

## The Relationship Between Commodity Prices and Islamic Stock Markets: Evidence From the Wavelet-Quantile Approach

Mustafa Uysal<sup>1</sup>

Erhan Daştan<sup>2</sup>

### Abstract

The main objective of this study is to investigate the relationship between commodity prices and Islamic stock markets for Türkiye. In this context, the relationship between the MSCI Türkiye Islamic Stock Index (ISLAMIC) and the prices of gold (GOLD), silver (SILVER), and copper (COPPER) was analyzed using various methods based on monthly data covering the period from May 2002 to March 2026. First, the nonlinear structures of the variables were examined through the BDS test. Stationarity analyses were conducted using the Wavelet Quantile Augmented Dickey-Fuller (WQADF) and Wavelet Quantile Phillips-Perron (WQPP) tests. Subsequently, the relationships among the variables were investigated through the Wavelet Quantile Regression (WQR) and Wavelet Quantile Granger Causality (WQGC) methods. The findings reveal that the relationships between ISLAMIC and GOLD, SILVER, and COPPER differ across both frequency components and quantile levels. In particular, the effects of GOLD and SILVER on ISLAMIC become more pronounced in medium- and long-term frequency components, while they remain relatively weaker in short-term frequencies. In addition, COPPER is found to exhibit a stronger and more widespread relationship with ISLAMIC compared to the other variables. The WQGC results further indicate that the causality relationships among the variables vary depending on market conditions and investment horizons. Overall, the findings demonstrate that the relationship between commodity prices and Islamic stock markets possesses a nonlinear and frequency-dependent structure.

- 1 Assoc. Prof. Dr., Artvin Çoruh University, Faculty of Economics and Administrative Sciences, Department of Business Administration, [muyasal@artvin.edu.tr](mailto:muyasal@artvin.edu.tr), <https://orcid.org/0000-0002-6377-2644>
- 2 Asst. Prof. Dr., Artvin Çoruh University, Artvin Vocational School, Department of Accounting and Taxation, [erhan@artvin.edu.tr](mailto:erhan@artvin.edu.tr), <https://orcid.org/0000-0001-7498-8910>

## 1. INTRODUCTION

With the globalization of financial markets, global uncertainties, regional or global risks, and economic crises have significantly shaped the investment environment. The COVID-19 pandemic, which emerged as a global health crisis, ultimately evolved into an economic crisis and further increased the fragility of financial markets. The volatile and fragile structure observed in financial markets in recent years, together with global inflationary pressures and the economic policies implemented in response to these pressures, has substantially altered investor behavior. Investors no longer focus solely on financial assets that provide high returns, but have also turned toward investment instruments that offer hedging and portfolio diversification benefits. In this regard, in addition to precious metals such as gold and silver, which are traditionally regarded as safe-haven assets, copper, as an important instrument of the commodity market, has attracted attention as both a hedging and portfolio-diversifying asset.

Gold has traditionally been regarded as one of the primary safe-haven assets preferred by investors during periods of economic and financial crises (Klein, 2017). Similarly, silver, due to both its status as a precious metal and its increasing popularity as an investment instrument in recent years (Lucey and Li, 2015), occupies an important position in commodity markets. Copper, on the other hand, is considered one of the strategic instruments of economic activity and economic growth because it is one of the main inputs of industrial production. Therefore, since these commodities also serve as investment instruments, their relationship with stock markets, which constitute one of the most important components of financial investments, is of considerable importance (Al-Ameer, 2018). Examining the relationships among investment instruments belonging to different categories provides important insights, particularly in understanding investor behavior.

**In recent years, alongside the rapid global development of the Islamic finance sector,** interest in Islamic stock markets has also increased significantly. Due to their distinctive characteristics, Islamic stock markets differ from conventional stock markets. In particular, their reliance on an interest-free system, the restriction of excessive uncertainty and speculative activities, and the adoption of Shariah-compliant qualitative and quantitative criteria constitute the main features of these markets (Güçlü, 2019). Owing to these characteristics, Islamic stocks may react differently to market shocks compared to other financial assets and may also exhibit diversification benefits within investment portfolios (Uddin et al., 2018). In this respect, examining the relationship between commodity markets and Islamic stock markets

is important for investors in terms of determining alternative investment strategies and achieving effective portfolio diversification. Identifying how Islamic investment instruments interact with alternative financial assets may help investors make healthier decisions under different market conditions.

