

THE ASYMMETRIC RELATIONSHIP BETWEEN ALTERNATIVE FINANCIAL INSTRUMENTS: EVIDENCE FROM TÜRKİYE

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Abstract

This study examines the asymmetric dynamic relationships between gold prices, Borsa Istanbul (BIST) index, US dollar (USD), Euro (EUR) and deposit interest rates in Turkey between January 2002 and February 2023. The asymmetric causality approach is used to analyze the substitution-complementarity relationships between these assets. The empirical findings reveal three main results. First, with an average monthly return of 2.18%, gold outperformed equities (BIST: 1.94%), exchange rates (EUR: 1.33%; USD: 1.27%) and interest-bearing deposits (0.23%). Second, the highest single-month increase (78.55%) and decrease (25.47%) in deposit interest rates, which is indicative of the macroeconomic instability and volatility of the interest rate market in Turkey. Third, asymmetric causality tests show that positive shocks to gold returns generate significant spillover effects to the BIST index, exchange rates (USD/EUR) and interest rates. This result suggests that gold plays a role not only as a hedging instrument but also as a speculative investment asset. The findings have important policy and portfolio management implications for the dynamic relationship between gold and financial markets in emerging economies with high exchange rate volatility and inflationary pressures.

Keywords: Financial Investment Instruments, Return, Asymmetric Causality Test

JEL Codes: O16, D14, G11

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INTRODUCTION

The international financial landscape has undergone a radical transformation, driven by deepening global interconnectedness, financial liberalization, and advancements in information communication technologies (Zhang et al., 2020). This intensified integration fosters the rapid propagation of shocks originating in a single economy, leading to significant spillover effects across other economies (Shah et al., 2023). Emerging economies are highly susceptible to external shocks, like volatile commodity prices and increased financial uncertainty from global economic slowdowns (Wen & Cheng, 2018). This is because they rely heavily on commodity trade and are increasingly integrated into the global economy. Consequently, strong risk management and diversified investment portfolios are crucial for these markets.

In the current environment of widespread global geopolitical tensions and macroeconomic uncertainty, gold has re-emerged as a strategic asset for both individual investors and institutional actors (Sui et al., 2021). Gold's traditional function as a hedge and safe haven, particularly during periods of economic recession, is extensively documented (Baur et al., 2016). The intrinsic supply limitation serves as a safeguard against inflationary pressures, hence enhancing demand and the inclination to retain gold, particularly during times of elevated inflation or hyperinflation (Baur et al., 2016). This phenomenon is further reinforced by the increased opportunity cost of holding depreciating local currencies in high-inflation environments (Raheem, 2017).

Despite the ever-expanding range of financial products characterizing modern global financial markets (Dee et al., 2013), the fundamental challenge for investors persists: achieving desired returns while minimizing risk through the optimal allocation of savings. Volatility, defined as the standard deviation of asset price changes over a given period (Shu & Chang, 2019), serves as a key measure of risk and uncertainty. The dynamic interaction of exchange rate volatility with various investment opportunities significantly complicates investment decisions and portfolio diversification processes (Ansari & Changle, 2015). Countries struggling with low domestic savings rates face persistent savings-investment gaps, which further emphasizes the imperative of optimal capital allocatio.

Building upon these theoretical and empirical insights, this study addresses a crucial gap by constructing a diversified and efficient portfolio for a representative emerging market, Turkey. Specifically, we investigate the symmetric and asymmetric relationships among key alternative investment instruments: the stock market (BIST100 Index), gold prices (bullion selling price), major foreign currencies (US Dollar and Euro selling prices against Turkish Lira), and deposit interest rates (up to one year). This comprehensive analysis, spanning the period from January 2002 to February 2025, utilizes data meticulously sourced from

the Central Bank of the Republic of Turkey's Electronic Data Distribution System (EVDS). By exploring these interdependencies, our research aims to provide valuable insights for both individual and institutional investors seeking to optimize their investment strategies and enhance risk management in a globally interconnected and volatile financial environment.

