Chapter 10

Is Gold Safe Haven for Turkish Stocks During the Russia-Ukraine War? 🔓

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Abstract

This study aims to investigate the safe haven property of gold against Turkish stocks, namely, the BIST tourism, BIST construction, BIST food-beverage, and BIST chem petrol plastic during the Russia-Ukraine war. In the study, the dynamic conditional correlation-GARCH (DCC-GARCH) model is preferred to investigate the dynamic correlation between gold and Turkish stocks. To check the robustness of the DCC-GARCH empirical findings, the corrected dynamic conditional correlation-GARCH (cDCC-GARCH) model is applied to investigate the dynamic correlation between gold and Turkish stocks. Empirical results show that the correlations between the gold and BIST tourism, BIST construction, and BIST food-beverage returns are negative from February 24, 2022, to February 28, 2022. Gold could act as a safe haven during war periods for BIST tourism, BIST construction, and BIST food-beverage. The gold and BIST chem petrol plastic are positive from February 24, 2022, to February 28, 2022. For BIST chem petrol plastic, gold could not act as a safe haven during war periods. Besides, the empirical findings of the cDCC-GARCH support the empirical results of the DCC-GARCH. This study finds that gold exhibits safe haven properties during the Russia-Ukraine war.

1. Introduction

The Russia-Ukraine war, which began on February 24, 2022, was an escalation of the Russia-Ukrainian war, which began in 2014 and is considered the largest conventional military offensive in Europe since World War II (Sun et al., 2022a). With the end of the cold war between NATO member states and Russia, geopolitical tensions that seemed to have subsided have increased significantly. The Russian invasion of Ukraine was not expected

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either by most politicians or by the Ukrainian people (Berninger, 2022). In the academic literature, the war is one of the most important events impacting the financial markets globally, such as health crises, elections, natural disasters, financial crises, and terrorist attacks. The war increases the uncertainty of investors about the future performance of the firm and this leads to changes in stock prices. The import or export relations between warring or non-warring countries are also impacted by the war, causing negative effects on the expected cash flows, profitability, production, and stock prices of firms (Yousaf et al., 2022). Military operations during the Russia-Ukraine war will indirectly or directly impact many industries by disrupting the global supply chain. A Russian export ban and a retaliatory ban on Russian foreign imports could disrupt the global supply chain, including Russia's failure to allow foreign cargoes to pass through airspace and waterways during the conflict (Ozili, 2022).

Financial markets across the globe have been impacted due to the Russia-Ukraine war. Before the Russian invasion of Ukraine (December 31, 2021), the United States (USA) dollar index was 95.7, the Euro-Dollar (EUR/USD) parity was 1.137, the Brent oil usd barrel was $75, the gold ons was $1.829, while the US dollar index was 97.09, the EUR/USD parity was 1.1192, the Brent oil usd barrel was $100, the gold ons was $1.902 on the February 24, 2022 (Investing.com, 2022). The USA dollar index gains in value since the USA is far from the region, does not trade natural gas with Russia and does not show a tendency to enter into a hot war, and because the USA does not suffer from the interruption of mutual trade (the USA has a deficit of around 14 billion dollars in foreign trade against Russia). Europe, on the other hand, may suffer greatly from the interruption of trade relations with Russia, according to Russia's attitude. Since European countries mostly buy natural gas from Russia, the total amount of natural gas that Europe will receive from Russia in 2021 is 155 billion m³. High volume of imports to other manufacturers. The possibility of Russia cutting off Europe's natural gas causes the Euro to lose value.The gold stands out as a 'safe haven' in such tensions (Egilmez, 2022).

This study provides several contributions to previous literature. Few studies report whether gold acted as a safe haven for financial assets during the Russia-Ukraine war. For this reason, this study aims to investigate the safe haven property of gold against Turkish stocks during the Russia-Ukraine war. To the best of our knowledge, this is the first study to test the safe haven property of gold against Turkish stocks during the Russia-Ukraine war. Thus, this study would be beneficial for new studies in the finance literature.