A review of the existing literature reveals that a significant portion of the studies examining the relationships between Islamic stock markets and commodity markets relies on linear methods (Nagayev et al., 2016; Bahloul and Khemakhem, 2021). However, financial markets exhibit a nonlinear structure due to the influence of various factors (Suleman et al., 2021). These factors generally include investor behavior, market structures, economic shocks, and changing expectations. Investors' investment horizons also constitute an important parameter. Since investment horizon preferences may differ across investors, they can consequently affect the structure of financial markets. For these reasons, conventional methods that evaluate relationships solely based on the average effects of factors influencing markets may be insufficient to explain the complex relationships among financial variables. In particular, because financial time series exhibit asymmetric and nonlinear characteristics, the use of frequency- and quantile-based methods may provide more comprehensive and reliable results.

This study investigates the relationship between the MSCI Türkiye Islamic Stock Index (ISLAMIC) and the prices of gold (GOLD), silver (SILVER), and copper (COPPER) for Türkiye. Within the framework of the wavelet-quantile approach, the nonlinear structures of the series were first examined using the BDS test, followed by the analysis of their stationarity properties through the Wavelet Quantile Augmented Dickey-Fuller (WQADF) and Wavelet Quantile Phillips-Perron (WQPP) tests. In order to reveal how the relationship between the variables changes under different market conditions and investment horizons, the Wavelet Quantile Regression (WQR) method was employed. In addition, the Wavelet Quantile Granger Causality (WQGC) method was utilized to examine the causality structure among the variables across different frequency and quantile levels. Thus, the study reveals not only the average effects but also how the relationships among the variables differ across various market regimes.

## **2. CONCEPTUAL FRAMEWORK**

During turbulent market conditions or periods of crisis, investors seek ways to protect their investments depending on prevailing market conditions. Diversification and hedging strategies implemented by investors during normal periods may become insufficient during crises. For this reason, stock market

investors in particular tend to shift their investments toward safe-haven assets. However, the concepts of diversifier assets, hedge assets, and safe-haven assets are often confused with one another or used interchangeably. To eliminate this confusion, Baur and Lucey (2010) distinguished these three types of assets and developed separate definitions for each. According to their classification;

- A hedge asset is defined as “an asset that is uncorrelated or negatively correlated with a portfolio or another asset on average.” As understood from this definition, a hedge asset provides protection against risk only during normal periods. Therefore, it may fail to fulfill this protective function against risks arising during crisis periods.
- A diversifier asset is defined as “an asset that is positively, but not perfectly, correlated with a portfolio or another asset on average.” Similar to hedge assets, diversifier assets do not play a role in reducing potential losses during periods of market crisis.
- A safe-haven asset is defined as “an asset that is uncorrelated or negatively correlated with another asset or portfolio during periods of market turbulence or crisis.” As implied by this definition, safe-haven assets move in the opposite direction of other assets during crisis periods. In such times, these assets tend to decouple from the portfolio in which they are included.

The safe-haven properties of various investment instruments have been extensively examined in the literature. Gold, in particular, is considered one of the most prominent among these assets (Akhtaruzzaman et al., 2021; Baur and McDermott, 2010). Several factors underlie the strong demand for gold and its recognition as a safe-haven asset. In particular, its use as a medium of exchange since ancient times and early civilizations, its role as a symbol of power, and its scarcity in nature are among these factors. Gold preserves the value of savings against inflation. Even during periods when the U.S. dollar loses value against other currencies, gold has consistently appreciated in value (Capie et al., 2005).

Silver, another commodity examined in the present study, has been used as a form of money for centuries. In portfolio investments, its role as a portfolio diversifier is particularly prominent. Similar to gold, silver exhibits portfolio diversification, hedging, and safe-haven properties during periods of global instability and financial turmoil characterized by uncertainty and high market volatility (Matiushin, 2019). Copper, on the other hand, is not only a major input in industrial production but also a fundamental industrial commodity widely used in infrastructure investments, energy, electronics, and construction

sectors. Due to its strong connection with production activities, copper is considered one of the leading indicators of global economic activity. For this reason, close relationships may emerge between copper price movements and stock markets (Guo, 2018; Mendiola et al., 2019). During periods when expectations of economic growth strengthen, increases in production and investment activities raise the demand for copper. Accordingly, positive relationships may be observed between copper prices and stock markets. However, global economic slowdowns, recession expectations, or contractions in industrial production may negatively affect both copper prices and stock markets. Particularly in the context of Islamic stock markets, the inclusion of sectors more closely linked to real economic activities due to Shariah-compliant screening criteria may cause the relationship between copper and Islamic stock markets to become more pronounced.

