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Research Article

Investigating the impact of global and Türkiye-specific geopolitical risks on BIST indices

Küresel ve Türkiye'ye özgü jeopolitik risklerin BİST endeksleri üzerindeki etkisinin araştırılması

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Abstract

This research provides insights into how geopolitical developments influence investment strategies and risk pricing in emerging markets. The study examines the effects of global and Türkiye-specific geopolitical risks on the stock indices traded on BIST. Utilising the Geopolitical Risk index (GPR) and a Türkiye-specific Geopolitical Risk index (GPRT), analyses the asymmetric impacts of these risks on 10 sectoral indices. The findings contribute to understanding the complex interplay between geopolitical events and financial market dynamics, offering valuable information for investors and policymakers seeking to navigate geopolitical uncertainties effectively. The study employs an NARDL model, utilising a comprehensive dataset from February 1997 to January 2025, which incorporates monthly closing prices of BIST indices and geopolitical risk indices. The results shed light on the differential sensitivity of Turkish stock indices to global and domestic geopolitical risks, highlighting the importance of considering these factors in investment decisions.

Keywords: Geopolitical Risk, BIST Indices, NARDL, Asymmetry

Jel Codes: C22, F65, G10, G32

Öz

Bu araştırma, jeopolitik gelişmelerin gelişmekte olan piyasalardaki yatırım stratejilerini ve risk fiyatlamasını nasıl etkilediğine ışık tutmaktadır. Çalışma, küresel ve Türkiye'ye özgü jeopolitik risklerin BİST'te işlem gören hisse senedi endeksleri üzerindeki etkilerini incelemektedir. Jeopolitik Risk Endeksi ve Türkiye'ye özgü bir jeopolitik risk endeksi kullanılarak, bu risklerin 10 farklı sektörel endeks üzerindeki asimetrik etkileri analiz edilmektedir. Bulgular, jeopolitik olaylar ile finansal piyasa dinamikleri arasındaki karmaşık etkileşimin anlaşılmasına katkıda bulunmakta ve jeopolitik belirsizlikleri etkin bir şekilde yönetmek isteyen yatırımcılar ve politika yapıcılar için değerli bilgiler sunmaktadır. Çalışmada, BİST endeksleri ve jeopolitik risk endekslerinin aylık kapanış fiyatlarını içeren Şubat 1997-Ocak 2025 dönemine ait kapsamlı bir veri seti ile NARDL modeli uygulanmıştır. Sonuçlar, Türk hisse senedi endekslerinin küresel ve yerel jeopolitik risklere karşı farklı duyarlılığını ve yatırım kararlarında bu faktörlerin dikkate alınmasının önemini vurgulamaktadır.

Anahtar Kelimeler: Jeopolitik Risk, BİST Endeksleri, NARDL, Asimetri

Jel Kodları: C22, F65, G10, G32

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Introduction

Geopolitical risk refers to disruptions in international relations stemming from armed conflicts, terrorism, and interstate tensions. These events can destabilise markets, influence investor behaviour, and reshape economic expectations. While definitions vary across the literature, scholars broadly agree that geopolitical risk encompasses events that threaten international order and economic continuity (Papagianni, Evgenidis, Tsagkanos and Megalooikonomou, 2023; Tran and Vo, 2023a; Al Mamun, Uddin, Suleman and Kang, 2020; Hachicha, 2024), actions that threaten world peace and affect international socio-political trajectories (Banerjee, Sensoy and Goodell, 2024; Lee, 2019), tensions between regions or states, nuclear threats (Panazan and Gheorghe, 2024; Liu, 2024), risks such as espionage threats from a country (Kyriazis and Economou, 2024), the propensity for economic and political change that has the potential to disrupt human welfare (Liu, Chen, Zhu, Chen and Huang, 2024).

In other words, the concept of geopolitical risk is often associated with the events such as wars and armed conflicts (Bossman and Gubareva, 2023), terrorist attacks (Tiwari, Boachie, Suleman, and Gupta, 2021), tensions between states (Smales, 2019), political unrest and regime changes (Hoque, Zaidi and Hassan, 2021), nuclear threats (Pyo, 2021), trade wars (Su, Qin, Tao, Shao, Albu, and Umar, 2020), oil embargoes (Gong, Sun and Du, 2022), regional political instability (Bouri, Demirer, Gupta and Marfatia, 2019).

Geopolitical risks have been shown to influence capital flows on a macroeconomic scale. Aysan, Demir, Gozgor and Lau (2019) indicate that heightened geopolitical risks often result in capital moving from emerging markets to safer, developed economies, thereby exacerbating the financial instability of less developed regions. This trend is particularly evident during periods of heightened conflict, where investor uncertainty leads to a marked decline in stock returns across various sectors (Zhang, 2022; Sayed, 2024).

Geopolitical risks can destabilise markets and alter investor behaviour and economic expectations. It has become an increasingly researched topic concerning its impact on several stock markets. Financial theories can help explain how geopolitical risk affects financial markets, which is relevant to this research. For example, the Efficient Market Hypothesis (EMH) suggests that all available information, including geopolitical events, is already reflected in asset prices. In contrast to the EMH, behavioural finance theory argues that human psychology and biases can distort market behaviour (Nyakurukwa and Seetharam, 2023). Geopolitical risks often trigger emotional reactions in investors, causing them to overreact or underreact to news and events. Investors may panic in the presence of geopolitical uncertainty and sell stocks even if the fundamental economic principles remain unchanged.