The current paper proceeds as follows: Section 2 present literature. Section 3 describes the methodology. Empirical results are discussed in Section 4. Section 5 concludes the paper.

2. Literature

The historical process has shown that gold is the only financial asset that can maintain its value in the most important events such as crises, uprisings, government changes, global pandemics, and wars (Hood & Malik, 2013). A safe haven is defined as an asset that is not related or negatively related to another asset or portfolio during times of market crash or crisis. A strong (weak) safe haven is expressed as an asset that is negatively correlated (non-related) with another asset or portfolio during times of market crash or crisis (Baur and McDermott, 2010). There is a large literature examining the "safe haven" status of gold according to financial assets which are stocks, bonds, foreign exchange, etc. Baur and Lucey (2010) found that gold was as a safe haven for stocks and bonds. Baur and McDermott (2010) found that gold was a strong safe haven for stock markets during the peak of the financial crisis. Reboredo (2013) found that gold could act as an effective safe haven against extreme oil price movements. Gürgün and Ünalmış (2014) found that gold was a safe haven in more countries as equity markets decline more severely in the post-2008 crisis period. Beckmann et al. (2015) found that gold was as a safe haven for stocks. Salisu et al. (2021) found that gold was a safe haven for USA stock and precious metals during the coronavirus disease 2019 (COVID-19) pandemic. Akhtaruzzaman et al. (2021) stated that gold served as a safe-haven asset for stock markets during the COVID-19 pandemic. Wen et al. (2022) found that gold was a safe haven for oil and stock markets during the COVID-19 pandemic. Yatie (2022) found that Bitcoin, Ethereum, and Gold failed as safe havens during the Russia-Ukraine war. Oosterlinck et al. (2022) found that gold was as a safe haven for financial assets (stocks and oil) during the Russia-Ukraine war.

3. Data and methodology

This study uses daily price data of gold spot and the Borsa Istanbul (BIST) sector indices, namely BIST tourism, BIST construction, BIST food-beverage, and BIST chem petrol plastic, from July 1, 2021, to July 22, 2022. However, this study considers the war effect by dividing the data sample into two sub-samples: (a) covering the period before the Russian leader Putin announced on television that they had started to invade Ukraine (July 1, 2021, to February 23, 2022); and (b) during the Russia-Ukraine war period

(February 24, 2022, to July 22, 2022). The price data are downloaded from investing.com and converted into percentage logarithmic returns.

In the study, the dynamic conditional correlation-GARCH (DCC-GARCH) model developed by Engle (2002) is preferred to investigate the dynamic correlation between the Gold, BIST tourism, BIST construction, BIST food-beverage, and BIST chem petrol plastic. The model is as follows:

$$r_t = \omega x_t + \psi_t \tag{1}$$

$$\psi_t = H_t^{1/2} + \varsigma_t \tag{2}$$

$$H_t = D_t^{1/2} R_t \psi_t D_t^{1/2} \tag{3}$$

$$R_t = \text{diag} \{Q_t\}^{-1/2} \text{diag} \{Q_t\}^{-1/2} \tag{4}$$

$$Q_t = (1 - \alpha - \beta)\bar{Q} + \alpha \epsilon_{t-1} \epsilon_{t-1}^T + \beta Q_{t-1} \tag{5}$$

Where, r_t is the m*1 dimensional dependent variable vector. ω is the m*k dimensional parameter matrix. X_t is the k*1 dimensional independent variable vector. ψ_t is the m*1 dimensional standardized error term vector. ς_t is the error term vector with m*1 dimensional i.i.d properties. H_t is the m*m dimensional conditional covariance matrix. D_t is the diagonal matrix of m*m dimensional time-varying conditional variance. R_t is the m*m dimensional time-varying correlation matrix. Q_t denotes the conditional dynamic correlation structure. $\bar{Q}$ denotes the unconditional correlation matrix.

