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Effects of Geopolitical Risks on Countries' Trade Flows: A Nonlinear ARDL Analysis

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ABSTRACT

In this study, the effects of geopolitical risks (GPR) on countries' trade flows are examined with the nonlinear ARDL method by using the data of 11 countries for 1993M01 – 2021M08 periods. According to the findings, positive GPR shocks reduced exports in Turkey, Russia, China, South Africa, Argentina, and Israel, whereas they reduced imports in Turkey, Russia, South Africa, and Israel. Negative GPR shocks increased exports in Russia, China, South Africa, Argentina, and Israel, whereas they increased imports in Mexico, China, and Argentina. It was determined that the effects of GPR on exports are symmetrical in Turkey, Russia, South Africa, Argentina, and Israel, whereas they are asymmetrical in Mexico, South Korea, India, Brazil, China, and Indonesia. Moreover, we find that the effects of geopolitical risks on imports are symmetrical in all countries. Increases in the REER decreased exports in Turkey, Mexico, India, China, Indonesia, South Africa, Argentina, and Israel, whereas they increased imports in Turkey, South Korea, Russia, Brazil, and Indonesia and decreased imports in Argentina and Israel. Increases in the world income increased exports of all countries, whereas increases in the countries' own national income increased imports in Turkey, Mexico, South Korea, Russia, India, Brazil, Argentina, and Israel.

Keywords: Geopolitical Risk Index, Trade Flows, Nonlinear Ardl, Symmetric And Asymmetric Effects.

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INTRODUCTION

Although free foreign trade is a very significant mechanism that increases the productivity and national income of countries, geopolitical risks, wars, and tensions between countries, as well as enforcements and boycotts may have considerable negative effects on external trade flows. Moreover, geopolitical risks might change the investment decisions of countries (Balcilar et al. 2018) and affect their transportation costs (Webster and Ivanov, 2014), as well as their production and economic growth (Gozgor and Ongan, 2017: 99).

In this study, when geopolitical risks are mentioned, they refer to risks or uncertainties that are related to interstate wars, acts of terrorism, and tensions that affect the normal and peaceful course of international relations (Wang, Wu, and Xu, 2019: 6). Major events such as the terrorist attacks that were organized with civil planes on September 11, 2001 on the World Trade Center in New York; the US military intervention in Afghanistan and Iraq; the Arab Spring that started on December 18, 2010 in Tunisia and spread to North Africa and the Middle Eastern countries and whose effects still continues in Syria; terrorist attacks that occurred in Paris in November 2015; aggressive policies of the US that were implemented against Mexico, China, and other countries after Donald Trump was elected as the US president in November 2016; tensions between North Korea and the US from 2017 till the first half of 2018; the COVID-19 pandemic; as well as Taliban's capture of Afghanistan in August 2021 have caused an increase in geopolitical instability. These types of negative developments have increased geopolitical risks and affected national and international economic activities negatively (Bouoiyour et al. 2019: 1-2).

Entrepreneurs, market participants, and central bank authorities regard geopolitical risks as key determinants of investment decisions and stock market dynamics. According to a survey conducted by Wells Fargo/Gallup with 1,005 investors in May 2017, 75% of the participants stated their concerns about the economic effects of militaristic and diplomatic conflicts in various parts of the world, and they ranked geopolitical risk before political and economic uncertainties (Business Wire, 2017).

The European Central Bank, in its April 2017 Economic Bulletin, and the International Monetary Fund, in the

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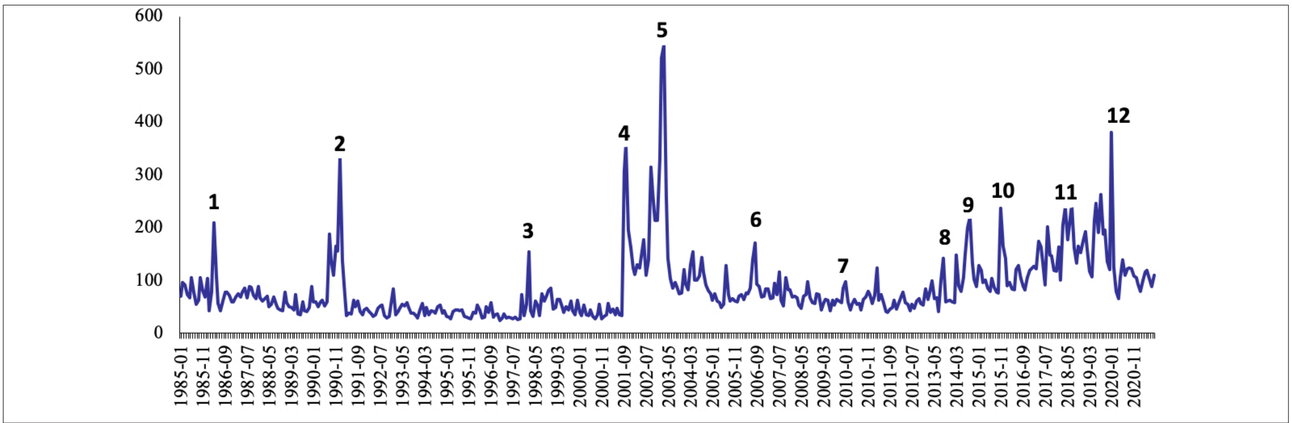

Figure 1. Geopolitical Risk Index (2000-2009=100)
Source: Caldara and Iacoviello (2017: 8) and Policy Uncertainty (2021).

