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The Impact of Domestic and Global Risk Factors on Turkish Stock Market: Evidence from the NARDL Approach

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ABSTRACT
The study investigates the short-run and long-run asymmetric effects of the global economic policy uncertainty, real oil prices, and country-specific geopolitical risk on real stock returns in Turkey by using the nonlinear autoregressive distributed lag (NARDL) framework over the pre-COVID -19 period of 1997:01–2019:12 and full-sample period of 1997:01–2020:12. The empirical findings indicate the following results. Firstly, global economic policy uncertainty leads to depress real stock returns for both sample periods. Secondly, negative real oil price changes, in the long run, have relatively greater effects compare to positive changes on real stock returns, whereas positive oil price changes affect negatively in the short-run for the full-sample period. Thirdly, the country-specific geopolitical risk exerts positive effects on the real stock returns in the long run for both periods. The overall results suggest that the Turkish real stock returns react more to the bad news caused by the global factors than the domestic one.

KEYWORDS
Economic policy uncertainty; stock returns; geopolitical risks; oil prices; non-linear ARDL; Turkey

JEL CLASSIFICATION
C14; D80; E32; E44; O52; Q43

1. Introduction

Over the last decades, there is a growing body of both theoretical and empirical literature focusing on explaining the risk-return relationship in the capital market and the stock market behavior in response to risk factors. The conventional finance theories posit that stock market investors are rational and use all available information to properly assess probabilities and consequences of different events or risk factors.[1] On the contrary, behavioral finance theories postulate that psychological and sociological issues affect the decision-making process of economic agents. Empirical behavioral finance literature provides plausible explanations about the investor sentiment and investors' willingness to hedge against uncertainties about the state of the economy that makes stock market return underreact or overreact to good news or bad news (Barberis, Shleifer, and Vishny 1998; Daniel, Hirshleifer, and Subrahmanyam 1998; Veronesi 1999; among others). For instance, Narayan (2020a) and Phan and Narayan (2020) discuss that as with any unexpected news such as the coronavirus pandemic (COVID-19), markets over-react and as more information becomes available and people understand the ramifications more broadly the market corrects itself. Therefore, this study aims to examine how domestic and global risk factors such as the global economic policy uncertainty, real oil prices, and country-specific geopolitical risks affect Turkish stock market returns in the pre-COVID-19 and full-sample periods. These domestic, as well as global risk factors, are driven by such events,[2] may create a sense of unstable economic, financial and political environment, especially fragile emerging economies such as Turkey that has high levels of current-account deficit (exceeding 6% of GDP) and heavy dependence on capital inflows due to the insufficiency of domestic savings. Thus, it is expected that

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raising in both domestic and global uncertainties may contribute to the Turkish stock market turmoil through heightening stock market investment risk and also affect both domestic and foreign investors' perception of risks and confidence regarding the Turkish economy.

Economic policy uncertainty (EPU) is one of the important global risk factors that affect stock market return since it seems to be both push and pull factors[3] that lead to capital flows due to increasing integration in the global financial markets. The effect of EPU on stock returns is expected to be negative that can be explained with the theory of wait-and-see business cycles proposed by Bloom (2014). He argues that there is a negative correlation (countercyclical) between indicators of the business cycle and proxies of uncertainty in the minds of consumers, managers, and policymakers about possible futures. Pástor and Veronesi (2013) also posit that economic policy uncertainty hurts stock market returns by creating a dilemma in investors' minds, stopping them from investing in the stock market which may result in a potential stock market crash. Besides, the failure of investors to assess the effects of uncertainty, regarding the potential systematic risk factors, results in the withdrawal of investment to reduce investment risk and the anxiety of income loss. Thus, investor risk assessment of the effects of uncertainty urges investors to ask for a higher margin of the risk premium for taking such an investment risk at specific volatility. However, Brogaard and Detzel (2015) point out that the effect of economic policy uncertainty on stock returns/prices can be positive since the EPU causes to increase risk premium. Their findings imply that the U.S. policy uncertainty is an important risk factor and policy uncertainty positively forecasts log excess stock market returns in S&P500. Also, the findings of Donadelli (2015) show that the impact of the U.S. policy uncertainty on Asian stock market returns is not significant or weakly positive. From the empirical point of view, Phan, Sharma, and Tran (2018) argue that the effect of economic policy uncertainty on the stock market return can be asymmetric because of good or bad news. Some recent empirical studies documented that there is an asymmetric relationship between the U.S. policy uncertainty and stock price/returns. These empirical studies include Ko and Lee (2015), Dakhlaoui and Aloui (2016), Liang, Troy, and Rouyer (2020), among others. But, few studies investigated the impact of global economic policy uncertainties[4] on the stock market returns. For instance, Balcilar et al. (2019) provide strong evidence of causality from the domestic and global EPUs for stock return volatility of Malaysia, and South Korea except for Hong Kong. Also, Li et al. (2020) examine the effect of both domestic EPU and global economic policy uncertainty (GEPU) on Chinese stock market volatility and their results indicate that changes in the GEPU may lead to higher stock market volatility when the GEPU and EPU rise in the same month. Hoque and Zaidi (2020a) document the asymmetrical relationship between the GEPU and Malaysian stock market returns and their findings reveal that the impact of global policy uncertainty on Malaysian stock market returns is negative.