A two-stage process was followed in estimating the parameters of the DCC-GARCH model. In the first stage, the AR(1)-GARCH(1,1) model shown in Equations (6) and (7) has been estimated.

$$r_t = c + r_{t-1} + \Theta_t, \Theta_t = N(0, \sigma_t^2) \tag{6}$$

$$\sigma_t^2 = \omega + a_i \mu_{t-1}^2 + \beta_j \sigma_{t-1}^2 \tag{7}$$

Here, Equation (6) denotes the return equation and Equation (7) denotes the variance equation ($\omega > 0$, $a_i \geq 0$, $\beta_j \geq 0$, and $a_i + \beta_j < 1$).

Following the Engle (2002), in the second stage, the conditional correlation values of the DCC model are calculated using the standardized error terms obtained in the first stage. While estimating the DCC model under the assumption of multiple student t distribution, the log-likelihood function shown in Equation (8) is used.

$$L = \left[-\frac{1}{2} \sum_{t=1}^{T} (n \log(2\pi) + \log|D_t|^2 + \epsilon_t D_t^{-2} \epsilon_t \right] + \left[-\frac{1}{2} \sum_{t=1}^{T} (\log|R_t| + \epsilon_t R_t^{-1} \epsilon_t + \epsilon_t \epsilon_t \right] \tag{8}$$

Following Aielli (2013), this study also estimates corrected DCC (cDCC) and compares results with DCC results as a robustness test.

Using DCC class models, this study will be able to extract time-varying correlations between Gold and BIST sector returns. If the Gold/BIST sector exhibits safe-haven characteristics, the correlation between these assets should be zero or negative at the period the Russian leader Putin announced on television that they had started to invade Ukraine. Using the cDCC model, this study takes into account possible bias in the estimation of time-varying correlations associated with the standard DCC model.

4. Results and Discussion

Table 1 indicates the descriptive statistics for gold and BIST sector returns for different periods. The mean of the descriptive statistics shows a positive average value for gold, BIST construction, and BIST chem petrol plastic returns in all periods. The mean of the descriptive statistics shows a positive average value for BIST tourism and BIST food-beverage returns full period and pre-Russia-Ukraine war period, while the average BIST tourism and BIST food- beverage returns are negative during the Russia-Ukraine war period. Besides, standard deviation, which is a measure of some level of volatility in time series, is more volatile than BIST sectors when gold and BIST sectors are compared in all periods. The results of Jarque-Bera (JB) test statistics show that gold and BIST sector returns don't have normal distribution in all periods. The Augmented Dickey-Fuller (ADF) (1988) and Kwiatkowski, Phillips, Schmidt and Shin (KPSS) (1992) tests indicate that gold and BIST sectors are stationary during all periods. The results of ARCH-LM test statistics show that gold and BIST sector returns have heteroscedasticity in all periods.

Table 1. The descriptive statistics for gold and BIST sector returns

	Gold	BIST tourism	BIST food-beverage	BIST construction	BIST chem petrol plastic
Panel A: (Full period: July 1, 2021-July 22, 2022)					
Mean	0.0000	0.001	0.001	0.002	0.003
S.dev	0.007	0.025	0.013	0.018	0.019
Skewness	-0.920	-0.658	-1.501	-0.682	-1.090
Kurtosis	6.472	5.458	10.546	8.691	8.363
ADF	-14.022[a]	-13.153[a]	-14.363[a]	-14.799[a]	-13.045[a]
KPSS test	0.200[a]	0.095[a]	0.095[a]	0.059[a]	0.046[a]
p-value (JB)	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.000[a]
ARCH(5)	4.018[b]	6.449[a]	3.239[a]	2.692[c]	6.071[a]