October 2017 World Economic Outlook (WEO), highlighted geopolitical uncertainties as a salient risk to economic outlook (Caldara and Iacoviello, 2017: 2). When there is an increase in geopolitical risks, it becomes more difficult to transmit goods and make payments on time in international trade (Gupta et al. 2019: 516); tourism operations can be directed toward different destinations (Neacşu et al., 2018: 878), and stock markets and other financial institutions may make huge losses (Elsayed and Helmi, 2019: 2). An increase in risk leads to a substantial amount of foreign capital outflow from countries (Lu et al. 2020: 95), thereby increasing the exchange rate (Obstfeld, 2012) and leading to economic crisis (Jordá et al., 2011; Gourinchas and Obstfeld, 2012; Schularick and Taylor, 2012; Davis et al., 2016). The increase in geopolitical risks might be able to direct countries to allocate more resources to the defense industry (Buzdagli and Ozdemir, 2021: 188), leading to the use of resources in non-productive/improper areas, whereas they might be required for production and economic growth (Ghosh, 2022). Moreover, an increase in geopolitical risks might increase the demand of households and firms with speculative motives and are cautious, and this might cause scarce economic resources to move to non-productive areas and damage economic growth (Carroll, 1996: 1).

Despite its importance, it is very difficult to measure geopolitical risks and use them for quantitative analysis. To address this challenge, Caldara and Iacoviello (2017), who are members of the Board of Governors of the Federal Reserve, introduced the Geopolitical Risk Index (GPR) to the literature. In the current study, the effects of GPR on countries' trade flows are examined with the nonlinear ARDL method using the monthly data of 11 countries whose regular data could be accessed from January 1993 to August 2021. In the analysis, the GPR was decomposed as negatively and positively accumulated shocks, and we tried to determine the symmetrical and asymmetrical effects of the GPR on foreign trade. To the best of our knowledge, this is the first study to analyze the symmetrical and asymmetrical effects of the GPR index on foreign trade flows.

In the second section of this paper, the GPR index is introduced. In the third section, the data, model, and methodology are explained; econometric analyses are also conducted in this section. This paper ends with the conclusions in section fourth. Using the nonlinear ARDL method in this study has also provided significant contributions to deduce the symmetrical and asymmetrical effects of the GPR. Because both the GPR and the nonlinear method are used, this study is expected to provide significant contributions to the foreign trade literature and the countries' economies.

GEOPOLITICAL RISK INDEX

When Caldara and Iacoviello (2017) created the GPR index Caldara and Iacoviello (2017) when constructing the GPR index of 19 countries, they counted the words that were included in the news and articles of the 11 leading newspapers[1] published in the US, the United Kingdom, and Canada and labeled the geopolitical risks affecting the countries *"political tensions," "geopolitical risk or concern or tension or uncertainty," "coup," "guerrilla," "warfare," "nuclear or atomic war," "nuclear conflict," "fear or threat or risk or peril or menace," "war risk or fear," "military threat," "terrorist threat," "terrorism menace," "terrorist act,"* and *"beginning or outbreak or start or escalation of the war,"* and the index was then

[1] The Boston Globe, Chicago Tribune, The Daily Telegraph, Financial Times, The Globe and Mail, The Guardian, Los Angeles Times, The New York Times, The Times, The Wall Street Journal, and The Washington Post. The researchers explained the reason for selecting these newspapers as: The New York Times, Financial Times and The Wall Street Journal cover geopolitical events that are of global interest, and mostly the US is involved or will intervene in these events. Thus, the GPR index can be seen as a measure of geopolitical risks in the related areas for big companies, investors, and policymakers from the perspective of the North America and the Great Britain.

normalized to an average value of 100 from 2000 to 2009. The values that are higher than 100 signify deeper risks (Caldara and Iacoviello, 2017: 5-7). The authors also stated that the GPR also covers events that signify a reduction in geopolitical risks, such as the end of a war or peace negotiations (Caldara and Iacoviello, 2017: 8). While constructing the GPR index, climate change, significant democratic political events, such as Brexit, and global economic events, such as the 2008 global financial crisis, were excluded.

While constructing the GPR index, Caldara and Iacoviello (2017) used the algorithm of Baker et al. (2016) to calculate the Economic Policy Uncertainty (EPU) index. EPU or GPR are indices that can closely affect countries' economies and financial markets.

When the authors plotted the GPR index on a graph, they observed that they have successfully determined the significant geopolitical risk elements in the world. The updated GPR index[2] can be examined using Figure 1.

As depicted in Figure 1, the GPR represents (1) the US bombs Libya, (2) the First Gulf War in 1991, (3) the Iraq disarmament crisis, (4) the September 11, 2001 terrorist attacks, (5) the Second Gulf War that began in 2003, (6) the Iran nuclear tensions, (7) the Arab Spring that began in January 2010 (8) the Syrian War, (9) the ISIS Escalation, (10) the nuclear rocket tests of North Korea in 2016, (11) the toughening of the exchange rate and external trade wars between the US and China in 2018, and (12) the COVID-19 pandemic, which was widespread in January 2020. Therefore, it will be useful to use such an important index in economic analyses.

EMPIRICAL ANALYSIS

Data Set

In this study, the monthly data of 11 countries whose regular data could be accessed were used to analyze the effects of geopolitical risks (Geopolitical Risk: GPR) on the countries' trade flows from January 1993 to August 2021. The main independent variable of the study is the index that was prepared by Caldara and Iacoviello (2017), and these data were obtained from the Policy Uncertainty (2021). The data about merchandise exports (billion dollar, X), merchandise imports (billion dollars, M), and the industrial production index (IPI) (2015=100) were collected from the websites of the IMF (2021), OECD (2021), and FRED (2021). The data about the real effective exchange rate ($REER$) were obtained from the study of Bruegel (2021). Seasonal effects were eliminated from all the series. All variables are in logarithmic form.