Studies in the literature demonstrate an interconnectedness between geopolitical changes and the market, particularly in sectors such as energy, defence, and tourism. For example, sanctions on Russian oil and gas have had a profound impact on capital markets, particularly in the energy sector. Konovalova and Abuzov (2023) highlight that these crises can lead to significant volatility in financial markets, necessitating diversification strategies to mitigate risks associated with geopolitical uncertainties. This sentiment is echoed by Alsagr and Van Hemmen (2021), who assert that geopolitical risks can alter investment dynamics, leading to delays in decision-making and impacting overall market confidence.

Moreover, the impact of geopolitical risks extends beyond immediate market reactions; it can shape long-term investment strategies. For instance, Apergis, Bonato, Gupta and Kyei (2018) argue that geopolitical risk can lead to increased volatility in the defence sector, where investor behaviour can change dramatically in response to perceived danger. Since geopolitical tensions often cause investors to panic-sell and seek safe havens, this volatility is not only a reflection of market sentiment but also demonstrates that it is grounded in fundamental economic principles (De Wet, 2023). For instance, Gozgor, Lau, Zeng, Yan and Lin (2022) argue that geopolitical risks can significantly disrupt supply chains in emerging economies, while Demiralay and Kilincarslan (2019) emphasise that geopolitical risks can lead to broader economic repercussions by discouraging consumer spending and reducing investment.

Furthermore, the relationship between geopolitical risks and energy markets is particularly pronounced. (Antonakakis, Gupta, Kollias and Papadamou, 2017), emphasise that geopolitical tensions can lead to significant fluctuations in oil prices, which in turn affect stock market performance globally. The interconnectedness of these markets means that geopolitical events can have far-reaching implications, influencing everything from commodity prices to equity valuations across sectors (Ren, Chen, Hsiao, and Liao, 2024).

In conclusion, the literature underscores the multifaceted impact of geopolitical risks on capital markets and their various sectors. From current market volatility to long-term investment strategies, the influence of geopolitical events is profound and necessitates a comprehensive understanding for both investors and policymakers. Therefore, the study seeks to determine whether global and Türkiye-specific geopolitical risks are impacting the BIST indices and whether the asymmetric effects vary across these indices.

Literature review

Geopolitical risks, associated with disturbances such as terrorist activities and international conflicts, have been on the rise recently, impacting global stock markets. There are many research studies on different aspects of this topic. Some of the prominent recent studies are listed below:

Findings from Sharif, Aloui and Yarovaya (2020), who analysed the time-frequency relationship between the COVID-19 pandemic, oil prices, geopolitical risk, economic uncertainty, and the Dow Jones 30 index, indicate that the relationships between the variables vary across time and investment horizons. Furthermore, the COVID-19 pandemic had a greater impact on U.S. geopolitical risk and economic uncertainty than on the stock market.

Hoque and Zaidi (2020) used a three-regime Markov switching model in their study to examine the effects of global and country-specific geopolitical risk uncertainty on stock returns in Brazil, India, Indonesia, South Africa, and Turkey. The results show that these effects are nonlinear and asymmetric, and that linear models fail to capture them. While global risks can impact markets both positively and negatively, country-specific political unrest tends to hurt stock returns in all countries except India. In a similar study, Pehlivanoğlu, Akdağ and Alola (2021) investigate the impact of geopolitical risks on consumer and producer confidence indexes from January 2004 to June 2018 in countries such as Türkiye, Brazil, South Korea, China, Indonesia, Russia, Mexico, and South Africa. Specifically, the findings suggest a causal relationship between the geopolitical risk index and the consumer confidence index in Mexico, South Africa, and Indonesia. In contrast, the producer confidence index is affected in Mexico, South Korea, Indonesia, and China.

Jung et al. (2021) analyse how South Korean corporate stock returns are influenced by geopolitical risk from North Korea, using a GPRNK index that tracks media coverage of events such as nuclear tests and diplomatic talks. The findings show that heightened geopolitical risk reduces stock returns, with larger firms and those with more domestic investors or higher fixed asset ratios being more significantly impacted.

Salisu, Ogbonna, Lasisi and Olaniran (2022) aim to forecast stock return volatility using GPR data, focusing on out-of-sample predictability in their research. The GARCH-MIDAS model is employed to analyse high-frequency stock volatility in relation to low-frequency GPR data. The dataset includes stock prices and GPR indices for 11 major emerging economies. The analysis covers data from January 1997 to May 2020. The model demonstrates that GPR has a significant predictive value for stock market volatility in emerging economies. In a similar study, Alqahtani, Bouri, and Vo (2020) investigate the predictability of stock returns in the GCC countries, focusing on the impact of crude oil prices and geopolitical risk. They use data from February 2007 to December 2019 and employ the Feasible Generalised Least Squares (FGLS) Estimator. Their findings reveal that crude oil returns have a more substantial predictive influence on GCC stock returns than the geopolitical risk index.

Tran and Vo (2023b) examined how geopolitical risks from the U.S. influence market return spillovers to ten Asia-Pacific countries from 1991 to 2022, with a focus on major global crises. The findings show that uncertainty in U.S. geopolitical risk and U.S. economic policy has a significant impact on spillovers from the U.S. to Asia-Pacific markets, contrary to what Asia-Pacific countries tend to do, which is to reduce these spillover effects. The study also emphasises the role of information technologies in facilitating the transmission of these risks across borders.

Sayed (2024) employs an event study method to investigate the impact of the Russia-Ukraine conflict on Saudi Arabia's stock market, revealing significant abnormal returns with varying sectoral reactions. T-statistics were employed to assess the statistical significance of abnormal returns, and the hypotheses investigated the impact of the Russia–Ukraine conflict on the overall Saudi stock market, as well as across individual sectors. In a similar study, Bossman and Gubareva (2023) investigated the impact of geopolitical risk on stock markets, specifically focusing on the G7 and E7 equities during the Russian-Ukrainian conflict. This study highlights how geopolitical events, particularly military conflicts, increase investor uncertainty regarding firm profitability, resulting in heightened stock price volatility. The authors emphasise that all E7 and G7 stock markets, except for Russia and China, respond positively

to geopolitical risk under normal conditions. Still, in a bearish market, stock markets of Türkiye, Brazil, Russia, and China (among the E7) and France, Japan, and the U.S. (among the G7) show resilience to GPR.