This paper organizes the remaining sections as follows: Section 2 provides a summary of the relevant literature, Section 3 describes the dataset and research methodology used, Section 4 presents the main findings from the empirical analysis, and the final section provides an overview of the results of the analysis and policy implications.

LITERATURE REVIEW

The relationship among stock market returns, gold returns, exchange rate volatility, and interest rate changes has been thoroughly examined within the framework of global economic variations and financial crises. The data from the literature is summarized in this chapter, which also evaluates the connections between alternative investment instruments and clarifies the strategic role of different assets in various crisis scenarios.

The potential of gold as a hedge against exchange rate risks and as a safe haven in times of financial crises is an important area of research in the financial economics literature. Wang and Lee (2022), using a Time-Varying Parameter Vector Autoregression with Time-Varying Parameters (TVP-VAR) model on five major currencies, namely the Chinese yuan, the euro, the pound, the yen and the US dollar, find that gold reduces dynamic risks against the euro, the dollar and the pound in the short run, but this protective effect weakens in the long run. Similarly, Qureshi et al. (2018), using wavelet analysis, show that gold is an effective short-term hedge against rupee depreciation, but its long-term effect is limited. Arouri et al. (2015) argue that gold serves as a safe haven during periods of financial stress in China, especially in the context of volatility spillovers. Churchill et al. (2019) made important contributions to the theoretical debates in this area by identifying regime-varying nonlinear cointegration relationships and bidirectional causal links between oil, gold and exchange rates using 135 years of long-run data. On the other hand, Beckmann et al. (2015) draw attention to asymmetric volatility pass-throughs between the US dollar and gold prices, arguing that dollar depreciations initially suppress gold prices, but then lead to a lagged increase. Finally, Azimli (2024) confirms the safe-haven properties of gold during the COVID-19 pandemic and the Russian-Ukrainian war, but emphasizes that this protective effect may vary across currency pairs and crisis types, hence context-specific approaches are important in diversification strategies.

The interaction between equity markets and exchange rates has been particularly salient in emerging economies. Akkoc and Cıvırcı (2019) examined volatility spillovers in Turkey, finding that gold exacerbates stock market volatility, undermining its perceived safe-haven status. In Mexico, Singhal et al. (2019) identified divergent effects: rising oil prices depress stock returns, while gold exhibits a weak positive association with equities. Huang et al. (2021) revealed heterogeneous mechanisms in BRICS nations, with Brazil's stock market driven by financial account dynamics and Russia's by current account fluctuations. Sokhanvar et al. (2024) analyzed commodity-exporting (Australia, Canada) and importing (Germany, UK) economies during the Ukraine war, demonstrating unidirectional causality from stock indices to exchange rates, irrespective of trade structures. These findings underscore the context-specific nature of equity-currency interactions.

Interest rate differentials and monetary policy shocks significantly influence cross-market dependencies. Schmitt-Grohé and Uribe (2022) demonstrated that permanent interest rate hikes in open-economy models trigger short-term exchange rate depreciations and deviations from uncovered interest rate parity (UIP). Giannellis et al. (2019) linked gold prices to real interest rates in G7 countries, showing that gold serves as a hedge during recessions. Hambuckers and Ulm (2023) introduced an asymmetric GARCH framework, revealing that high-yield currencies face elevated depreciation risks during volatility spikes. These studies collectively emphasize the centrality of monetary policy in shaping financial market interdependencies.

Recent literature has shifted toward capturing nonlinearities and asymmetries in financial relationships. Bildirici and Türkmen (2015) applied nonlinear ARDL and Granger causality tests to Turkey, identifying asymmetric responses of gold prices to oil shocks. Chen et al. (2022) employed an asymmetric VAR-BEKK-GARCH model for BRICS nations, showing gold as the ultimate volatility spillover recipient in Brazil and India, contrasting with Russia's bidirectional spillovers. Hong et al. (2022) utilized extreme time-frequency Granger causality tests to reveal intensified gold-stock causality post-COVID-19, driven by long-term shocks. These findings highlight the necessity of nonlinear frameworks to model crisis-driven market behaviors. The practical implications of these interdependencies for portfolio optimization are increasingly scrutinized. Arouri et al. (2015) and Vieira et al. (2023) demonstrated that gold enhances risk-adjusted returns in diversified portfolios, particularly during high-volatility regimes. However, Bhatia (2023) cautioned that gold's efficiency as a safe haven diminishes during structural instability, such as pandemic-induced market panics. Kumar et al. (2021) confirmed asymmetric long-run relationships between gold, oil, and exchange rates in India, advocating for dynamic hedging strategies.