Model and Methodology

In this study, the linear form of the models[3] that were tested to analyze the effects of geopolitical risks on the countries' trade flows are presented as follows:

$$LogX_t = \alpha_0 + \alpha_1 LogGPR_t + \alpha_2 LogREER_t + \alpha_3 LogY_t^w + \varepsilon_t \quad (1)$$

$$LogM_t = \beta_0 + \beta_1 LogGPR_t + \beta_2 LogREER_t + \beta_3 LogY_t^d + \epsilon_t \quad (2)$$

Here, $REER_t$ measures the appreciation/depreciations of the real value of a country's currency against the basket of its trading partners. An increase in REER affects the export of the home country negatively, whereas it affects the home country's import positively (Mankiw, 2010: 147-148). Y_t^w and Y_t^d denote the world income and the national income of the related country, respectively. Y_t^w is proxied with the average industry production index (IPI) of OECD countries[4], and Y_t^d is proxied with IPI of related country. An increase in positively affects the host country's export, whereas an increase in Y_t^d increases the host country's imports.

In this study, to be able to analyze the effects of geopolitical risks on the countries' trade flows, the nonlinear ARDL approach, developed by Shin, Yu, and Greenwood-Nimmo (2014) was used. Although this method is based on the studies of Pesaran and Pesaran (1997) and Pesaran et al. (2001), it based on decomposing the independent variable into its positively and negatively cumulative shocks. Therefore, it is also possible to determine the type of the effects (whether it is symmetrical/asymmetrical) of the related variable on the dependent variable (Shin et al., 2014: 282). In order to write Equations (1) and (2) in the nonlinear ARDL form, first, the GRP series should be decomposed into its positively and negatively cumulative shocks.

$$LogGPR_t^+ = \sum_{k=1}^{t} \Delta LogGPR_k^+ = \sum_{k=1}^{t} \max(\Delta LogGPR_k, 0) \quad (3)$$

$$LogGPR_t^+ = \sum_{k=1}^{t} \Delta LogGPR_k^+ = \sum_{k=1}^{t} \max(\Delta LogGPR_k, 0) \quad (4)$$

where GPR^+ and GPR^- are partial sums of increases (+) and decreases (-) of the GPR indices. When Equations (1) and (2) are written in a nonlinear ARDL form, Equations (5) and (6) are obtained:

[2] While generating this global index, all geopolitical risk factors worldwide were considered.

[3] This model was created based on the study of Bahmani-Oskooee and Arize (2019: 915), and we added the GPR index to the models.

[4] Consisting of 36 countries, the OECD constituted 61.46% of the world national income as of the end of 2020 (World Bank, 2021); thus, the production and income of the OECD countries have high representative power of the world income.

$$\Delta LogX_t = \alpha_0 + \alpha_1 LogX_{t-1} + \alpha_2 LogGPR^{+}_{t-1} + \alpha_3 LogGPR^{-}_{t-1} + \alpha_4 LogREER_{t-1} + \alpha_5 LogY^{w}_{t-1} + \sum_{k=1}^{m_1-1} \alpha_{6k}\, \Delta LogX_{t-k} + \sum_{k=0}^{m_2-1} \alpha_{7k}\, \Delta LogGPR^{+}_{t-k} + \sum_{k=0}^{m_3-1} \alpha_{8k}\, \Delta LogGPR^{-}_{t-k} + \sum_{k=0}^{m_4-1} \alpha_{9k}\, \Delta REER_{t-k} + \sum_{k=0}^{m_5-1} \alpha_{10k}\, \Delta LogY^{w}_{t-k} + \varepsilon_t \quad (5)$$

$$\Delta LogM_t = \beta_0 + \beta_1 LogM_{t-1} + \beta_2 LogGPR^{+}_{t-1} + \beta_3 LogGPR^{-}_{t-1} + \beta_4 LogREER_{t-1} + \beta_5 LogY^{d}_{t-1} + \sum_{k=1}^{n_{1-1}} \beta_{6k}\, \Delta LogM_{t-k} + \sum_{k=0}^{n_2-1} \beta_{7k}\, \Delta LogGPR^{+}_{t-k} + \sum_{k=0}^{n_3-1} \beta_{8k}\, \Delta LogGPR^{-}_{t-k} + \sum_{k=0}^{n_4-1} \beta_{9k}\, \Delta REER_{t-k} + \sum_{k=0}^{n_5-1} \beta_{10k}\, \Delta LogY^{d}_{t-k} + \epsilon_t \quad (6)$$

Here m_i and n_i represent the optimal lag lengths. In these equations, the long-term impacts of changes in GPR^+ and GPR^- indices on X and M are determined by the signs and significances of normalized $-\alpha_2/\alpha_1, -\alpha_3/\alpha_1,\ -\beta_2/\beta_1$ and $-\beta_3/\beta_1$ coefficients, respectively. Furthermore, the long-run impacts of the $REER$, Y^w, and Y^d are determined by the signs and significances of normalized $-\alpha_4/\alpha_1$, $-\alpha_5/\alpha_1$, $-\beta_4/\beta_1$, $-\beta_5/\beta_1$ and respectively (Shin et al. 2014: 286).