To examine the effects of Geopolitical Risk on various stock markets, Zhou, Huang and Chen (2020) used ARDL and TVP-VAR analyses. It was found that GPR generally harms stock markets, but the effects vary across markets. Additionally, they observed that volatility is more affected than returns, and developing economies are more sensitive. In a similar study, Akdağ, Yıldırım and Kesebir (2019) examined the impact of geopolitical risks on stock market indices in 12 countries using panel causality analysis with monthly data from November 1997 to October 2018. Their findings suggest a significant causal relationship, where rising geopolitical risks are associated with declines in stock market indices. In a similar study, Pala (2024) investigated the relationship between stock market indices of selected OECD economies and EPU, FSI, GPR, and VIX using a quantile-on-quantile regression test. The results show that GPR negatively impacts sectoral stock returns in general, but there's an exception for tech stocks, as it has both positive and negative effects. To investigate the impact of geopolitical risk on equities and tokens of the tourism industry, Gunay, Kirimhan and Payne (2024) conducted DCC-GARCH, TVGC, and Q-VAR models. They concluded that equity markets exhibit a stronger link with global issues, such as war and pandemics, compared to cryptocurrency markets.

There are also a few studies testing the BIST indexes. For instance, in a study testing the impact of Türkiye's geopolitical risk on the returns of BIST 100, Industrial, Financial, Service and Technology indices for the period 2009-2018 using the ARDL method, it was concluded that a 1-unit increase in the geopolitical risk index reduced the BIST100 index returns by 4% (Bezgin, 2019). Similarly, Iltas (2020) conducted Toda-Yamamoto and Hacker and Hatemi-J (2012) causality tests to analyse the impact of economic, political, financial, and geopolitical risks on BIST 100. There is no causal relationship between the monetary and geopolitical risk premia and the BIST100 index, according to the results of these tests. Polat, Alptürk and Gürsoy (2021) investigated in their research the impact of GPR on Türkiye's tourism sector using the Hatemi-J causality test. They used the BIST tourism index and the number of tourists data between 1998 and 2020 as independent variables. Positive geopolitical risk shocks were found to be an effective response to adverse shocks of the BIST tourism index. Seçme (2024) analysed the impact of uncertainty metrics on the BIST sector indexes for the period January 2014-December 2022, and concluded that many indexes are affected by various uncertainty metrics, with asymmetric effects.

As can be seen from the above studies, while prior research has explored the relationship between geopolitical risks and stock markets, this study distinguishes itself by addressing a gap in the literature through its combined focus on the asymmetric effects, the extended period under consideration (1997-2025), and the inclusion of 10 distinct indices. Additionally, this study utilises either global and Türkiye-specific GPR index data for the research.

Methodology

Aim of the research

This study aims to investigate the extent to which geopolitical risks, both global and Türkiye-specific, affect stock indices traded on Borsa Istanbul. The research seeks to identify patterns that may inform risk pricing and investment strategies in emerging markets by testing the differential sensitivities of these indices to geopolitical events. By revealing asymmetric effects, it was aimed to uncover whether the increase and decrease of geopolitical risks affect stock market indices at different levels; by researching 10 different indices, it was aimed to determine how different sectors react to the same dangers; and by examining a long period of 28 years, it was aimed to ensure stability in the results of the research.

Research hypotheses

Using the arguments of the previous literature, we pose two hypotheses concerning the asymmetric impacts of geopolitical risk on the price of selected indices of the equity market of Türkiye:

H_1: Global Geopolitical Risks have an asymmetric effect on the price of selected BIST indices

H_2: Geopolitical Risks of Türkiye have an asymmetric impact on the price of selected BIST indices

Dataset

Geopolitical risk is a significant factor influencing investment decisions and can impact investor sentiment, market liquidity, asset price volatility, and economic activity (Agoraki, Kouretas, and Laopodis, 2022). Previous studies have utilised the Geopolitical Risk Index (GPR) to assess geopolitical risk. It is an index constructed by counting words related to geopolitical tensions in newspaper articles

(Demir Bingöl and Emsen, 2023). Caldara and Iacoviello (2022) developed the index to measure the risks associated with events that affect the peaceful course of international relations. The primary objective of the GPR index is to track the evolution of geopolitical risks over time and analyse their impact on markets, enabling investors, policymakers, and researchers to understand the economic implications of geopolitical developments better (Agoraki et al., 2022) and assess the effects of geopolitical risk.

The subsequent steps are undertaken in the calculation process of the GPR index.

- Keyword identification: First, specific words and phrases associated with geopolitical tensions are identified. These words typically encompass topics such as war, terrorism, nuclear tensions, military threats, and political disputes (Plakandaras, Gupta, and Wong, 2019). The GPR index is usually calculated by measuring the number of articles that contain the words of "geopolitical risk(s), geopolitical concern(s), geopolitical tension(s), geopolitical uncertainty(s), war risk(s), military threat(s), terrorist threat(s), terrorist act(s), Middle East tensions" as keywords (Bouri et al., 2019).

- Newspaper scanning: The identified keywords are searched in the electronic archives of major national and international newspapers. The GPR index usually uses the newspapers: The Times, The Washington Post, The Daily Telegraph, Chicago Tribune, The Globe and Mail, The Guardian, The Wall Street Journal, Financial Times, Los Angeles Times, The New York Times, and Boston Globe (Balcilar, Bonato, Demirer and Gupta, 2018)

- Article count: Each month, the number of articles in these newspapers that contain the identified keywords is counted. This count reflects the intensity of geopolitical tensions that month (Elsayed and Helmi, 2021).