	Gold	BIST tourism	BIST food-beverage	BIST construction	BIST chem petrol plastic
Panel B: (Pre-Russia-Ukraine war: July 1, 2021-February 23, 2022)					
Mean	0.000	0.002	0.000	0.002	0.003
S.dev	0.007	0.026	0.021	0.018	0.019
Skewness	-1.421	-0.637	-0.152	-0.617	-0.696
Kurtosis	8.791	4.675	3.999	7.261	6.289
ADF	-11.601[a]	-10.016[a]	-10.979[a]	-10.795[a]	-9.920
KPSS test	0.073[a]	0.183[a]	0.250[a]	0.125[a]	0.077[a]
p-value (JB)	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.000[a]
ARCH(5)	3.449[b]	4.425[a]	2.932[c]	6.238[a]	10.039[a]
	Gold	**BIST tourism**	**BIST food-beverage**	**BIST construction**	**BIST chem petrol plastic**
Panel C: (during Russia-Ukraine war: February 24, 2022-July 22,2022)					
Mean	0.000	-0.002	-0.002	0.003	0.003
S.dev	0.007	0.022	0.022	0.019	0.018
Skewness	-0.141	-0.570	-0.018	-0.794	-1.901
Kurtosis	5.491	7.350	6.817	10.910	12.981
ADF	-7.876[a]	-9.395[a]	-9.706[a]	-11.821[a]	-10.319[a]
KPSS test	0.206[a]	0.238[a]	0.054[a]	0.111[a]	0.187[a]
p-value (JB)	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.000[a]
ARCH(5)	2.456[a]	2.549[c]	2.631[b]	4.438[a]	5.041[a]

Notes: ([a]), ([b]) and ([c]) indicate statistical significance at 1%, 5%, and 10 % levels. The ARCH(5) denotes the ARCH test statistic with lag 5.

Table 2 indicates the pairwise correlations of gold and BIST sector returns for different periods. The pairwise correlation between the returns of gold and BIST tourism, BIST construction, BIST food-beverage, BIST chem petrol plastic are negative full period and pre-Russia-Ukraine war period. It can be said that gold is a safe-haven asset for BIST tourism, BIST construction, BIST food-beverage, BIST chem petrol plastic full period, and pre-Russia-Ukraine war period. The during Russia-Ukraine war period, the pairwise correlation between the returns of gold and BIST tourism, BIST construction, BIST food-beverage are negative, except for BIST chem petrol plastic. It can be said that gold is a safe-haven asset for BIST tourism, BIST construction, BIST food-beverage during the Russia-Ukraine war period. More empirical models such as DCC GARCH and cDCC GARCH are applied in the following sections to investigate the safe-haven properties of gold.

Table 2. The pairwise correlations of gold and BIST sector returns

	Gold	BIST tourism	BIST food-beverage	BIST construction	BIST chem petrol plastic
Panel A: (Full period: July 1, 2021-July 22, 2022)					
Gold	1				
BIST tourism	-0.015	1			
BIST construction	-0.005	0.155	1		
BIST food-beverage	-0.007	0.234	0.536	1	
BIST chem petrol plastic	-0.050	0.283	0.525	0.721	1

	Gold	BIST tourism	BIST food-beverage	BIST construction	BIST chem petrol plastic
Panel B: (Pre-Russia-Ukraine war: July 1, 2021-February 23, 2022)					
Gold	1				
BISTtourism	-0.040	1			
BIST construction	-0.001	0.101	1		
BIST food-beverage	-0.065	0.216	0.245	1	
BIST chem petrol plastic	-0.020	0.292	0.531	0.333	1

	Gold	BIST tourism	BIST food-beverage	BIST construction	BIST chem petrol plastic
Panel C: (during Russia-Ukraine war: February 24, 2022-July 22,2022)					
Gold	1				
BIST tourism	-0.147	1			
BIST construction	-0.028	0.272	1		
BIST food-beverage	-0.070	0.268	0.257	1	
BIST chem petrol plastic	0.108	0.273	0.517	0.324	1

Figure 2 displays the returns of the gold and the BIST sector's evolution over time. The patterns of the gold and BIST sector returns indicate volatility clustering. The plots indicate increased volatility in BIST sector returns from February 15, 2022, to February 28, 2022. In addition, it is seen that there was a sharp decrease in the returns of the BIST sector from February 15, 2022 to February 28, 2022.