Table 1. Results of the ADF Unit Root Test

		LogX	LogM	LogGPR+	LogGPR-	LogREER	LogYd	LogYw
Turkey	***Level***	0.63	0.70	0.99	0.99	0.36	0.95	0.20
	First Difference	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
Mexico	***Level***	0.14	0.45	0.99	0.99	0.07*	0.47	0.20
	First Difference	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
S. Korea	***Level***	0.36	0.54	0.56	0.73	0.30	0.20	0.20
	First Difference	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
Russia	***Level***	0.66	0.82	0.99	0.99	0.00***	0.93	0.20
	First Difference	0.00***	0.00***	0.00***	0.00***	-	0.00***	0.00***
India	***Level***	0.76	0.59	0.42	0.70	0.01**	0.19	0.20
	First Difference	0.00***	0.00***	0.00***	0.00***	-	0.00***	0.00***
Brazil	***Level***	0.37	0.80	0.98	0.94	0.00***	0.14	0.20
	First Difference	0.01**	0.00***	0.00***	0.00***	-	0.00***	0.00***
China	***Level***	0.86	0.71	0.85	0.93	0.01**	0.00***	0.20
	First Difference	0.00***	0.00***	0.00***	0.00***	-	-	0.00***
Indonesia	***Level***	0.73	0.80	0.97	0.98	0.10	0.86	0.20
	First Difference	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
S. Africa	***Level***	0.75	0.49	0.99	0.99	0.09*	0.10	0.20
	First Difference	0.00***	0.00***	0.00***	0.00***	-	0.00***	0.00***
Argentina	Level	0.66	0.40	0.99	0.99	0.76	0.59	0.20
	First Difference	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
Israel	***Level***	0.25	0.53	0.99	0.99	0.61	0.62	0.20
	First Difference	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***

Note: Values on the Table 1 are the probability values of the ADF test. ***, **, and * indicate that the series are stationary at the 1%, 5%, and 10% significance levels, respectively.

The nonlinear ARDL model has a big advantage, as it can discover hidden relations between changes in GPR indices and trade flows. Symmetry and asymmetry are defined as when there are the same sign and size of decomposed coefficients of GPR^{+} and GPR^{-} indices. The long-run (W_{LR}) Wald tests are used to make symmetry or asymmetry decisions. We focused on whether $(-\alpha_2/\alpha_1) = (-\alpha_3/\alpha_1)$ and $(-\beta_2/\beta_1) = (-\beta_3/\beta_1)$ or not in the long-run Wald test (Shin et al. 2014: 290).

Empirical Findings

Before running the nonlinear ARDL model, first, we should know the series stationary levels. For this purpose, the ADF unit root test developed by Dickey and Fuller (1979, 1981) was used. The null hypothesis of this test is "*Series has a unit root*." The results are presented in Table 1.

According to the results in Table 1, whereas the REER series are stationary in Russia, India, Brazil, and South Africa, the series are stationary in China (I(0)). Other series are not stationary on their level values, but they are stationary in their first differences (I(1)).

The estimates of the models can be moved. In the process, a maximum of six lags are imposed on each first-differenced variable for each model, and Akaike's Information Criterion is used to select an optimum model. The results of the nonlinear ARDL approach for export, normalized long-run coefficients, and diagnostic test results are presented in Table 2.