This paper contributes to the literature in the following ways. While extant studies have advanced understanding through linear and symmetric frameworks, critical gaps persist in addressing asymmetric responses to extreme shocks and time-varying dependencies. This study bridges these gaps by employing advanced nonlinear causality tests and regime-switching models to explore asymmetric causal relationships among stock market returns, gold returns, exchange rate returns, and deposit interest rate returns. By integrating high-frequency data and geopolitical risk factors, the research offers novel insights into dynamic hedging strategies and policy responses in emerging markets. These contributions not only refine risk management practices but also deepen theoretical understanding of financial interconnectedness in an era of unprecedented global uncertainty.

DATA SET AND METHOD

This study examines the symmetric/asymmetric relationships among alternative investment instruments in Turkey during the period from January 2002 to February 2025. The variables used in this study include gold prices (selling price of bullion), BIST (BIST100 stock market Index), US dollar (selling price, \$/TL), Euro (selling price, €/TL), and deposit interest rates (up to one year), which were obtained from the Central Bank of the Republic of Turkey's electronic data distribution system (EVDS). Information regarding the variables is presented in Table 1. Additionally, the analysis utilizes the return rates of these variables.

Table 1: Indicators

Symbol	Indicators	Source	Period
Gold	Gold Bullion Sales Price (TL/Gr)-Level	CBRT3	2002:M01 - 2025:M02
BIST	BIST 100 Index (According to Closing Price (January, 1986=0.01))		
Dollar	Exchange Sale (\$/TL)		
Euro	Exchange Sale(€/TL)		
Int	Deposit Interest Rate (Up to 1 Year TRY)		

In this study, the asymmetric causality test developed by Hatemi-J (2012) is used to analyse the symmetric and asymmetric relationships between investment instruments in Turkey. This approach is based on the idea that positive and negative components of variables may have different effects on the dependent variable. Granger and Yoon (2002) emphasised that the relationship between positive and negative shocks may be different from the overall relationship of variables. According to Granger and Yoon (2002), variables

³Central Bank of the Republic of Turkey (CBRT), *Electronic Data Distribution System (EDDS)*, <https://evds2.tcmb.gov.tr/index.php?evds/serieMarket>

are cointegrated in case of similar responses to shocks, while this relationship disappears in case of different responses. On this basis, they analysed the long-run relationship by dividing the series into cumulative positive and negative components. Hatemi-J (2012) extended this methodology and developed the asymmetric causality test based on a vector autoregressive (VAR) model (Yilanci and Bozoklu, 2014). Below is the VAR model that decomposes the bivariate random walk process into positive and negative components:

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{10} + \sum_{i=1}^t \varepsilon_{1i} \quad (1)$$

$$y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{20} + \sum_{i=1}^t \varepsilon_{2i} \quad (2)$$

Where y_{10} and y_{20} are the initial values and ε_{1i} , ε_{2i} are the white noise terms. Positive shocks are defined as $\varepsilon_{1i}^+ = \max(\varepsilon_{1i}, 0)$, $\varepsilon_{2i}^+ = \max(\varepsilon_{2i}, 0)$ and negative shocks are defined as $\varepsilon_{1i}^- = \min(\varepsilon_{1i}, 0)$, $\varepsilon_{2i}^- = \min(\varepsilon_{2i}, 0)$. Hence, when equation 1 is rewritten:

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{10} + \sum_{i=1}^t \varepsilon_{1i}^+ + \sum_{i=1}^t \varepsilon_{1i}^- \quad (3)$$

$$y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{20} + \sum_{i=1}^t \varepsilon_{2i}^+ + \sum_{i=1}^t \varepsilon_{2i}^- \quad (4)$$