Figure 1. Returns of gold and BIST sectors evolution over time
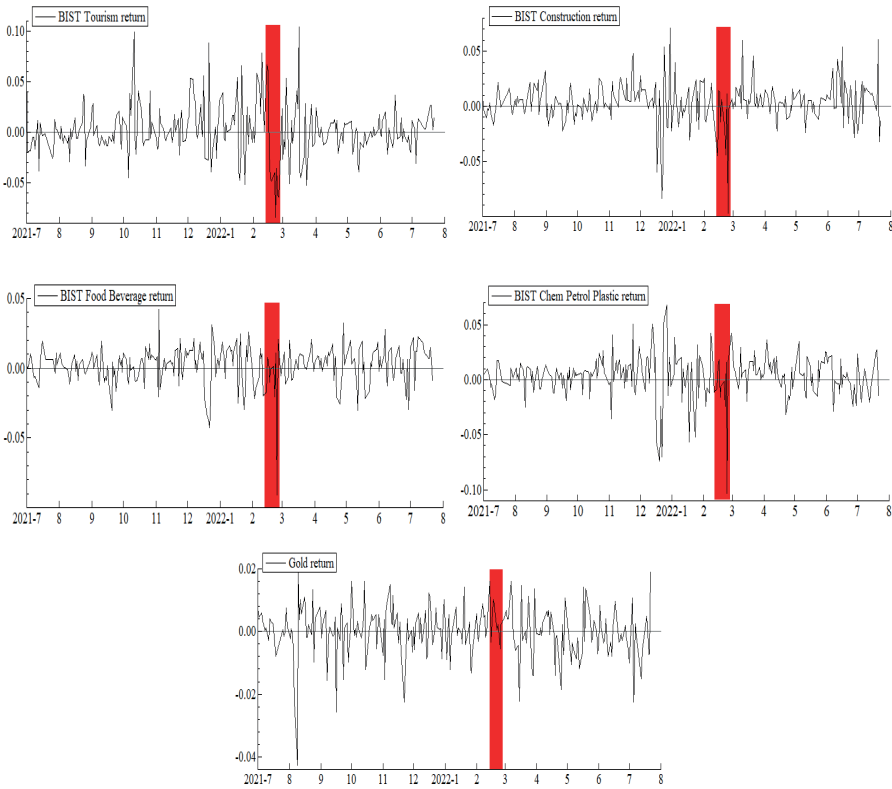