Table 2: The Nonlinear ARDL Estimation Results for Export

Variables	Turkey	Mexico	S. Korea	Russia	India	Brazil	China	Indonesia	S. Africa	Argentina	Israel
Short Run-Coefficients											
$\Delta LogX_{t-1}$	-0.31*** (0.00)	-0.23*** (0.00)	-0.27*** (0.00)	-0.11*** (0.00)	-0.36*** (0.00)	-0.33*** (0.00)	-	-	-0.64*** (0.00)	-	-0.65*** (0.00)
$\Delta LogX_{t-2}$	-	0.05*** (0.00)	-	-	-0.11** (0.03)		-	-	-0.41*** (0.00)	-	-0.42*** (0.00)
$\Delta LogGPR_t^{+}$	-	0.07*** (0.00)	-	-	-	-0.36*** (0.00)	-	-	-	-	0.07** (0.01)
$\Delta LogGPR_{t-2}^{+}$	-	-	-	-	-	-0.32*** (0.00)	0.60*** (0.00)	-0.12*** (0.00)	-	-	0.12*** (0.00)
$\Delta LogGPR_{t-1}^{-}$	-	-	-	-0.14*** (0.00)	-	-0.42*** (0.00)	0.08 (0.27)	0.27** (0.00)	-	-0.07*** (0.00)	-0.03 (0.46)
$\Delta LogGPR_{t-2}^{-}$	-0.18*** (0.00)	-	-	0.14*** (0.00)	-		0.19*** (0.00)	0.31*** (0.00)	0.14*** (0.00)		0.25*** (0.00)
$\Delta LogREER_t$	-	-	-	-	-		-	-	-	-0.42*** (0.00)	0.96*** (0.00)
$\Delta LogREER_{t-3}$	-0.24** (0.04)	-	-	-	-		-	-	-		0.98*** (0.00)
$\Delta LogY_t^{w}$	3.30*** (0.00)	1.68*** (0.00)	1.40*** (0.00)	1.54*** (0.00)	-	1.21*** (0.00)	-	-	4.89*** (0.00)	0.77*** (0.00)	1.036*** (0.00)
$\Delta LogY_{t-1}^{w}$	-0.35*** (0.00)	2.76*** (0.00)		1.15*** (0.00)	4.78*** (0.00)	-	-	-02.76*** (0.00)	1.91*** (0.00)	0.95*** (0.00)	0.95 (0.15)
Long-Run Coefficients											
C	-1.72* (0.06)	-4.63*** (0.00)	-3.34*** (0.00)	-0.52* (0.09)	-0.07 (0.95)	-4.30*** (0.00)	-4.96*** (0.00)	-6.61*** (0.00)	-4.82*** (0.00)	-0.45 (0.11)	-0.95 (0.14)
$LogX_{t-1}$	-0.24*** (0.00)	-0.66*** (0.00)	-0.37*** (0.00)	-0.04*** (0.00)	-0.29*** (0.00)	-0.08** (0.02)	-0.54*** (0.00)	-0.65*** (0.00)	-0.20*** (0.00)	-0.04*** (0.00)	-0.20*** (0.00)
$LogGPR_{t-1}^{+}$	0.03** (0.02)	0.03* (0.07)	0.0001 (0.99)	-0.08*** (0.00)	-0.02 (0.46)	0.01 (0.84)	-0.32*** (0.00)	0.03* (0.09)	-0.06*** (0.00)	-0.03*** (0.00)	-0.14*** (0.00)
$LogGPR_{t-1}^{-}$	0.03** (0.04)	0.01 (0.46)	-0.003 (0.83)	0.08*** (0.00)	-0.04 (0.21)	-0.002 (0.97)	-0.40*** (0.00)	0.01 (0.43)	-0.07*** (0.00)	-0.03*** (0.00)	-0.14*** (0.00)
$LogREER_{t-1}$	-0.11* (0.05)	-0.25*** (0.00)	0.29 (0.31)	0.01 (0.50)	-0.58** (0.03)	-0.20*** (0.00)	-0.29*** (0.00)	-0.47* (0.08)	-0.18*** (0.00)	-0.04** (0.01)	-0.32*** (0.00)
$LogY_{t-1}^{w}$	0.58*** (0.00)	1.16*** (0.00)	0.71*** (0.00)	0.12* (0.08)	0.74** (0.03)	1.10*** (0.00)	1.74*** (0.00)	2.16*** (0.00)	0.94*** (0.00)	0.18*** (0.00)	0.59*** (0.00)
Normalized Long-Run Coefficients											
$LogGPR_t^{+}$	0.14* (0.08)	0.05 (0.10)	0.0004 (0.99)	-1.89*** (0.00)	-0.08 (0.48)	0.18 (0.84)	-0.60*** (0.00)	0.05 (0.10)	-0.33*** (0.00)	-0.74*** (0.00)	-0.71*** (0.00)
$LogGPR_t^{-}$	0.12 (0.13)	0.02 (0.47)	-0.01 (0.83)	-1.95*** (0.00)	-0.14 (0.24)	-0.03 (0.97)	-0.73*** (0.00)	0.02 (0.44)	-0.34*** (0.00)	-0.73*** (0.00)	-0.72*** (0.00)
$LogREER_t$	-0.48** (0.04)	-0.37*** (0.00)	0.78 (0.25)	0.34 (0.44)	-2.01** (0.03)	-2.57 (0.10)	-0.53*** (0.00)	-0.72* (0.07)	-0.87*** (0.00)	-1.08** (0.01)	-1.61*** (0.00)
$LogY_t^{w}$	2.39*** (0.00)	1.75*** (0.00)	1.91*** (0.00)	2.68* (0.07)	2.55*** (0.00)	13.69** (0.01)	3.19*** (0.00)	2.29*** (0.00)	4.58*** (0.00)	4.03*** (0.00)	2.94*** (0.00)
Diagnostic Tests											
R^2	0.99	0.99	0.49	0.33	0.82	0.71	0.83	0.88	0.54	0.40	0.82
$\bar{R}^2$	0.98	0.99	0.44	0.31	0.80	0.67	0.83	0.87	0.52	0.38	0.80
F	746.42 (0.00)	9591.45 (0.00)	10.37 (0.00)	16.37 (0.00)	43.09 (0.00)	17.47 (0.00)	168.91 (0.00)	54.14 (0.00)	38.94 (0.00)	22.37 (0.00)	43.94 (0.00)
DW	2.30	1.80	2.11	1.93	1.96	2.04	2.02	2.05	2.04	2.14	2.02
χ^2_{SC}	2.12 (0.34)	0.28 (0.75)	3.43 (0.17)	2.44 (0.09)	0.32 (0.84)	3.13 (0.20)	0.09 (0.95)	0.80 (0.66)	4.91 (0.08)	4.42 (0.10)	12.66 (0.18)
χ^2_{FF}	9.23 (0.07)	6.17 (0.15)	5.34 (0.06)	0.81 (0.37)	0.35 (0.55)	4.31 (0.38)	0.57 (0.45)	0.009 (0.92)	0.18 (0.66)	1.07 (0.12)	0.0002 (0.98)
χ^2_{NOR}	0.30 (0.85)	2.91 (0.23)	5.85 (0.05)	2.24 (0.32)	7.06 (0.29)	4.66 (0.36)	1.21 (0.46)	1.56 (0.39)	8.66 (0.11)	2.18 (0.26)	1.29 (0.15)
χ^2_{HET}	10.34 (0.32)	9.53 (0.48)	11.75 (0.10)	11.74 (0.16)	4.07 (0.85)	13.18	15.71 (0.10)	8.34 (0.59)	2.38 (0.81)	10.31 (0.58)	13.28 (0.20)
F_{PSS}	4.93 (0.02)	5.25 (0.00)	6.37 (0.00)	5.67 (0.00)	4.48 (0.02)	2.98 (0.03)	3.26 (0.00)	5.08 (0.00)	17.20 (0.00)	2.65 (0.09)	9.11 (0.27)
t_{BDM}	-2.99 (0.03)	-2.84 (0.02)	-3.32 (0.01)	-3.36 (0.01)	-3.98 (0.01)	-2.17 (0.04)	-2.00 (0.05)	-3.79 (0.02)	-15.99 (0.00)	-2.38 (0.08)	-2.86 (0.07)
W_{LR}	0.01 (0.42)	0.03 (0.00)	0.01 (0.04)	0.06 (0.10)	0.06 (0.00)	0.21 (0.01)	0.13 (0.00)	0.03 (0.00)	0.02 (0.15)	-0.01 (0.49)	0.007 (0.41)