- Normalisation: It is normalised by proportioning to the total number of articles and scaled so that the period average is 100 (Lee, 2019).

Finally, high GPR values indicate a greater risk associated with geopolitical events, while low values indicate a lower risk.

In the study, two specific indices are used as independent variables to analyse the impact of geopolitical risks on selected indices of the Borsa Istanbul stock market. The first is the Geopolitical Risk (GPR) monthly index, which measures the global geopolitical risk by tracking news articles and identifying terms related to geopolitical tensions. The second is the Türkiye-specific Geopolitical Risk (GPRT) monthly index, which is explicitly focused on the geopolitical risks affecting Türkiye. Geopolitical risk index data are obtained from Policy Uncertainty.

Additionally, the study incorporates monthly closing prices data from 10 stock market indices that are listed on Borsa Istanbul (the Turkish stock exchange). Table 1 displays BIST indices used as dependent variables in the analysis, their codes and base dates. The period of each data is determined between 1997/02 and 2025/01 for econometric analyses. Data of the Borsa Istanbul indices are obtained from Investing.

Table 1: BIST Indices Used in the Analysis

	INDEX NAME	CODE	BASE DATE		INDEX NAME	CODE	BASE DATE
1	BIST ALL	XUTUM	27.12.1996	**6**	BIST WOOD PAPER PRINTING	XKAGT	27.12.1996
2	BIST 30	XU030	27.12.1996	**7**	BIST TOURISM	XTRZM	27.12.1996
3	BIST FOOD BEVERAGE	XGIDA	27.12.1996	**8**	BIST TRADE	XTCRT	27.12.1996
4	BIST FINANCIALS	XUMAL	28.12.1990	**9**	BIST BANKS	XBANK	27.12.1996
5	BIST BASIC METAL	XMANA	27.12.1996	**10**	BIST TRANSPORTATION	XULAS	27.12.1996

Source: BIST-stock-indices, 2025

All series used in the analysis are expressed in logarithmic terms. Figure 1 shows the time series graphs of the logarithmic data.

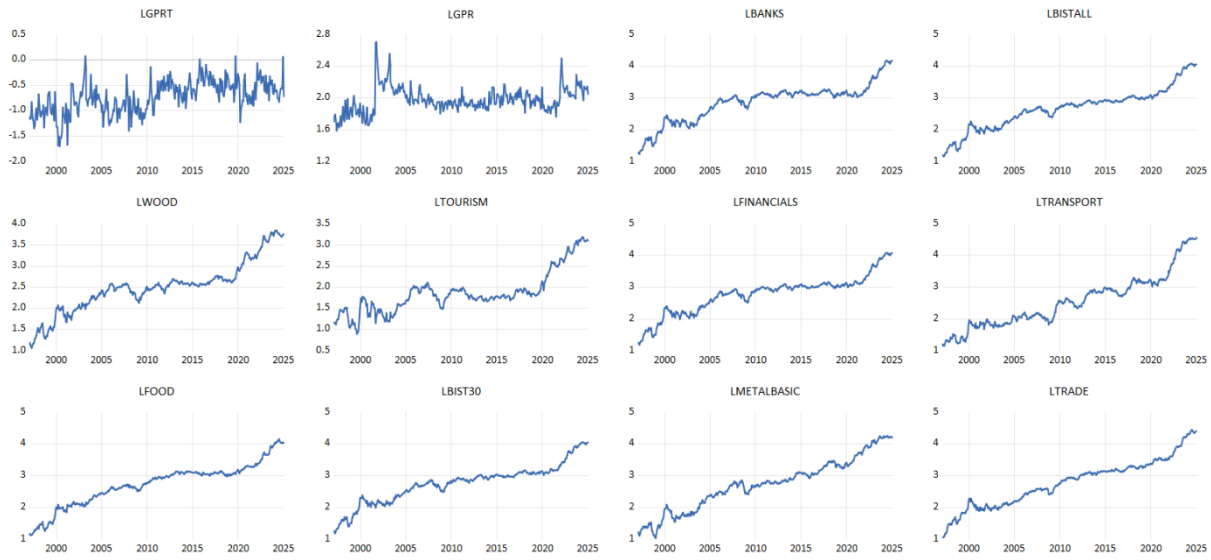

Figure 1: Time Series Graphs of 10 BIST Indices, GPR and GPRT in Logarithmic Terms

Source: Generated by the author.

When the charts are analysed, the first notable shocks for all indices are the 9/11 terror attacks and the COVID-19 pandemic. It can also be stated that geopolitical shocks specific to Turkey are more evident than global ones.

Nonlinear autoregressive distributed lag (NARDL) model

The ARDL approach has two notable advantages: first, it can be used to apply the bounds test even if the series are stationary at level or first difference values (Jareño, Tolentino, González and Oliver, 2019); second, it produces statistically more reliable results than the traditional co-integration tests created by Engle and Granger because of its unconstrained error correction model. As a result, the ARDL-derived error correction model concurrently includes details on the short- and long-term dynamics between the series. Following the ARDL bounds testing approach, the relationship between the stock index and geopolitical risk is modelled using both linear and nonlinear specifications. The use of the NARDL framework enables the detection of potential asymmetries in response to positive and negative shocks. The dependent variable of the model is the logarithmic terms of stock prices, while the independent variables include global and Türkiye-specific GPR indices.