The Islamic stock indices whose relationships with the above-mentioned commodities are examined in this study are subject to specific screening methodologies. Although the criteria used in all Islamic indices are generally similar, they may differ in certain aspects. In order for a firm to be included in the Islamic stock index created by MSCI for Türkiye, it must satisfy specific qualitative and quantitative criteria. First, regarding the qualitative criteria, firms must not operate in sectors such as interest-based banking and financial services, insurance, alcohol, tobacco, gambling, certain areas of the entertainment industry, weapons production, pork-related products, and similar activities. After satisfying the qualitative criteria, firms that seek inclusion in the index must also comply with quantitative criteria in the second stage. In the MSCI Islamic index methodology, the ratio of total debt to market value, the ratio of interest-bearing cash and securities to total assets, and the share of interest income within total revenues are generally required to remain below certain threshold values. In line with these criteria, companies with high interest income, excessive leverage, or intensive involvement in interest-based financial assets are excluded from the index (MSCI, 2025).

### 3. DATA AND METHODOLOGY

#### 3.1. Data

This study investigates the relationship between Islamic stock markets (ISLAMIC) and commodity prices for Türkiye. In this context, following the study of Tuna (2019), the Islamic stock market index created by MSCI for Türkiye was used as the dependent variable. In line with the existing literature, gold (GOLD) and silver (SILVER) prices were compiled as ounce prices denominated in U.S. dollars, while copper (COPPER) prices were

obtained as metric ton prices denominated in U.S. dollars (Gil-Alana and Poza, 2024; Derakhshani et al., 2024). The data representing the Islamic stock market were obtained as a U.S. dollar-denominated price index from <https://www.msci.com>, while the data for gold and silver were retrieved from [www.investing.com](http://www.investing.com) and the data for copper were obtained from <https://fred.stlouisfed.org>. The starting point of the analysis period was determined as 2002, the year in which the Islamic stock index was established, and monthly data were included in the analyses. Accordingly, the analyses were conducted using monthly data covering the period from May 2002 to March 2026. In order to eliminate the problem of heteroskedasticity, the natural logarithm of all variables was taken.

### 3.2. Methodology

In this study, the relationship between ISLAMIC and GOLD, SILVER, and COPPER in Türkiye is examined through the wavelet-quantile approach. In this way, the dynamics of the relationship among the variables are revealed across both different time frequencies and different quantiles. In this context, the linearity properties of the variables were first examined using the BDS test developed by Broock et al. (1996). The main hypotheses of this test are as follows:

$H_0$  = The series is independently and identically distributed.

$H_1$  = The series is not independently and identically distributed.

Subsequently, the stationarity properties of the variables were examined using the Wavelet Quantile Augmented Dickey-Fuller (WQADF) and Wavelet Quantile Phillips-Perron (WQPP) tests. While conventional linear methods assume that parameters remain constant across all quantiles, WQADF and WQPP are capable of revealing relationships that vary across different quantiles. Therefore, these methods are more appropriate particularly for dynamic and heterogeneous series such as economic and financial variables, as they take into account that the relationships among variables may differ under varying economic conditions (Huang and Tan, 2025). As wavelet-extended versions of the QADF and QPP tests, WQADF and WQPP examine the stationarity properties of variables across both frequency and quantile dimensions, unlike conventional tests that focus solely on average behavior. Thus, compared to the traditional ADF and PP tests, which evaluate stationarity properties only through average behavior, these methods allow the changes in stationarity structures across different time scales to be observed at low, medium, and high quantiles (Akadiri et al., 2025; Awosusi and Ozsahin, 2026). The main hypotheses of these tests are as follows:

$H_0$  = The series contains a unit root at the relevant quantile.