Cumulatively, $y_{1t}^+ = \sum_{i=1}^t \varepsilon_{1i}^+$, $y_{2t}^+ = \sum_{i=1}^t \varepsilon_{2i}^+$ represent positive shocks and $y_{1t}^- = \sum_{i=1}^t \varepsilon_{1i}^-$, $y_{2t}^- = \sum_{i=1}^t \varepsilon_{2i}^-$ represent negative shocks. The VAR model used to analyse the positive relationship can be expressed as follows:

$$y_t^+ = v + A_1 y_{t-1}^+ + \dots + A_p y_{t-p}^+ + u_t^+ \quad (5)$$

In the model, $y_t^+ = y_{1t}^+ + y_{2t}^+$ is the vector of variables, v is the vector of constant terms, u_t^+ is the vector of error terms and A_r is the matrix of parameters with r lags ($r:1 \dots p$). Within the scope of the asymmetric causality test, the Wald test statistic, which evaluates the null hypothesis, is used to examine the causality relationship between positive shocks. At this stage, it is tested whether the causality relationship between the positive components is statistically significant. The Wald test statistic stages are as follows:

$$Y = DZ + \delta \quad (6)$$

Where,

$$Y = (y_1^+, \dots, y_T^+), (nxT) \text{ matrix} \quad (7)$$

$$D = (v, A_1, \dots, A_p), (nx(1 + np)) \text{matrix} \quad (8)$$

$$Z = \begin{bmatrix} 1 \\ y_t^+ \\ y_{t-1}^+ \\ \vdots \\ y_{t-p+1}^+ \end{bmatrix}, ((1 + np)x1) \text{matrix}, t = 1, \dots, T \quad (9)$$

$$Z = (Z_0, \dots, Z_{T-1}), ((1xnp)xT) \text{matrix} \quad (10)$$

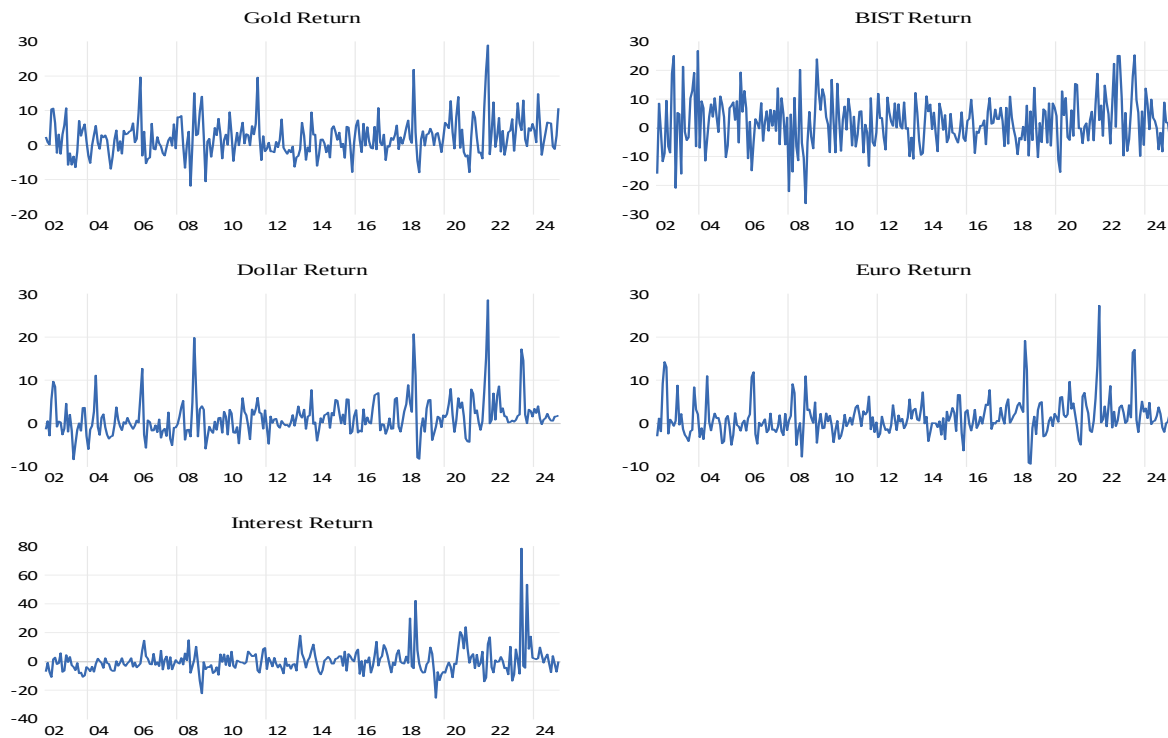
$$\delta = (u_1^+, \dots, u_T^+), (nxT) \text{matrix} \quad (11)$$