The mathematical form of the study is as follows:

$$y = f(x) \quad \textbf{(1)}$$

In equation (1), the dependent variable symbolised by y represents the closing price of the stock market index, and the independent variable x represents the geopolitical risk indexes. According to this model, it is depicted that the stock market index will be affected by the geopolitical risk index. To avoid any issues in econometric analyses, the mathematical form in equation (1) has been examined in a double logarithmic form, which is mathematically represented by equation (2) as follows:

$$ly = f(lx) \quad \textbf{(2)}$$

The difference between model (2) and model (1) is that the "l" symbol in front of the variables in model (2) indicates the logarithmic structure. The econometric definition of the mathematical form in equation (2) is also shown below in model (3):

$$ly = \beta_0 + \beta_1 lx_t + \varepsilon_t \quad \textbf{(3)}$$

In equation (3), the coefficient β_0 represents the constant term, β_1 shows the effect of changes in the geopolitical risk index (x) on the Borsa Istanbul indexes (y), t represents the time period, and ε represents the error term.

The variables to be used can be defined using equation (4) in the Conditional Error Correction form:

$$\Delta ly_t = \alpha + \sum_{i=1}^{p} \beta_i \Delta ly_{t-i} + \sum_{j=0}^{q} \gamma_j \Delta lx_{t-j} + \lambda \hat{e}_{t-1} + \varepsilon_t \quad \textbf{(4)}$$

Where:

- ly_t is the dependent variable (Borsa Istanbul indexes) at time t.
- lx_t is the independent variable (geopolitical indexes) at time t.
- $\Delta ly_t = ly_t - ly_{t-1}$ and $\Delta lx_t = lx_t - lx_{t-1}$ represent the first differences (the change from one period to the next)
- α is the intercept term
- β_i are the short-run coefficients for the lagged differences of ly_t
- γ_j are the short-run coefficients for the lagged differences of lx_t
- λ is the coefficient of the error correction term, representing the speed at which the dependent variable returns to equilibrium
- $\lambda \hat{e}_{t-1}$ is the lagged residual (error correction term) from the long-run co-integration relationship
- ε_t is the error term

This equation reflects the short-run dynamics of the model (Δy_t and Δx_t) as well as the long-run equilibrium adjustment via the error correction term ($\lambda \hat{e}_{t-1}$).

ARDL Model

$$ly_t = \alpha + \sum_{i=1}^{p} \beta_i ly_{t-i} + \sum_{j=0}^{q} \gamma_j lx_{t-j} + \varepsilon_t \quad \textbf{(5)}$$

NARDL Model

$$ly_t = \alpha + \sum_{i=1}^{p} \beta_i ly_{t-i} + \sum_{j=0}^{q} \gamma_j^{+} lx_{t-j}^{+} + \sum_{j=0}^{q} \gamma_j^{-} lx_{t-j}^{-} + \varepsilon_t \quad \textbf{(6)}$$

In these equations:

- y_t is the dependent variable at time t.
- x_t is the independent variable at time t.
- x_t^{+} represents the positive and negative partial sums of x_t in the NARDL model.
- α is the intercept term.
- β_i, γ_j^{+} and γ_j^{-} are coefficients.
- ε_t is the error term.
- p and q are the maximum lag orders for the dependent and independent variables, respectively.

In this context, the models established for the study are given below. (BIST) refers to any of the BIST indices to be used as the dependent variable. (GPR) refers to the global geopolitical risk index (GPRT) or the Türkiye-specific geopolitical risk index, which is used as the independent variable.

$$lB\dot{I}ST_t = \alpha + \sum_{i=1}^{p} \beta_i lB\dot{I}ST_{t-i} + \sum_{j=0}^{q} \gamma_j^{+} lGPR_{t-j}^{+} + \sum_{j=0}^{q} \gamma_j^{-} lGPR_{t-j}^{-} + \varepsilon_t \quad \textbf{(7)}$$

$$lB\dot{I}ST_t = \alpha + \sum_{i=1}^{p} \beta_i lB\dot{I}ST_{t-i} + \sum_{j=0}^{q} \gamma_j^{+} lGPRT_{t-j}^{+} + \sum_{j=0}^{q} \gamma_j^{-} lGPRT_{t-j}^{-} + \varepsilon_t \quad \textbf{(8)}$$

Findings

Descriptive statistics and normality test

Table 2 summarises the descriptive statistics and normality test of the data. It is shown that the highest mean price is found in BIST Banks (2.858). The highest standard deviation is in BIST Transport (0.828). Meaning that their distributions are left-skewed, some variables exhibit negative skewness, but some others are right-skewed because they show positive skewness. On the other side, BIST Banks have maximum kurtosis (127.784). Finally, except for the series of LFood, LFinancials, LTourism, LBanks, LTransportation, and LGPR, the remaining series accepted the normality hypothesis once the Jarque-Bera test showed that the data were normally distributed. There are 336 observations for each time series.

Table 2: Descriptive Statistics and Normality Test (period: 1997/02-2025/01)

	LBISTall	LBIST30	LFood	LFinan	LMetal	LWood	LTour	LTrade	LBanks	LTrans	LGPR	LGPRT
Mean	2.6689	2.7490	2.7257	2.7257	2.7334	2.4988	1.8662	2.7803	2.8586	2.5493	1.9766	-0.7307
Median	2.7727	2.8661	2.9261	2.9261	2.6626	2.5401	1.7883	2.9055	3.0623	2.5071	1.9581	-0.7150
Maximum	4.0835	4.0647	4.1489	4.1489	4.4073	3.8511	3.1977	4.4569	4.1798	4.5718	2.7097	0.0792
Minimum	1.1492	1.1841	1.1297	1.1297	1.1741	1.0596	0.8921	1.0626	1.2398	1.1572	1.5916	-1.6981
Std. Dev.	0.6326	0.6019	0.6680	0.6680	0.7338	0.5942	0.4883	0.7437	0.5962	0.8278	0.1584	0.3248
Skewness	-0.0711	-0.2579	-0.4050	-0.4050	0.2698	0.1223	0.9440	0.0353	-0.5285	0.6194	0.9124	-0.2432
Kurtosis	3.0849	3.2228	2.9309	2.9309	2.9418	3.2509	3.7473	2.5382	3.3697	2.9162	5.8519	2.9557
Jarque-Bera	0.3842	4.4183	9.2534	6.2414	4.1244	1.7185	57.7189	3.0553	17.5541	21.5847	160.4860	3.3398
Probability	0.825	0.110	0.010*	0.044*	0.1271	0.4234	0.000*	0.217	0.0001*	0.0000*	0.000*	0.1882
Observations	336	336	336	336	336	336	336	336	336	336	336	336

Source: Generated by the author.