$H_1$  = The series is stationary at the relevant quantile.

In order to investigate the relationship among the variables whose stationarity properties were examined, the Wavelet Quantile Regression (WQR) method was employed. Developed by Adebayo and Özkan (2024), this method is an extended version of conventional quantile regression combined with wavelet applications. Thus, changes in the relationships among variables across both time and quantiles can be observed. In the WQR method, the time series are first decomposed into short, medium, and long-term components through the Maximum Overlap Discrete Wavelet Transform (MODWT) developed by Percival and Walden (2000). This process enables the separate examination of both low-frequency long-term trends and high-frequency short-term fluctuations in the series (Nawaz et al., 2026). Subsequently, quantile regression is estimated using the detail coefficients obtained at each wavelet level, and the effects of independent variables on the quantiles of the dependent variable across different periods are revealed (Hung, 2026). In this context, the WQR model can be expressed as follows:

$$Q_{\tau}(d_j(Y)|d_j(X)) = \beta_0(\tau) + \beta_1(\tau)d_j(X) \quad (1)$$

In Equation 1,  $d_j(Y)$  and  $d_j(X)$  represent the wavelet components of the dependent and independent variables at the  $j$ -th level, respectively.  $\beta_0(\tau)$  denotes the constant term, while  $\beta_1(\tau)$  represents the slope coefficient. Through this method, nonlinear and asymmetric relationships among the variables can be revealed in greater detail.

The causality relationship among the variables was examined using the Wavelet Quantile Granger Causality (WQGC) method developed by Özkan et al. (2024). This method combines the Granger causality approach of Granger (1969), the wavelet decomposition framework of Percival and Walden (2000), and the quantile estimation method of Li et al. (2015) in order to reveal how the causality relationship between two variables changes across different quantiles and periods. In this respect, it provides more comprehensive results compared to methods focusing solely on either the time or quantile dimension. In the WQGC method, the dependent variable  $Y$  and the potential causal variable  $X$  are first decomposed into the  $z$ -th level using MODWT. Subsequently, quantile series ranging from 0.05 to 0.95 are generated for each decomposition level of the  $Y$  variable. Finally, a VAR model is established between each quantile series of  $Y$  and the decomposed series of  $X$ , and the Granger causality test is applied. The WQGC method is estimated using the following model:

$$dz[Y]_{\tau t} = \partial_{z,\tau} + \sum \vartheta_{z,\tau,\mu} dz[Y]_{\tau t-\mu} + \sum \beta_{z,\tau,\mu} dz[X]_{t-\mu} + \varepsilon_{t,z,\tau} \quad (2)$$

In Equation 2,  $\partial_{z,\tau}$  denotes the constant term at the  $\tau$ -th conditional quantile and the  $z$ -th decomposition level,  $dz[Y]_{\tau t}$  represents the  $\tau$ -th conditional quantile series of the dependent variable at the  $z$ -th decomposition level,  $dz[X]_{t-\mu}$  denotes the  $z$ -th decomposition level of the independent variable  $X$ ,  $\mu$  indicates the lag length, and  $\varepsilon_{t,z,\tau}$  represents the error term at time  $t$ , the  $\tau$ -th conditional quantile, and the  $z$ -th decomposition level. If  $\beta_{z,\tau,\mu} \neq 0$  and is statistically significant, it is accepted that variable  $X$  has Granger causality on the  $\tau$ -th conditional quantile of  $Y$  at the  $z$ -th decomposition level. Through this method, it is possible to examine at which quantile(s) and time horizons the causality relationship exists. In addition, this method is considered a robustness test for the findings obtained from Wavelet Quantile Correlation (WQC) analysis (Nathaniel et al., 2026).