The Wald statistic is as follows:

$$Wald = (C\beta)' [C((Z'Z)^{-1} \otimes S_U)C']^{-1} (C\beta) \quad (12)$$

Where C is the matrix containing the constraint parameters and S_U is the variance-covariance matrix of the unrestricted VAR model. The degrees of freedom of the Wald test are equal to the number of constraints tested (i.e. the p-value) under the assumption of normal distribution. In other words, the degrees of freedom used to assess the statistical significance of the test is determined by the number of constraints (p) in the model (Hatemi-j, 2012).

Figure 1: Time series graph of variables



The graphs clearly show the short-run movements of the series, in other words, the time span of the shocks in the series. The graph of interest rates shows that the length of fluctuations is shorter than the graphs of other variables. The graphs of dollar and euro yields show that these variables move quite close to each other. The variable with the highest volatility is the stock market return, which has been quite volatile. In addition, there is no trend tendency in all variables and all variables are stationary at their level values as can be seen from the level graphs; unit root tests were also performed and the results are reported in the rest of the study.

Table 2: Descriptive statistics

	GOLD	BIST	DOLLAR	EURO	INT
Mean	2.181021	1.941899	1.274696	1.332630	0.230797
Median	1.705266	2.169000	0.681093	0.600256	-1.030286
Maximum	28.93413	26.78205	28.55802	27.29210	78.55834
Minimum	-11.87853	-26.27112	-8.408272	-9.428292	-25.47000
Std. Dev.	5.276270	8.713899	4.303417	4.249180	9.182729
Skewness	1.124687	0.152247	1.999171	1.776911	3.424834
Kurtosis	6.443843	3.456286	11.33888	9.811171	26.46227
Jarque-Bera	195.2820	3.473043	987.0852	681.2088	6894.945
J.B. Probability	0.000000	0.176132	0.000000	0.000000	0.000000
Sum	604.1428	537.9061	353.0909	369.1386	63.93083
Sum Sq. Dev.	7683.572	20957.24	5111.354	4983.328	23273.01
Observations	277	277	277	277	277

Correlation Matrix					
GOLD	1.000000				
BIST	-0.165374	1.000000			
DOLLAR	0.663720	-0.138670	1.000000		
EURO	0.689509	-0.068357	0.870906	1.000000	
INT	-0.049935	0.051994	0.202047	0.202247	1.000000

Table 2 presents the basic descriptive statistics of the variables. When Table 2 is analyzed, it is seen that the average of gold return and stock market return during the period is 2.18 and 1.94, respectively. The magnitude of the difference between the minimum and maximum values of the series indicates the changes in the series over time. A negative coefficient of a variable indicates the existence of a substitution relationship (being an alternative investment instrument) between that variable and the dependent variable

in the model. In other words, while the return of one of these variables increases, the return of the other variable (the dependent variable) decreases. It would be a more rational decision for investors to include only one of such investment instruments in their portfolios. If the coefficient of the independent variable is positive, it means that there is a complementarity relationship between this variable and the dependent variable. It will be decided that it is beneficial to keep such investment instruments together in the portfolio. Accordingly, it is seen that the relationship between the change in gold return and the stock market return and interest rate return has a negative correlation and the variables move separately in the opposite direction. However, the relationship between the change in gold return and the dollar and Euro returns, i.e. exchange rate return, has a positive correlation and the variables change in the same direction and together. The relationship between the change in stock market return and exchange rate has a negative correlation and the variables change separately in the opposite direction, while the relationship with interest rate has a positive correlation and the variables change together in the same direction. The relationship between exchange rate and interest rate has a positive correlation and the variables change together in the same direction. These results show that there is a substitution relationship between gold return, stock market return and interest rate return, i.e., gold return increases while stock market and interest rate returns decrease. The fact that the coefficients of gold return and exchange rate return variables are positive indicates that there is a complementarity relationship between these variables, i.e. when gold return increases, exchange rate return also increases.