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The values in parentheses are prob. W_{LR} is the long-run Wald tests. *DW denotes the* Durbin-Watson autocorrelation test; χ^2_{SC} is Breusch-Godfrey LM test for autocorrelation; χ^2_{NOR} is the Jarque-Bera test for normality; χ^2_{FF} is Ramsey test for functional form misspecification; χ^2_{HET} denotes Breusch–Pagan–Godfrey heteroscedasticity test. t_{BDM} is the Banerjee, Dolado, and Mestre (1998) cointegration tests' *t*-statistic; F_{PSS} denotes the Pesaran, Shin, and Smith (2001) bounds tests' *F*-statistic. The null hypotheses of BDM and PSS tests are "*No cointegration*". The results of all diagnostic tests are reliable.

Table 3: The Nonlinear ARDL Estimation Results for Import

Variables	Turkey	Mexico	S. Korea	Russia	India	Brazil	China	Indonesia	S. Africa	Argentina	Israel
Short Run-Coefficients											
$\Delta LogM_{t-1}$	-	-	-0.22*** (0.00)	-0.10*** (0.00)	-0.15*** (0.00)	-0.49*** (0.00)	-0.39*** (0.00)	-0.53*** (0.00)	-0.44*** (0.00)	0.35*** (0.35)	-0.22*** (0.00)
$\Delta LogM_{t-4}$	-	-	-	-	-	0.38*** (0.00)	-	0.39*** (0.00)	-0.46*** (0.00)	-	-
$\Delta LogGPR^{+}_{t-1}$	0.13*** (0.00)	-	-	-	-	0.11*** (0.00)	-0.31*** (0.00)	-	0.16*** (0.00)	-	-
$\Delta LogGPR^{+}_{t-2}$	-	-	-	-	-0.20*** (0.00)	0.11*** (0.00)	-0.31*** (0.00)	0.08*** (0.00)	0.14*** (0.00)	0.09*** (0.00)	-
$\Delta LogGPR^{-}_{t}$	-	-	-0.08*** (0.00)	-	-	-	-	0.09*** (0.00)	-	-	0.13*** (0.00)
$\Delta LogGPR^{-}_{t-5}$	0.11*** (0.00)	-	-	-0.06*** (0.00)	-	-	-	-	-	-	-0.14*** (0.00)
$\Delta LogREER_{t}$	-	0.60*** (0.00)	0.72*** (0.00)	0.44*** (0.00)	2.48*** (0.00)	-	-	-	-	-	-
$\Delta LogREER_{t-1}$	0.24*** (0.00)	0.30*** (0.00)	-0.45*** (0.00)	-0.49*** (0.00)	-2.08*** (0.00)	-	-	-	-	-	2.03*** (0.00)
$\Delta LogREER_{t-3}$	-	0.22*** (0.00)	-	-	-	-	-	-0.36*** (0.00)	-1.22*** (0.00)	0.52*** (0.00)	-
$\Delta LogY^{d}_{t}$	0.63*** (0.00)	0.85*** (0.00)	1.07*** (0.00)	-	2.98*** (0.00)	-	-1.85*** (0.00)	-	-	0.39*** (0.00)	1.31*** (0.00)
$\Delta LogY^{d}_{t-1}$	-	-0.93*** (0.00)	-	-	-	0.79*** (0.00)	2.85*** (0.00)	-	-	-	-
$\Delta LogY^{d}_{t-2}$	-	-	-	-	-	-	-	-	-	-0.62*** (0.00)	-
$\Delta LogY^{d}_{t-4}$	-0.31*** (0.00)	-	-	-	-	-	-	-	-	-	-
Long-Run Coefficients											
C	-0.61** (0.03)	-1.64*** (0.00)	-1.08*** (0.00)	-1.83*** (0.00)	-1.33* (0.05)	-1.07*** (0.00)	0.18 (0.65)	-1.51*** (0.00)	-0.34 (0.50)	0.53*** (0.00)	-2.20*** (0.00)
$LogM_{t-1}$	-0.005** (0.01)	-0.20*** (0.00)	-0.06*** (0.00)	-0.11*** (0.00)	-0.14*** (0.00)	-0.07** (0.01)	-0.06*** (0.00)	0.01 (0.92)	-0.13*** (0.00)	-0.01 (0.12)	-0.56*** (0.00)
$LogGPR^{+}_{t-1}$	-0.04*** (0.00)	0.03*** (0.00)	-0.01 (0.11)	-0.09*** (0.00)	-0.03 (0.32)	-0.04* (0.06)	0.11*** (0.00)	0.03** (0.02)	-0.06* (0.05)	0.05*** (0.00)	-0.05** (0.01)