#### 4. FINDINGS

Descriptive statistics for the series used in the study examining the relationship between MSCI Türkiye ISLAMIC and GOLD, SILVER, and COPPER are presented in Table 1. According to the findings reported in Table 1, copper has the highest average value among the variables. The highest value belongs to COPPER with 9.472, while the lowest value belongs to SILVER with 1.491. Based on the standard deviation values, GOLD and SILVER are found to exhibit the highest volatility. Therefore, it can be stated that precious metals display a more volatile structure compared to ISLAMIC during the sample period. Among the variables considered, ISLAMIC exhibits the lowest volatility, indicating that these markets demonstrate a relatively more stable structure. The skewness values are negative for all variables, indicating that the series are left-skewed. According to the Jarque-Bera test statistics, ISLAMIC, SILVER, and COPPER exhibit fatter tails compared to the normal distribution. Considering the probability values, the null hypothesis of normal distribution is rejected for all series, indicating that the variables are not normally distributed. Therefore, it can be argued that the variables possess a non-normal and asymmetric structure, and methods based solely on average effects may be insufficient for evaluating the relationships among them.

*Table 1. Descriptive Statistics*

STATISTICS	ISLAMIC	GOLD	SILVER	COPPER
Mean	7.578	7.049	2.825	8.706
Median	7.667	7.156	2.851	8.835
Maximum	8.157	8.571	4.542	9.472
Minimum	6.224	5.716	1.491	7.299
Standard Deviation	0.371	0.603	0.573	0.474
Skewness	-1.425	-0.414	-0.410	-1.411
Kurtosis	5.136	2.863	3.447	4.511
Jarque-Bera	151.759***	8.439**	10.439***	122.468***
Probability	0.000	0.015	0.005	0.000

*Note: \*\*\*, \*\*, and \* indicate significance levels at 1%, 5%, and 10%, respectively.*

Table 2 presents the BDS test results for the variables examined in the study. According to the BDS test results, the null hypothesis of linearity is rejected for all variables, indicating that all series exhibit nonlinear structures across all dimensions. This finding reflects the complex nature of both ISLAMIC and commodity markets, which contain nonlinear dynamics.

*Table 2. BDS Test Results*

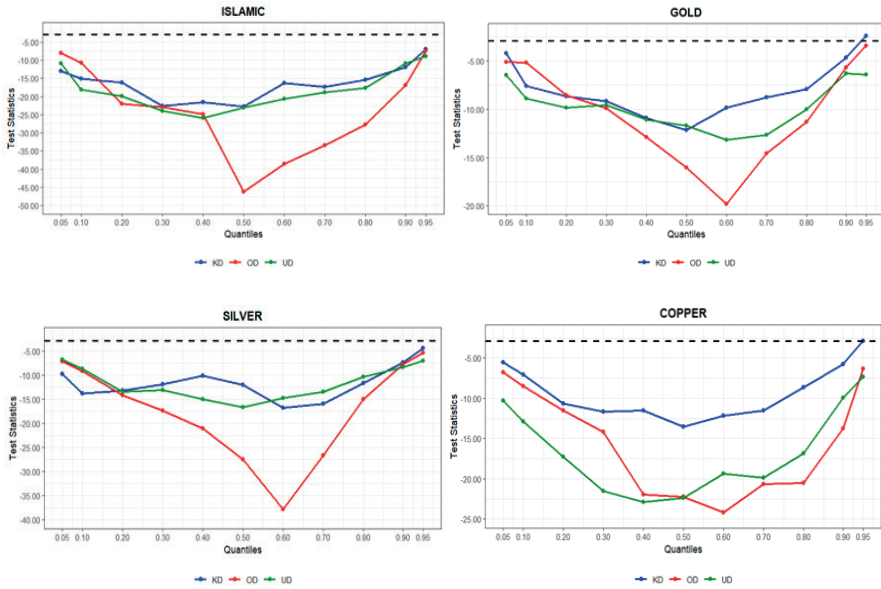
DIMENSIONS	ISLAMIC	GOLD	SILVER	COPPER
2	29.261 (0.000***)	41.806 (0.000***)	32.947 (0.000***)	30.161 (0.000***)
3	30.701 (0.000***)	44.480 (0.000***)	35.127 (0.000***)	31.824 (0.000***)
4	32.325 (0.000***)	48.026 (0.000***)	37.775 (0.000***)	33.956 (0.000***)
5	35.023 (0.000***)	53.370 (0.000***)	41.695 (0.000***)	37.259 (0.000***)
6	38.744 (0.000***)	60.660 (0.000***)	47.153 (0.000***)	41.829 (0.000***)

*Note: The values reported in the table represent the estimated z-statistics for each dimension. The values in parentheses indicate the probability values associated with the relevant z-statistics. \*\*\* indicates statistical significance at the 1% level.*

Moreover, the higher BDS statistics observed for gold prices compared to the other variables emphasize that this market possesses stronger nonlinear characteristics relative to the others. When the Jarque-Bera test statistics and BDS test statistics are evaluated together, the findings suggest that the use of average-based linear models may be insufficient to explain the relationships among the variables. Therefore, the preference for quantile- and frequency-

based methods in this study is considered both appropriate and necessary for obtaining more reliable results.