Table 3: Unit root test results

PP					
I(0)					
	GOLD	BIST	DOLLAR	EURO	INT
C	-125.513***	-166.312***	-107.035***	-113.623***	-149.611***
C&T	-126.377***	-166.249***	-107.043***	-112.544***	-151.828***
ADF					
I(0)					
C	-127.622***	-166.315***	-114.746***	-117.221***	-65.775***
C&T	-118.973***	-166.249***	-122.362***	-121.201***	-68.958***

Note: *** indicates statistical significance at 1 %. C and C&T indicate constant and constant-trend model, respectively.

Since t and f statistics become insignificant in the absence of stationarity in time series, the stationarity of the series should be investigated. For this purpose, PP (Phillips and Perron, 1988) and ADF (Dickey and Fuller, 1981) unit root tests were used. According to the unit root test results in Table 3, the series are

stationary at level values for the models with constant, with constant and trend, without constant and without trend. When the results of the unit root tests are considered collectively, since none of the variables contain unit roots, it can be said that small shocks in these variables will not have a permanent effect, while the effects of large shocks may be permanent.

Table 4: Asymmetric causality test results

X=>Y	DIRECTION	GOLD	BIST	DOLLAR	EURO	i
GOLD	+/+		8.147**	5.180**	4.007**	7.799*
	+/-		6.598***	10.037*	19.656*	20.597*
	-/-		1.347	15.721*	21.778*	1.229
	-/+		1.557	1.664	1.200	0.231
BIST	+/+	8.520**		22.439*	6.621**	3.670
	+/-	0.822		8.173**	2.155	6.176**
	-/-	6.352**		12.358*	12.802*	4.312
	-/+	1.017		6.027***	7.402**	12.255*
DOLLAR	+/+	0.213	5.748***		0.135	9.256*
	+/-	0.261	18.534*		7.779*	21.132*
	-/-	0.063	3.529		0.010	10.595*
	-/+	1.888	2.822		0.250	4.964***
EURO	+/+	0.982	7.954**	0.930		9.082*
	+/-	0.013	19.845*	14.197*		25.661*
	-/-	0.524	2.387	0.050		2.181
	-/+	4.530**	4.447	2.939***		1.033
INT	+/+	0.120	5.296***	1.203	1.228	
	+/-	0.399	14.061*	1.020	1.678	
	-/-	0.063	5.376***	0.500	0.054	
	-/+	5.952**	0.808	2.591	2.178	

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

The asymmetric causality test results in Table 4 reveal the complex relationships between financial markets. The findings show that positive shocks to the gold return have both positive and negative effects on the stock market return. This implies that the stock market can function as both a substitute and a complementary investment instrument against gold when there is an increase in gold prices. On the other hand, a positive shock in the stock market return triggers a positive shock in the gold return, while a negative