Table 3 indicates the estimations of parameters and diagnostic tests for DCC-GARCH. It indicates that $\alpha + \beta < 1$ is less than one (0.870), (0.812), (0.922), (0.797) indicating the persistency of gold and BIST sector correlation. The α measures the response to sudden shocks to the correlation series, and the β indicates one period of lagged effects. It indicates that all α are statistically insignificant and all β are statistically significant, indicating the persistency of gold-BIST sector correlations. The diagnostics tests indicate that the specified model is suitable for BIST sector returns.
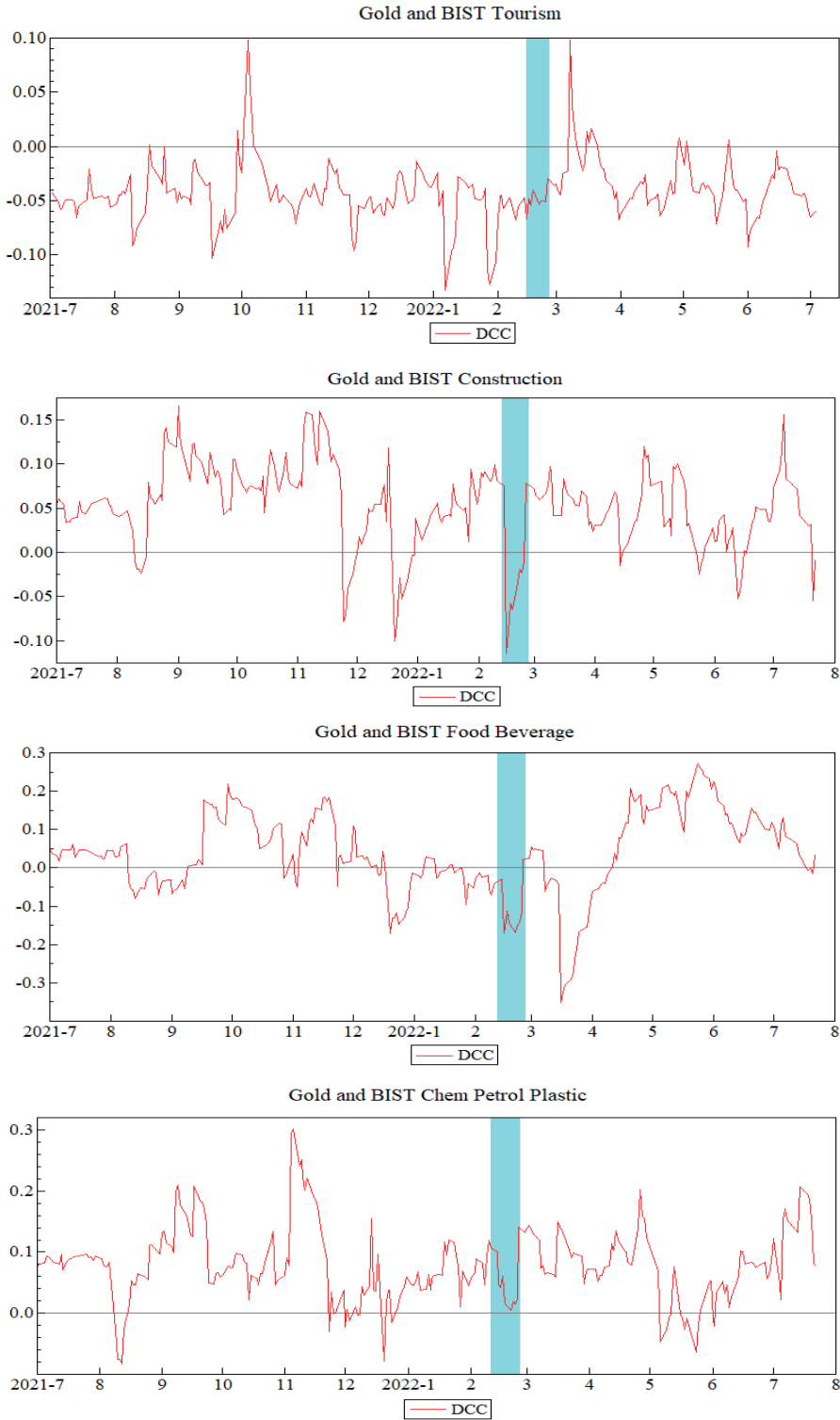
Table 3. The estimations of parameters and diagnostic tests for DCC-GARCH

	BIST tourism	BIST construction	BIST food-beverage	BIST chem petrol plastic
Parameters estimations				
ω	-0.042 (0.491)	0.054 (0.406)	0.050 (0.578)	0.076 (0.281)
α	0.018 (0.703)	0.030 (0.431)	0.039 (0.102)	0.040 (0.237)
β	0.852 (0.000)[a]	0.782 (0.000)[a]	0.883 (0.000)[a]	0.757 (0.000)[a]
α + β	0.870	0.812	0.922	0.797
Diagnostics tests				
Hosking_s (5)	19.641	18.483	24.273	20.663
Li-McLeod_s (5)	19.699	18.584	24.334	20.746

Notes: ([a]), ([b]) and ([c]) indicate statistical significance at 1%, 5%, and 10 % levels.

Figure 2 displays the dynamic conditional correlation values produced by the DCC model with the help of conditional correlational plots. The bands show periods defined by the Russian leader Putin announced on television that they had started to invade Ukraine (February 24, 2022, to February 28, 2022). The gold and BIST tourism, BIST construction, and BIST food-beverage dynamic conditional correlation are negative from February 24, 2022, to February 28, 2022. Sun et al. (2022a); Berninger et al. (2022); Yousaf et al. (2022); Boubaker et al. (2022); Sun et al. (2022b) found that stock markets were impacted negatively on February 24, 2022. This result consists with Sun et al. (2022a); Berninger et al. (2022); Yousaf et al. (2022); Boubaker et al. (2022); Sun et al. (2022b). Gold could act as a safe haven during war periods for BIST tourism, BIST construction, and BIST food-beverage. This result consists with Oosterlinck et al. (2022). The gold and BIST chem petrol plastic are positive from February 24, 2022, to February 28, 2022. For BIST chem petrol plastic, gold could not act as a safe haven during war periods.