$LogGPR^{-}_{t-1}$	-0.04** (0.01)	0.03** (0.01)	-0.01 (0.12)	-0.09*** (0.00)	-0.01 (0.60)	-0.04** (0.04)	0.10*** (0.00)	0.03** (0.01)	-0.06* (0.05)	0.06*** (0.00)	-0.05** (0.01)
$LogREER_{t-1}$	0.08*** (0.00)	-0.001 (0.95)	0.20*** (0.00)	0.11*** (0.00)	-0.08 (0.56)	0.11*** (0.00)	-0.04 (0.49)	0.19*** (0.00)	0.03 (0.66)	-0.11*** (0.00)	-0.23*** (0.00)
$LogY^{d}_{t-1}$	0.07 (0.00)	0.48*** (0.00)	0.08*** (0.00)	0.37*** (0.00)	0.53*** (0.00)	0.14** (0.01)	0.05 (0.20)	0.16** (0.01)	0.07 (0.16)	0.01 (0.48)	0.93*** (0.00)
Normalized Long-Run Coefficients											
$LogGPR^{+}_{t}$	-0.76* (0.05)	0.18*** (0.00)	-0.28 (0.12)	-0.85*** (0.00)	-0.20 (0.31)	-0.53 (0.14)	1.77** (0.03)	-2.09 (0.91)	-0.47** (0.04)	2.97*** (0.00)	-0.09** (0.01)
$LogGPR^{-}_{t}$	-0.80** (0.04)	0.14** (0.01)	-0.27 (0.13)	-0.84*** (0.00)	-0.11 (0.59)	-0.59 (0.11)	1.63* (0.05)	-2.24 (0.91)	-0.47** (0.04)	3.14** (0.03)	-0.09** (0.01)
$LogREER_{t}$	1.48*** (0.00)	-0.004 (0.95)	3.42*** (0.00)	0.97*** (0.00)	-0.57 (0.55)	1.45*** (0.00)	-0.76 (0.48)	-11.34 (0.92)	0.23 (0.64)	-6.99 (0.37)	-0.42*** (0.00)
$LogY^{d}_{t}$	1.17*** (0.00)	2.31*** (0.00)	1.34*** (0.00)	3.25*** (0.00)	3.67*** (0.00)	1.88*** (0.00)	0.88 (0.18)	-9.31 (0.92)	0.55 (0.11)	1.17*** (0.00)	1.65*** (0.00)
Diagnostic Tests											
R^2	0.53	0.89	0.77	0.75	0.52	0.71	0.57	0.71	0.70	0.53	0.64
$\bar{R}^2$	0.51	0.89	0.77	0.75	0.50	0.71	0.56	0.70	0.70	0.51	0.63
F	21.54 (0.00)	290.09 (0.00)	116.30 (0.00)	103.53 (0.00)	36.28 (0.00)	84.16 (0.00)	44.66 (0.00)	80.89 (0.00)	79.91 (0.00)	37.56 (0.00)	59.66 (0.00)
DW	1.83	1.81	1.96	2.08	2.24	1.99	1.99	1.91	2.30	1.96	1.93
χ^2_{SC}	0.01 (0.99)	4.05 (0.11)	1.05 (0.25)	2.08 (0.22)	3.25 (0.15)	2.80 (0.18)	3.75 (0.18)	1.97 (0.25)	3.76 (0.17)	3.92 (0.13)	1.08 (0.65)
χ^2_{FF}	0.90 (0.34)	1.44 (0.20)	1.59 (0.21)	1.55 (0.20)	0.46 (0.49)	3.42 (0.30)	1.07 (0.22)	5.02 (0.28)	0.82 (0.36)	6.30 (0.12)	1.53 (0.21)
χ^2_{NOR}	3.77 (0.30)	2.52 (0.44)	1.75 (0.38)	1.44 (0.43)	1.54 (0.42)	3.13 (0.20)	3.44 (0.26)	5.66 (0.17)	5.06 (0.22)	4.25 (0.37)	2.69 (0.43)
χ^2_{HET}	2.53 (0.81)	5.61 (0.28)	2.85 (0.15)	2.85 (0.15)	2.14 (0.85)	1.23 (0.91)	0.98 (0.87)	5.39 (0.31)	2.78 (0.78)	7.89 (0.36)	1.49 (0.71)
F_{PSS}	15.17 (0.00)	4.09 (0.07)	4.03 (0.01)	5.96 (0.00)	5.68 (0.00)	2.94 (0.03)	5.78 (0.00)	9.20 (0.00)	7.06 (0.00)	3.68 (0.01)	4.89*** (0.00)
t_{BDM}	-8.11 (0.00)	-4.83 (0.06)	-5.17 (0.04)	-6.27 (0.00)	-5.05 (0.03)	-2.46 (0.04)	-3.87 (0.01)	-4.55 (0.00)	-5.56 (0.00)	-2.91 (0.03)	-3.09 (0.00)
W_{LR}	0.04 (0.20)	0.03 (0.15)	-0.008 (0.49)	-0.01 (0.40)	-0.09 (0.20)	0.06 (0.17)	0.13 (0.15)	1.50 (0.91)	0.001 (0.89)	-0.17 (0.32)	-0.0005 (0.12)