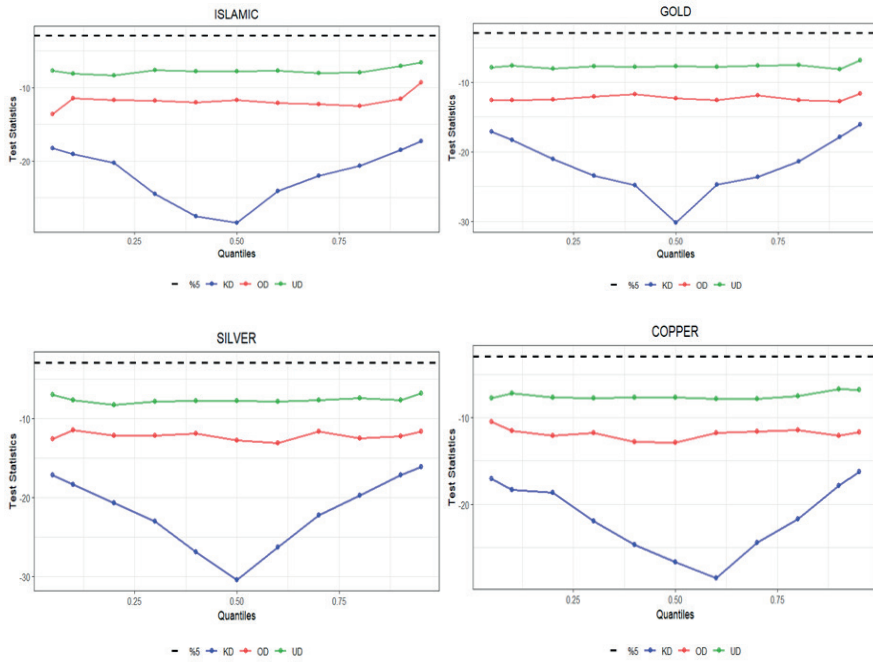
*Figure 1. Wavelet Quantile Augmented Dickey-Fuller (WQADF) Results*



*Note: The dashed line indicates significance at the 5% level.*

Figure 1 presents the WQADF results. It is observed that the variables considered remain below the critical value at the 5% significance level. This finding reveals that all variables exhibit a stationary structure across short-, medium-, and long-term time frequencies as well as across all quantile levels. In addition, the lower values of the test statistics for the medium-term component, particularly at medium and high quantiles, reflect the strong stationarity characteristics of medium-term frequencies.

Figure 2. Wavelet Quantile Phillips-Perron (WQPP) Results



The WQPP results for the variables are presented in Figure 2. Similar to the findings obtained from the WQADF unit root test, the WQPP unit root test results indicate that all variables take values below the critical value at the 5% significance level and exhibit a stationary pattern. However, the WQADF unit root test reveals that the short-term component displays a strong stationarity structure, particularly concentrated around the medium quantiles. In addition, it is noteworthy that the test statistics associated with the long-term component exhibit a flatter and more stable pattern together with relatively weaker stationarity characteristics.