"*" indicates a rejection of the null hypothesis of normality at the 5% significance level.

According to the Jarque-Bera results, it is decided to use HAC Newey-West standard errors (Heteroskedasticity and Autocorrelation Consistent standard errors) in the analysis because if there are problems like heteroskedasticity and autocorrelation in the series, it ensures reliable results (Stock and Watson, 2019).

Correlation between BIST indices and GPR indices

The relations between BIST indices and geopolitical risk indices [global (LGPR) and Türkiye-specific (LGPRT)] are presented in Table 3.

Table 3: Correlation between BIST Indices and GPR Indices

	LBISTALL	LBIST30	LFOOD	LFINAN.	LMETAL	BLWOOD	LTOURISM	LTRADE	LBANKS	LTRANSPORT
LGPR	0.2838	0.2913	0.3007	0.2813	0.2477	0.3208	0.2071	0.2367	0.2653	0.2712
LGPRT	0.4914	0.4923	0.5293	0.4772	0.5059	0.4607	0.2821	0.5307	0.4666	0.5055

Source: Generated by the author.

Table 3 indicates that the BIST indices have a positive correlation with both LGPR and LGPRT. The highest correlation was found between LGPR and LBIST30, and between LGPRT and LTRADE—the lowest correlation was found between both LGPR and LGPRT with LTOURISM.

Non-linearity test

Before implementing the NARDL approach, the BDS test (Brock–Dechert–Scheinkman), developed by Brock, Scheinkman, Dechert and LeBaron (1996), which is commonly used to assess the presence of non-linearity in variables, was applied. The results of the BDS test, shown in Table 4, demonstrate that the null hypothesis of independent and identically distributed data is rejected at the 1% significance level. This rejection supports the presence of nonlinear characteristics in the data across multiple dimensions.

Table 4: BDS Test of Non-linearity for BIST Indices and LGPR-LGPRT Indexes

LGPR					LGPRT				
Dim.	**BDS Statistic**	**Std. Error**	**z-Statistic**	**Prob.**	**Dim.**	**BDS Statistic**	**Std. Error**	**z-Statistic**	**Prob.**
2	0.069514	0.004455	15.60343	0.0000	**2**	0.100230	0.003681	27.22859	0.0000
3	0.107892	0.007071	15.25793	0.0000	**3**	0.156304	0.005853	26.70527	0.0000
4	0.129126	0.008410	15.35460	0.0000	**4**	0.183869	0.006971	26.37549	0.0000
5	0.135103	0.008754	15.43385	0.0000	**5**	0.195420	0.007267	26.89286	0.0000
6	0.131923	0.008431	15.64805	0.0000	**6**	0.195355	0.007008	27.87671	0.0000

Source: Generated by the author.

Note: Because all results of probability are lower than 0.001, it confirms non-linearity for both LGPR and LGPRT by rejecting the null hypothesis of linear dependence at a 1% significance level.

Unit root and unit root with structural break test

A unit root indicates that a time series is non-stationary, meaning that it has a tendency to follow a random walk and does not return to a mean or trend over time. We applied the Phillips-Perron PP test in Table 5, which is a popular method for testing for unit roots because it improves upon the Dickey-Fuller test by adjusting for serial correlation and heteroscedasticity (non-constant variance) in the error terms of the time series data. Table 4 also shows the results of the structural break on variables via Lee and Strazicich's LM Unit Root Test (Lee and Strazicich, 2003). This test might refer to a specific modification of the unit root test where the presence of structural breaks is tested while accounting for

both the nature of the breaks and the series's stochastic properties. These types of tests allow researchers to incorporate abrupt changes in the data series while still determining if a unit root is present.

Table 5: Unit Root and Structural Break Test

	Phillips-Perron (PP) Test					Lee Strazicich LM Test	
Variables	**Constant**	**Constant and Trend**	**Variables**	**Constant**	**Constant and Trend**	**Break Point**	**Tau Stat.**
LBISTALL	-0.8993	-2.3352	**Δ(LBISTALL)**	-17.8475	-17.8225	1999/11 2000/02	-17.928
LBIST30	-1.3155	-2.6908	**Δ(LBIST30)**	-18.6247	-18.6066	1999/11 2000/02	-18.614
LFOOD	-1.2631	-2.3787	**Δ(LFOOD)**	-19.3345	-19.3345	2001/02 2002/01	-12.92941
LFINAN.	-1.4458	-2.6331	**Δ(LFINAN.)**	-18.0039	-17.9864	1999/11 2000/02	-18.34121
LMETALB	-0.6942	-2.9455	**Δ(LMETAL)**	-17.1909	-17.1653	2002/05 2008/07	-11.96909
LWOOD	-0.9691	-2.3387	**Δ(LWOOD)**	-17.7893	-17.7634	2000/10 2001/05	-10.80074
LTOUR.	-0.4085	-1.9209	**Δ(LTOUR.)**	-16.6345	-16.6371	2001/08 2002/07	-15.48004
LTRADE	-0.775	-2.7195	**Δ(LTRADE)**	-18.0476	-18.0230	2000/10 2001/02	-15.88092
LBANKS	-1.5835	-2.5756	**Δ (LBANKS)**	-18.3215	-18.3049	1999/11 2000/02	-18.598
LTRANSP.	0.4947	-1.4803	**Δ(LTRANSP.)**	-18.3545	-18.3917	1999/11 2000/02	-19.97755
LGPR	-5.9511	-6.0768	**Δ(LGPR)**	-35.6437	-35.7108	2001/06 2003/09	-6.909765
LGPRT	-7.8178	-9.9532	**Δ(LGPRT)**	-38.8918	-38.8712	2004/10 2011/06	-6.783783
Test critical values	%1 -3.456 %5 -2.872 %10 -2.57	%1 -3.995 %5 -3.427 %10 -3.13	**Test critical values**	%1 -3.456 %5 -2.872 %10 -2.57	%1 -3.995 %5 -3.427 %10 -3.13	**Test critical values**	%1 -5.649 %5 -4.962 %10 -4.688