Figure 2. DCC from July 1, 2021, to July 22, 2022

Gold and BIST Tourism

Gold and BIST Construction

Gold and BIST Food Beverage

Gold and BIST Chem Petrol Plastic

4.1. Robustness Checks

In this study, to check the robustness of the DCC-GARCH empirical results, the cDCC-GARCH is applied to investigate the dynamic correlation between gold, BIST tourism, BIST construction, BIST food-beverage, and BIST chem petrol plastic. Similarly, cDCC-GARCH has been used in to estimate time-varying conditional correlations. Table 4 indicates the estimations of parameters and diagnostic tests for cDCC-GARCH. It indicates that $\alpha + \beta < 1$ is less than one (0.868), (0.839), (0.921), (0.811) indicating the persistency of gold and BIST sector correlation. The α measures the response to sudden shocks to the correlation series, and the β indicates one period of lagged effects. It indicates that all α are statistically insignificant and all β are statistically significant, indicating the persistency of gold-BIST sector correlations. The diagnostics tests indicate that the specified model is suitable for BIST sector returns.

Table 4. The estimations of parameters and diagnostic tests for cDCC-GARCH

	BIST tourism	BIST construction	BIST food-beverage	BIST chem petrol plastic
Parameters estimations				
ω	-0.043 (0.486)	0.054 (0.422)	0.046 (0.599)	0.076 (0.284)
α	0.015 (0.699)	0.026 (0.464)	0.038 (0.128)	0.038 (0.265)
β	0.853 (0.000)[a]	0.813 (0.000)[a]	0.883 (0.000)[a]	0.773 (0.000)[a]
α + β	0.868	0.839	0.921	0.811
Diagnostics test				
Hosking_s (5)	19.623	18.536	24.236	20.767
Li-McLeod_s (5)	19.681	18.636	24.298	20.850

Notes: ([a]), ([b]) and ([c]) indicate statistical significance at 1%, 5%, and 10 % levels.

Figure 3 displays the cDCC between gold and BIST sector returns. The bands show periods defined by the Russian leader Putin announced on television that they had started to invade Ukraine (February 24, 2022, to February 28, 2022). The gold and BIST tourism, BIST construction, and BIST food-beverage dynamic conditional correlation are negative from February 24, 2022, to February 28, 2022. For BIST tourism, BIST construction, and BIST food -beverage, gold could act as a safe haven during war periods. The gold and BIST chem petrol plastic are positive from

February 24, 2022, to February 28, 2022. For BIST chem petrol plastic, gold could not act as a safe haven during war periods. The empirical findings of the cDCC support the empirical findings of the DCC.