Note: ***, **, and * denote statistical significances at the 1%, 5%, and 10% levels, respectively. The values in parentheses are prob. W_{LR} is the long-run Wald tests. DW denotes the Durbin–Watson autocorrelation test; χ^2_{SC} is the Breusch–Godfrey LM test for autocorrelation; χ^2_{NOR} is the Jarque–Bera test for normality; χ^2_{FF} is the Ramsey test for functional form misspecification; χ^2_{HET} denotes the Breusch–Pagan–Godfrey heteroscedasticity test. t_{BDM} is the Banerjee, Dolado, and Mestre (1998) cointegration tests' t-statistic; F_{PSS} denotes the Pesaran, Shin, and Smith (2001) bounds tests' F-statistic. The null hypotheses of BDM and PSS tests are "*No cointegration*." All the results of the diagnostic test are reliable.

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According to the findings presented in Table 2, in the short term, geopolitical risks, real effective exchange rate, and world income might affect the countries' exports in different directions. However, in the long term[5], shocks that increase geopolitical risks decrease exports in Turkey, Russia, China, South Africa, Argentina, and Israel, whereas shocks that reduce the GPR increase exports in Russia, China, South Africa, Argentina, and Israel. Among these countries, the following are the possible reasons behind the result of the following countries: for Russia, economic enforcements that are occasionally applied by the European countries against it due to the policies that it has implemented in Ukraine, Chechenia, and the Middle East; for China, it is the economic pressures that are applied by the US due to exchange rate policies of China; for Israel, boycotts that are occasionally applied by Turkey and Arabic countries to its products due to its use of disproportionate force on the Palestinians. To increase their exports, these countries should try to decrease their GPR levels. We find that GPR does not have any statistically significant effect on export in Mexico, South Korea, India, Brazil, and Indonesia, and these results are due to the following reasons: for Mexico, the low demand flexibility of the US citizens toward cheap Mexican goods; for South Korea, it exports high-tech products; for Brazil, it is a natural resource exporter. According to the W_{LR} test, the effects of geopolitical risks on export are symmetrical in Turkey, Russia, South Africa, Argentina, and Israel, whereas they are asymmetrical in other countries.

Consistent with the theory of economics, increases in the real effective exchange rate decrease exports in Turkey, Mexico, India, China, Indonesia, South Africa, Argentina, and Israel. Then, these countries might increase their exports by following competitive exchange rate policies. The increase in world income is based on the increase in the exports of all countries, and the highest effect is observed in Brazil.

The results of the nonlinear ARDL approach for import, normalized long-run coefficients, and diagnostic tests are presented in Table 3.

According to the findings presented in Table 3, in the short term, geopolitical risks, real effective exchange rate, and world income affect the imports of the countries in different directions. In the long term, factors that increase geopolitical risks reduced imports in Turkey, Russia, South Africa, and Israel, whereas they increased imports in Mexico, China, and Argentina. We find that protectionist policies have gained importance in countries where import decreases against an increase in GPR, whereas policies that provide supply security have gained importance in countries where import increases against an increase in GPR. By using the test, we find that the effects of geopolitical risks on import are symmetrical in all countries.

The increase in real effective exchange rate increased imports in Turkey, South Korea, Russia, Brazil, and Indonesia, which is consistent with the theory of economics, whereas it decreased imports in Argentina and Israel, which is contrary to the theory of economics. Therefore, Turkey, South Korea, Russia, Brazil, and Indonesia can decrease their imports by depreciated their national currency. The increase in countries' national incomes statistically significantly increases the imports in the countries, excerpt for China[6], Indonesia, and South Africa.

CONCLUSIONS

In this study, the effects of geopolitical risks on countries' trade flows are examined with the nonlinear ARDL method by using the monthly data of 11 countries whose regular data could be accessed from January 1993 to August 2021. According to the findings, in the short term, geopolitical risks, real effective exchange rate, and world income affect the exports and imports of the countries in different directions. However, in the long term, positive geopolitical risk shocks reduced exports in Turkey, Russia, China, South Africa, Argentina, and Israel, whereas they reduced imports in Turkey, Russia, South Africa, and Israel. The shocks that decreased GPR increased export in Russia, China, South Africa, Argentina, and Israel, whereas they increased imports in Mexico, China, and Argentina. It was determined that the effects of geopolitical risks on exports are symmetrical in Turkey, Russia, South Africa, Argentina, and Israel, whereas they are asymmetrical in Mexico, South Korea, India, Brazil, China, and Indonesia. Moreover, the effects of geopolitical risks on imports are symmetrical in all countries. Increases in the real effective exchange rate decreased exports in Turkey, Mexico, India, China, Indonesia, South Africa, Argentina, and Israel, whereas they increased imports in Turkey, South Korea, Russia, Brazil, and Indonesia and decreased imports in Argentina and Israel. Increases in the world income increased exports of all countries, whereas an increase

[5] According to the normalized long-term coefficients.

[6] The increase in national income in China is expected to increase import more in the future. Because there are rapidly increasing number of middle-income people (more than 400 million) and their disposable income in China (Siqi, 2020), it is possible that these people will be inclined to luxury imported consumption goods in the near future, thereby increasing the China's total imports (Zipser and Poh, 2020).

in the countries' own national income increased imports in Turkey, Mexico, South Korea, Russia, India, Brazil, Argentina, and Israel.

Within the framework of these results, particularly for developing countries, it will be useful to decrease their geopolitical risks to be able to organize their foreign trade flows positively. To minimize the effects of geopolitical risks that are not under their own control, it will be a wise approach for countries to focus on producing and selling high-tech products with low external demand flexibility. To be able to avert the effects of geopolitical risks on import fluctuations, these countries should establish solid supply chains in production and consumption and apply resource diversifications, especially in areas, such as energy, food, and health materials (e.g., the COVID-19 vaccine).

Pursuing policies to decrease real effective exchange rates will positively affect the countries' external trade competition powers. Thus, it will be helpful to keep the value of their national currencies and general price levels at low levels. However, it is difficult to improve foreign trade in the long run only with the implementation of foreign exchange policies. Moreover, for the governments, consciously keeping the foreign exchange rates at high levels might also bring international discussions and problems, as in the case of China and the US. In addition, it should be also remembered that high foreign exchange rates decrease the purchasing power of the residents and make them relatively poor. Therefore, it will be more appropriate for countries to concentrate on the production of high-value-added products.

The additional export opportunities that are provided by the increase in world income should be also utilized. Thus, countries should plan their production according to the business cycles related to the world economic growth in order not to miss the possible opportunities. To achieve this purpose, the Baltic Dry Index, which measures the dry bulk transportation cost in the world, can be followed as a leading indicator of future direction in the economy.

In addition to the increase in national income, countries should control their imports and current account deficits for them not to increase extremely, since an extreme increase in current account deficit can drag the countries into an economic crisis. Therefore, taxes on the import of final consumption goods can be increased to direct demand toward domestic goods, and external dependence on the production inputs of energy, intermediate goods, and capital goods can be minimized.

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