*Figure 3. Wavelet Quantile Regression (WQR) Results*

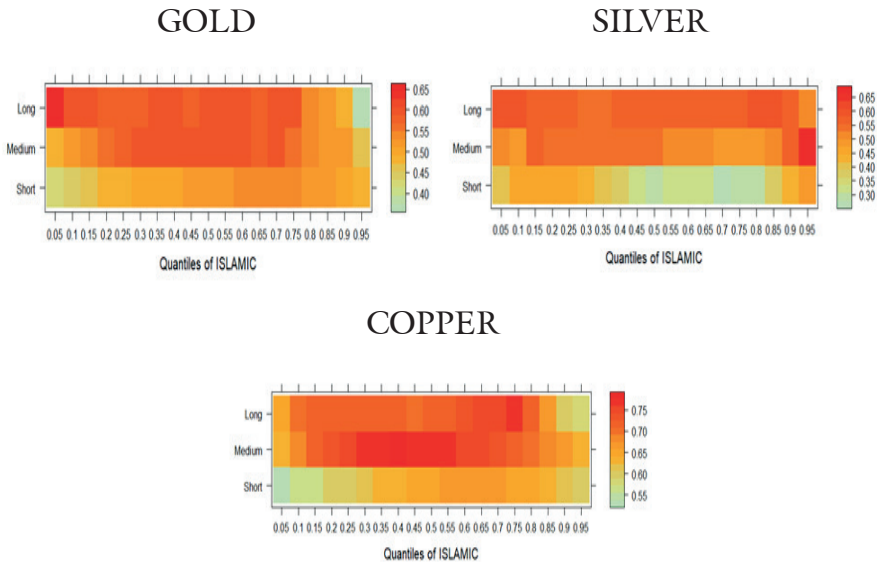


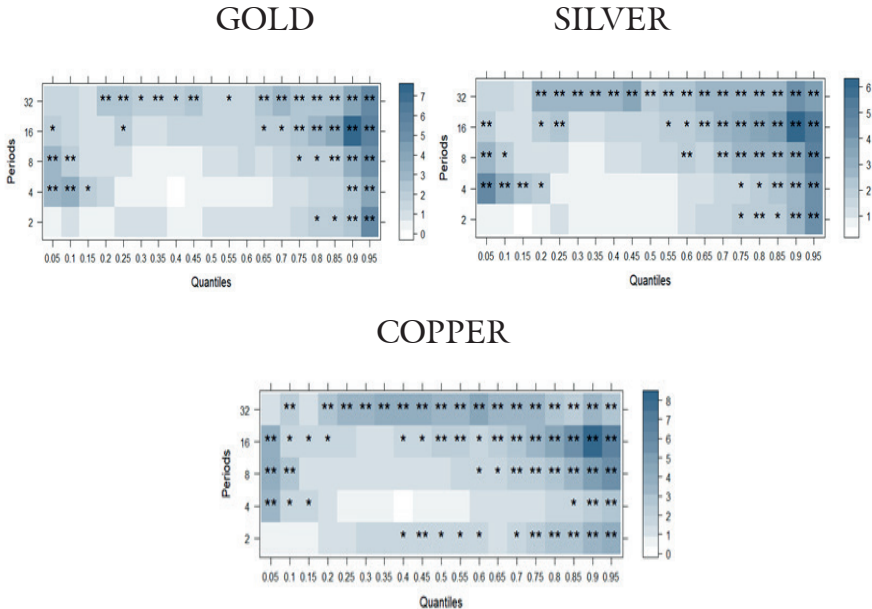
Figure 3 presents the WQR results obtained for the variables. According to the findings reported in Figure 3, it can be stated that the relationships between the independent variables and the dependent variable, namely the Islamic stock market, differ across both frequency and quantile levels. GOLD is found to have a positive effect on ISLAMIC. In particular, this effect becomes more pronounced in the medium- and long-term frequency components, while it appears relatively weaker in the short-term frequency component. In addition, a relatively weaker relationship is observed at the higher quantiles of ISLAMIC and within the long-term frequency component. A similar relationship structure is identified between SILVER and ISLAMIC. However, the positive effect of SILVER on ISLAMIC appears relatively weaker, especially within the short-term frequency component. In the medium- and long-term frequency components, the effect is observed to intensify across all quantile distributions. Therefore, the interactions of both GOLD and SILVER with ISLAMIC exhibit a fluctuating pattern depending on market conditions.

The effect of COPPER on ISLAMIC is found to be positive across all quantile and frequency components. This effect becomes particularly more pronounced in the medium- and long-term frequency components, while it weakens relatively in the short-term frequency component and at higher quantile levels. This finding suggests that movements in COPPER have significant effects on ISLAMIC in the medium and long term, whereas the effect remains more limited in the short term. Overall, the WQR results indicate that the relationship between ISLAMIC and GOLD, SILVER, and

COPPER exhibits a nonlinear structure and that this relationship may vary depending on different market conditions and investment horizons. This situation suggests that these assets may provide important insights for investors in terms of portfolio diversification and risk management.