Figure 3. cDCC from July 1, 2021, to July 22, 2022.
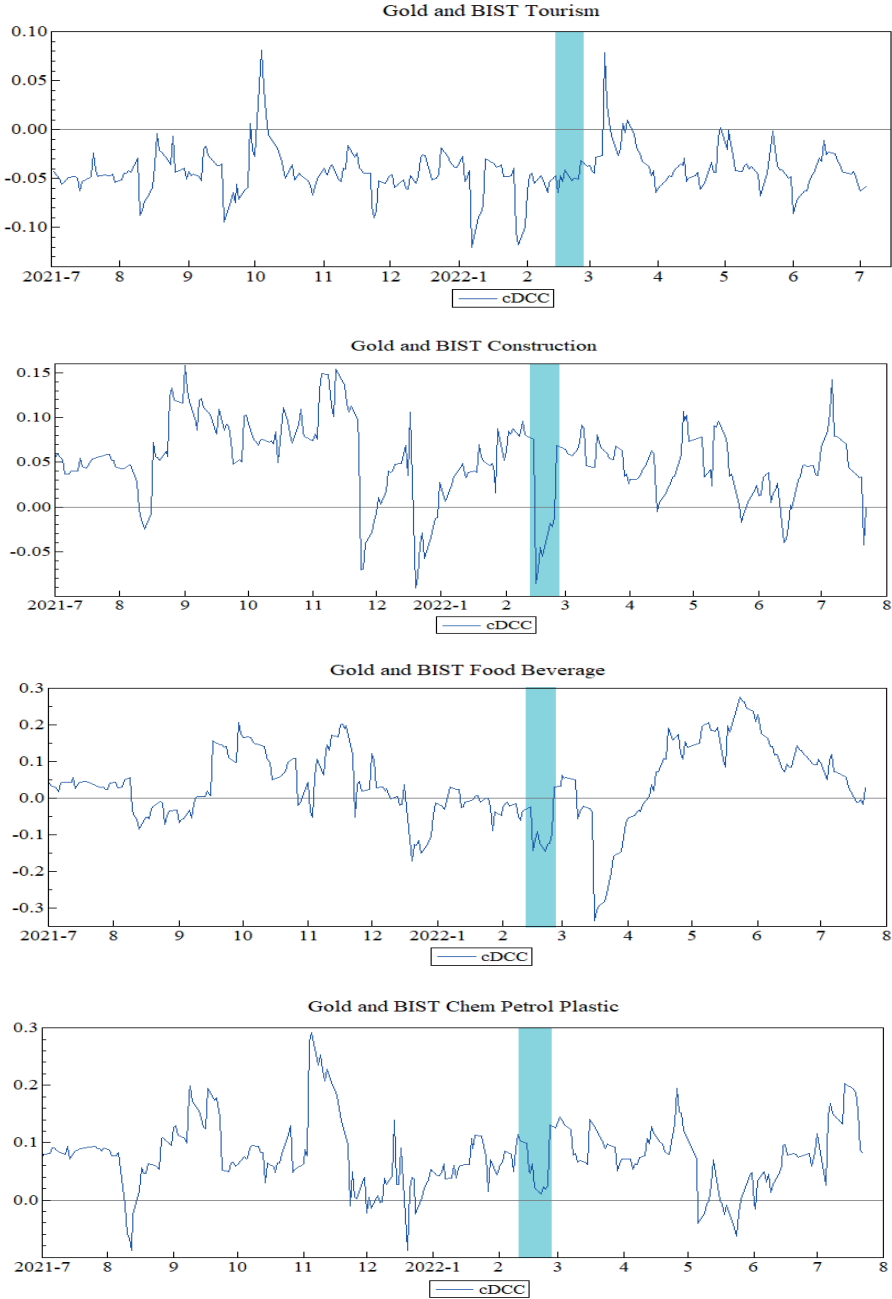
5. Conclusion

This study aims to investigate the safe haven property of gold against Turkish stocks during the Russia-Ukraine war. In the study, the DCC-GARCH model developed by Engle (2002) is preferred to investigate the dynamic correlation between gold, BIST tourism, BIST construction, BIST food-beverage, and BIST chem petrol plastic. Empirical results show that the correlations between the gold and BIST tourism, BIST construction, BIST food-beverage returns are negative from February 24, 2022, to February 28, 2022. For BIST tourism, BIST construction, and BIST food-beverage, gold could act as a safe haven during war periods. The gold and BIST chem petrol plastic are positive from February 24, 2022, to February 28, 2022. For BIST chem petrol plastic, gold could not act as a safe haven during war periods. To check the robustness of the DCC-GARCH empirical findings, the cDCC-GARCH is applied to investigate the dynamic correlation between the gold and BIST sectors. The empirical findings of the cDCC-GARCH support the empirical findings of the DCC-GARCH.

This study offers potential implications for investors. The negative relationship between gold and stocks during the war shows that gold is both a hedging and safe haven asset. The fact that gold is a safe-haven asset means that gold investments can compensate for the investor's loss due to stocks in the war period. The findings are decisive in ensuring the efficiency of asset selection for those who invest in the Turkish market. In addition, stock market investors in Turkey are required to include gold in their portfolios to disperse portfolio risk and provide security against market volatility. It is also important for academic research in this field.

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