shock in the stock market return causes a negative shock in the gold return. The findings show that the fluctuation in the stock market causes investors to turn to gold and strengthens the safe haven feature of gold. Positive shocks in gold returns have a bidirectional effect on both dollar and euro returns. This suggests that gold can act as both a substitute and a complementary investment instrument in the context of currency markets. On the other hand, negative shocks to gold rates only have a negative effect on foreign exchange yields, indicating that investors are becoming more cautious when faced with unfavorable expectations. The fact that the gold market is not much affected by yield shocks to the dollar or the euro indicates that these currencies are less active than gold. Additionally, rising gold prices cause interest rates to fluctuate in both directions. This implies that while assessing their gold investments, investor's view interest rates as both a complimentary and an alternative tool. This balance becomes more evident when downward shocks in interest rate yields cause a positive response in gold prices. Similarly, shocks to stock returns have a significant impact on dollar and euro markets, suggesting that foreign exchange investors are sensitive to stock market developments. In particular, positive shocks in stock returns have not only positive but also negative effects on euro returns, suggesting that investors act with heterogeneous expectations. On the other hand, the fact that negative shocks in FX returns do not cause a significant response in the stock market suggests that these shocks are priced to a limited extent by stock market investors. The inverse interaction between interest rates and stock markets suggests that investors try to offset negative developments in one asset class with another instrument, in line with the classical portfolio theory. The fact that upward movements in interest rate yields cause bidirectional shocks in stock market returns reflects the fact that investors may show different reflexes depending on their risk appetite and their perception of the macroeconomic outlook. A positive shock in the dollar yield causes only a negative shock in the euro return, while a positive shock in the euro return causes a negative shock in the dollar return. On the other hand, a negative shock to the euro yield leads to a positive shock to the dollar yield. The fact that a positive or negative shock to the dollar yield leads to positive and negative shocks to the interest rate yield supports the previous conclusion that the dollar can be both a substitute and a complementary investment instrument to the stock market when the stock market return increases. Only positive shocks to the euro yield lead to positive and negative shocks to the interest rate yield. It is noteworthy that any positive or negative shock to the interest rate yield has no effect on the return on the dollar or the euro.

CONCLUSION AND DISCUSSION

This study meticulously examined the asymmetric causal relationships among gold, the BIST100 stock market index, key foreign exchange rates (USD/TL, EUR/TL), and deposit interest rates in Turkey between January 2002 and February 2025, employing the advanced Hatemi-J asymmetric causality test. Our analysis provides compelling empirical evidence that financial interconnectedness in this emerging market

is characterized by significant asymmetries, meaning that positive and negative shocks often elicit fundamentally different responses across asset classes. This challenges the assumptions of many conventional linear models and underscores the critical importance of a non-linear approach.

Our key findings illustrate intricate dynamics. Gold's performance reveals a conditional safe-haven characteristic: a negative shock to interest rates consistently leads to a positive shock in gold returns, reinforcing its role when the opportunity cost of holding non-yielding assets decreases. However, its interactions with the stock market and exchange rates are complex and context-dependent, often showing bidirectional and asymmetric causality that requires careful interpretation rather than broad generalizations. The Turkish stock market (BIST100) is shown to be highly sensitive to asymmetric shocks from both foreign exchange and interest rate markets. For example, positive shocks in USD and EUR yields can generate mixed effects on stock returns, whereas negative foreign currency shocks often have no significant impact. Conversely, stock market performance also asymmetrically influences interest rates, suggesting active rebalancing by investors or policy responses. Furthermore, the foreign exchange market exhibits internal asymmetric dynamics, with competitive causal links between the USD and EUR. Interestingly, we found a notable lack of direct causal impact from domestic interest rate shocks on USD and EUR returns, implying that other global or regional factors might be more dominant drivers for these major currency pairs in Turkey. These findings show similarity with Arouri et al. (2015) and Vieira et al. (2023) demonstrated that gold enhances risk-adjusted returns in diversified portfolios; Bhatia (2023) cautioned that gold's efficiency as a safe haven diminishes.

The practical and theoretical implications of these asymmetric findings are substantial. For portfolio managers and institutional investors, these results emphasize the necessity of adopting dynamic and sophisticated asset allocation strategies that explicitly account for non-linear shock transmission. Relying on symmetric models risks misestimating risk and misidentifying optimal diversification opportunities. Understanding these specific asymmetric pathways allows for more precise hedging strategies and proactive risk management, particularly in emerging economies prone to heightened financial uncertainty. Academically, this study contributes by providing detailed empirical insights into asymmetric causality within a crucial emerging market, enriching the literature on financial interconnectedness and behavioral finance in the context of varying economic conditions.

AUTHORS' STATEMENT

The author declares that all contributions to this manuscript were made solely by the author. The author also declares that there are no conflicts of interest.

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