Source: Generated by the author.

PP unit root test results indicate that the stationarity of all the dependent data series is confirmed at the first difference. Still, it is at the level for independent data. Therefore, it can be estimated that NARDL models apply to these variables.

Results of NARDL analysis

Table 6 presents the short-run coefficients and error correction terms (ECTs) from an NARDL model estimating the asymmetric effects of the general price (LGPR) and Turkish-specific price (LGPRTUR) on various sectoral indices. The model captures both the short-term responses to positive and negative changes in these price variables, as well as the long-term equilibrium relationship through the ECTs.

Table 6: Results of the Short-Run Coefficients and Error Correction Terms

	SHORT RUN			ERROR CORRECTION TERM	
DEPENDENT VARIABLES	**INDEPENDENT VARIABLES**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
LBISTALL	D(LGPR_POS)	-0.029750	0.0327**	-0.0355	0.0110
	D(LGPR_NEG)	0.019107	0.3971		
	D(LGPRT_POS)	0.005552	0.5847	-0.0298	0.0225
	D(LGPRT_NEG)	-0.033489	0.2016		
LBIST30	D(LGPR_POS)	-0.092288	0.0313**	-0.0431	0.0032
	D(LGPR_NEG)	0.021592	0.3483		
	D(LGPRT_POS)	0.006957	0.5082	-0.0352	0.0094
	D(LGPRT_NEG)	-0.034088	0.2108		
LFOOD	D(LGPR_POS)	-0.073401	0.0222**	-0.0361	0.0008
	D(LGPR_NEG)	0.010647	0.5205		
	D(LGPRT_POS)	0.004121	0.6097	-0.0313	0.0089
	D(LGPRT_NEG)	-0.040842	0.1449		
LFINANCIALS	D(LGPR_POS)	-0.122696	0.0095***	-0.0410	0.0025
	D(LGPR_NEG)	0.120471	0.1482		
	D(LGPRT_POS)	0.006923	0.5618	-0.0331	0.0105
	D(LGPRT_NEG)	-0.031652	0.2749		
LMETALB	D(LGPR_POS)	-0.079708	0.0441**	-0.0729	0.0032
	D(LGPR_NEG)	0.094426	0.2474		
	D(LGPRT_POS)	-0.013927	0.5423	-0.0611	0.0008
	D(LGPRT_NEG)	-0.017649	0.1269		
LWOOD	D(LGPR_POS)	-0.090959	0.0129**	-0.0405	0.0043
	D(LGPR_NEG)	0.030285	0.1937		
	D(LGPRT_POS)	0.005609	0.6190	-0.0290	0.0308
	D(LGPRT_NEG)	-0.045396	0.1287		
LTOURISM	D(LGPR_POS)	-0.174725	0.1443	-0.0209	0.0589
	D(LGPR_NEG)	0.128699	0.3270		
	D(LGPRT_POS)	-0.132817	0.2275	-0.0355	0.0188
	D(LGPRT_NEG)	-0.029559	0.3021		
LTRADE	D(LGPR_POS)	-0.061128	0.0753*	-0.0312	0.0686
	D(LGPR_NEG)	-0.002741	0.9078		
	D(LGPRT_POS)	-0.05884	0.3776	-0.0414	0.0255
	D(LGPRT_NEG)	0.032165	0.3818		
LBANKS	D(LGPR_POS)	-0.103056	0.0423**	-0.0347	0.0059
	D(LGPR_NEG)	0.020449	0.4251		
	D(LGPRT_POS)	0.009488	0.4606	-0.0299	0.0116
	D(LGPRT_NEG)	-0.036264	0.2486		
LTRANSPORT	D(LGPR_POS)	-0.164950	0.0057***	-0.0116	0.2785
	D(LGPR_NEG)	0.016348	0.5699		
	D(LGPRT_POS)	-0.052097	0.1070	-0.0191	0.1081
	D(LGPRT_NEG)	-0.018502	0.2089		

Source: Generated by the author.

The findings from the NARDL analysis reveal that global and Türkiye-specific geopolitical risks exert asymmetric and sectorally differentiated impacts on Borsa Istanbul indices. In the short run, positive shocks in global geopolitical risk have a statistically significant adverse effect across all sectors, including BISTALL, BIST30, Food, Financials, Basic Metal, Wood and Paper, Tourism, Trade, Banks, and Transportation. In contrast, the effects of adverse shocks of GPR are statistically insignificant for most indices. The impacts of Türkiye-specific geopolitical risks are generally limited and vary by sector, but are insignificant.