The findings related to the WQGC results are presented in Figure 4 below. The obtained results indicate that the causality relationships among the variables differ across both frequency and quantile levels.

Figure 4. Wavelet Quantile Granger Causality (WQGC) Results



Note: \*\* and \* indicate the rejection of the null hypothesis of no Granger causality at the 5% and 10% significance levels, respectively.

It is determined that the causality relationship between GOLD and ISLAMIC is more concentrated particularly in the medium- and long-term frequency components and at higher quantiles, whereas no causality relationship is observed at low and medium quantiles or within the short-term frequency component. In the medium quantiles, the causality relationship appears relatively weaker. Therefore, it can be stated that shocks occurring in GOLD may affect ISLAMIC more strongly under certain economic and market conditions.

In addition, the causal effect of SILVER on ISLAMIC appears to be more pronounced than that of GOLD. In particular, a strong causal relationship is

observed across all frequency components and at medium and high quantiles. However, relatively weaker causality is observed at lower quantiles. The causality relationship between COPPER and ISLAMIC is also found to be more widespread compared to the other variables. The strong causality relationships observed across short-, medium-, and long-term frequencies indicate that developments occurring in COPPER may have stronger effects on ISLAMIC under favorable market and economic conditions.

Overall, the WQGC results indicate that the relationships between ISLAMIC and GOLD, SILVER, and COPPER possess a nonlinear and frequency-dependent structure, suggesting that investors should consider both investment horizons and market regimes when determining portfolio diversification and risk management strategies under different market conditions.

## 5. CONCLUSION

Stock markets may not always provide attractive opportunities for investors, particularly under risky market conditions. However, Islamic stock markets differ from their conventional counterparts in line with their fundamental principles and may therefore be considered an alternative investment option for investors, especially during periods of market risk and uncertainty. In this respect, the existence of financial instruments that can serve as safe havens during periods of financial uncertainty becomes increasingly important for investors. Under turbulent market conditions, precious metals such as gold and silver, which function as hedging instruments and provide safe-haven characteristics, together with industrial commodities such as copper, which reflects economic activity, are regarded as alternative investment instruments. In this context, the present study investigated the relationship between Islamic stock markets and commodity prices for Türkiye. Monthly data covering the period from May 2002 to March 2026 for the variables considered in the study were analyzed using the WQR and WQGC methods.

According to the findings obtained, the relationships between ISLAMIC and GOLD, SILVER, and COPPER vary across both frequency components and quantile levels. In particular, the relationships between GOLD, SILVER, COPPER, and ISLAMIC become more pronounced in the medium- and long-term frequency components and across most quantile levels of ISLAMIC. This finding indicates that price movements in precious metal markets exert stronger effects on ISLAMIC over medium- and long-term investment horizons. In addition, the relationship between COPPER and ISLAMIC is found to exhibit a stronger structure compared to the other variables. This finding may be associated with the role of the copper market as a reflection of global

economic activity. Overall, these results demonstrate that the relationships between commodity markets and ISLAMIC are not constant and may vary depending on changing market and economic conditions.

Similar to the WQR results, the WQGC findings also reveal that the causality structure among the variables differs across frequency components and quantile levels. More pronounced causality relationships from GOLD and SILVER to ISLAMIC are observed particularly within the medium- and long-term frequency components and across most quantiles. Likewise, a strong causality relationship from COPPER to ISLAMIC is observed across short-, medium-, and long-term frequency components. These findings indicate that price movements in commodity markets may affect ISLAMIC through investor behavior and portfolio preferences. Therefore, the results suggest that significant diversification opportunities exist between ISLAMIC and precious metal markets. In particular, the variation of these relationships across frequencies emphasizes that investors should consider such differences when determining short- and long-term portfolio strategies. In this respect, the study demonstrates to investors that the relationship between ISLAMIC and GOLD, SILVER, and COPPER possesses a dynamic structure and that investment decisions should be made by considering these relationships across different frequency components and quantile dimensions. Accordingly, when constructing portfolio strategies, investors may gain important advantages by considering not only approaches based on average effects but also frequency- and quantile-based approaches that take into account different economic and market conditions as well as varying investment horizons.

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