** Compare GCC with Asian sukuk markets and differentiate between sovereign and corporate sukuk.
- **Forecasting and risk solutions.** Construct predictive models with the identified global factors; test risk management, hedging and allocation schemes which mitigate external shocks.

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