Specifically, a one-unit increase in the global GPR index leads to a 0.029750-unit decline in the BISTALL index and a 0.029882-unit decline in the BIST30 index. Similarly, the FOOD index decreases by 0.050637 units, the FINANCIALS index by 0.122696 units, and the BASIC METAL index by 0.098267 units in response to a one-unit rise in geopolitical risk. The WOOD index also shows a significant reduction of 0.090995 units, while the TOURISM sector declines by 0.0355 units. In the TRADE sector, the index drops by 0.061128 units, and the BANKS index by 0.103606 units. Notably, the TRANSPORT index exhibits the most pronounced decline, decreasing by 0.165496 units. These findings collectively suggest that positive geopolitical shocks systematically exert downward pressure on sectoral stock prices in

Türkiye, emphasising the asymmetric and risk-sensitive nature of emerging market equity performance.

The results of Table 6 also emphasise that the transportation sector shows the most significant decline under rising geopolitical risk, reflecting how conflicts and crises disrupt trade routes, logistics, and energy costs. Finance and banking are also among the most affected, indicating that geopolitical tensions threaten capital flows and financial system stability, prompting faster investor withdrawals. Declines in the basic metals and wood sectors likely stem from their reliance on global supply chains, making them more vulnerable to disruptions and rising costs. Even the food sector, which focuses on basic needs, is experiencing a decline, indicating heightened overall market risk perception and widespread investor caution. The tourism sector, susceptible to geopolitical tensions, suffers from reduced travel, increased security concerns, and lower revenue expectations. Similarly, the trade sector is negatively impacted, potentially due to weakening domestic and external demand, supply chain disruptions, and declining consumer confidence.

Regarding the long-run dynamics, the error correction terms are negative and statistically significant for all sectors except Transportation and Tourism, indicating the presence of stable long-run relationships and suggesting that short-run disequilibria tend to converge toward equilibrium over time. The fastest speed of adjustment is observed in the Basic Metal sector, while the slowest is in the Wood and Paper sector. Overall, global geopolitical risks have a more pronounced impact on the BIST, while Turkey-specific risks affect only specific sectors. Therefore, investors should consider sectoral diversification when developing their investment strategies.

Discussion

The finding that sectors respond significantly to positive global geopolitical risk shocks aligns with theoretical expectations of behavioural finance. It may trigger a flight-to-safety effect, where investors shift their portfolios towards relatively resilient markets, as some stock markets are more heavily affected by geopolitical tensions, thereby creating short-term capital outflows and affecting specific sectors.

Some sectors exhibited strong negative responses to positive GPR shocks, reflecting the sensitivity of these capital-intensive or globally integrated industries to international uncertainty and disruptions. These sectors are often closely tied to global trade dynamics and investor confidence, making them more vulnerable to adverse news or investor panic.

The transportation sector responded strongly negatively to positive global GPR shocks, while the Tourism Sector responded more weakly. This can be interpreted to mean that tourism is directly influenced by domestic security risks, and transportation, especially international logistics, is disrupted by global tensions that impair global supply chains.

The presence of a significant and negative error correction term (ECT) in most sectoral models confirms the existence of a long-run relationship between geopolitical risk and stock market behaviour. This means that while markets may deviate from fundamentals in the short run due to behavioural biases, they tend to revert to equilibrium over time. In particular, the Metal sector has shown relatively rapid adaptation, underlining its efficiency in processing geopolitical information. However, the Transport sector lacked statistically significant ECTs, suggesting that any short-run deviations in response to geopolitical risks may dominate long-term dynamics in this sector.

The results are broadly consistent with prior empirical research, which highlights the asymmetric effects of risk shocks on the stock market (Bossman and Gubareva, 2023; Salisu et al., 2022; Sayed, 2024; Banerjee et al., 2024). However, by distinguishing between global and country-specific risks, this study provides a more granular understanding of how emerging markets, such as Türkiye, react under different geopolitical scenarios. It also reinforces the argument that sector-level analysis is more informative than aggregate market-level studies, as Iltas (2020) stated in his research. In addition, the results are consistent with those of some studies investigating BIST sectors and geopolitical risk (Kök and Nazlıoğlu, 2000; Polat et al., 2021; Seçme, 2024).

Conclusion

This study examined the asymmetric impacts of global and Türkiye-specific geopolitical risks on selected sectoral indices of Borsa Istanbul over the extended period from 1997 to 2025. Utilising the Nonlinear Autoregressive Distributed Lag model, the research confirmed that geopolitical risk is a significant determinant of sectoral index performance. However, the effects are neither uniform across

sectors nor symmetric in nature. The findings highlight that global geopolitical shocks tend to have more consistent impacts on BIST compared to domestic geopolitical developments.

According to the study, sector rotation tactics may be advantageous for investors during periods of heightened geopolitical risk. For example, risk-adjusted returns can be achieved by underweighting fragile sectors, such as metals and transportation, and overweighting resilient ones, like banks or wood, during times of global risk. The relatively low response of indices such as the food and trade to movements in global geopolitical risk suggests that investors perceive these sectors as more insulated from global turmoil. Such behaviour may stem from heuristic-driven decisions under uncertainty, a phenomenon well-documented in the behavioural finance literature.

The study has several limitations. First, the analysis is based on monthly data, which may obscure short-term market reactions. Second, the study does not incorporate control variables such as interest rates, inflation, or global economic indicators, which could interact with geopolitical risks and influence market dynamics. Lastly, the NARDL approach assumes stable relationships over time, potentially overlooking structural breaks or regime changes in the financial markets.

Future research could use higher-frequency data to capture immediate market reactions to geopolitical events. Comparative studies across other emerging markets may reveal whether the observed asymmetries are specific to Türkiye. Lastly, incorporating investor or media sentiment indices may provide further insights into behavioural responses to geopolitical risks.

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