Oil prices are also considered as a risk factor behind fluctuations in several markets, including financial markets and particular stock markets. Oil prices influence stock returns/prices through several theoretical transmission channels. These transmission channels suggest that oil price changes may affect stock market returns positively or negatively via changing the expected cash flows and/or the discount rate.[5] However, there is no consensus about the sign that can be depending on the net position of the country in the oil market, the state and/or time-dependent, the origin of shock or different market conditions, etc. Bernanke (2016) argues that the positive relationships can arise from the changes in aggregate demand and investors' retreat from commodities as well as stocks during periods of high uncertainty and risk aversion. Previous studies (Basher and Sadorsky 2006; Jones and Kaul 1996; Nandha and Faff 2008) report a negative link between stock returns and oil price shocks while others find a positive relationship (Arouri and Rault 2012; Narayan and Narayan 2010; Wen, Bouri, and Cheng 2019) for oil-importing countries. Hatemi-J, Shayeb, and Roca (2017) note that there could be asymmetry in the relationship between oil prices and stock returns/prices under the conditions of good news and bad news. For example, Ajmi et al. (2014) conclude that there exists a nonlinear causality relationship between oil prices and stock returns in MENA countries. Sadorsky (1999) finds that oil price shocks have asymmetric effects on stock returns, specifically, positive oil price changes have a greater impact on the U.S. stock returns than negative oil-price changes. Siddiqui, Mahmood, and Margaritis (2020) also support evidence that positive oil price changes lead to greater effects in the oil-importing countries. But, Narayan and Gupta (2015) provide an evidence that negative oil prices move the U.S. stock returns more than do positive oil prices. Driesprong, Jacobsen, and Maat (2008) find that investors seem to underreact to information in the price of an increase in oil prices lowers future stock returns.

Another risk variable used in the study is the country-specific geopolitical risk index.[6] Caldara and Iacoviello (2018) argue that geopolitical risks play an important role for economic agents such as entrepreneurs, market participants, and central bank officials in determining investment decisions and stock market dynamics. They find that an increase in geopolitical risk leads to depress real economic activity and stock returns, and movements in capital flows away from emerging economies and toward advanced economies. However, some previous empirical studies provide support for the positive or negative significant impacts of the GPR index on stock market returns depending on different volatility regimes, time, etc. For instance, Balcilar et al. (2018) discuss the direction and impact of the GPR may depend on the stock market volatility. Also, they find that the GPR affects stock market volatilities but not returns; thus, the GPR is a driver of bad volatility for the BRICS stock markets. Similarly, Bouras et al. (2019) also confirm that the global GPR has a positive and statistically stronger effect on stock market volatility than country-specific GPRs, and both global and country-specific GPR do not have an impact on stock returns for emerging economies. Rawat and Arif (2018) provide an evidence that Brazilian and Russian funds are more responsive to the country-specific geopolitical shocks than Indian and Chinese funds. Kannadhasan and Das (2020) documented that the impacts of GPR are asymmetric across quantiles and GPR is negatively related in the lower quantiles and positively related in the intermediate and upper quantiles in the Asian emerging stock markets. Also, Hoque and Zaidi (2020b) conclude that the effects of both risk factors on stock market returns are asymmetric and the country-specific GPR influences the stock market returns negatively except for India. Hoque, Wah, and Zaidi (2019) provide an evidence that while geopolitical risk has no significant direct impacts on the Malaysian stock market, its indirect impacts are significant and transmitted through the global economic policy uncertainty and oil shocks channels.

The study contributes to the existing literature in several ways. Firstly, the study extends Hoque, Wah, and Zaidi (2019) in a Factor Augmented VAR (FAVAR) analysis by modeling the asymmetric effects of both domestic and global risk factors on the Turkish stock market by employing the NARDL model. Unlike the linear VAR models, the main advantage of the NARDL framework is that it enables us to capture the short-run and long-run equilibrium adjustment patterns following positive and negative shocks and complex cointegration dynamics among the explanatory variables. Secondly, the study also adds new insights by integrating risk factors into the NARDL model to the existing literature by focusing on Turkey that is an oil-importing emerging country. Thirdly, to the best of our knowledge, this study is one of the first attempts to account for the asymmetry of the risk factors in the Turkish stock market that is important because the behavior of economic agents may respond differently to the new information depending on whether it is good news or bad news.[7] Lastly, some studies analyzed the COVID-19 effects on stock market returns, behavior, and/or volatility (Narayan 2020a, 2020b; Phan and Narayan 2020; Sharif, Aloui, and Yarovaya 2020; among others). As an additional contribution of the current study to the COVID-19 – international finance literature, the study conducts sub-sample and full-sample analysis – before and during the COVID-19 pandemic to access the evolution of the impact of the risk factors on stock returns during the COVID-19 pandemic period.

The remainder of the paper is organized as follows: Section 2 introduces empirical methodology. Then, section 3 describes the data and preliminary analysis. Section 4 presents the empirical results and discussions. Finally, section 5 summarizes and concludes with the policy implications.

2. Empirical Methodology

The study examines the effects of domestic and global risk factors on Turkish stock market returns by employing the arbitrage pricing theory model (APT, Ross 1976) within the NARDL framework proposed by Shin, Yu, and Greenwood-Nimmo (2014). This approach provides a more comprehensive insight into the existence of potential short and long-run asymmetric effects of the positive and negative shocks in the global economic policy uncertainty index (GEPU), real oil prices (ROILP), and the country-specific geopolitical risk index (GPR) on real stock returns (RBIST) in Turkey. As noted earlier, it is important to account for the asymmetry of these risk factors on stock returns since it is expected that the reaction of economic agents to good and bad news may vary. The main advantage of this approach is that it enables us not only to capture the positive and negative changes in the explanatory variables via partial sums but also to detect hidden cointegration (Granger and Yoon 2002). The NARDL framework is an asymmetric extension of the linear autoregressive distributed lag (ARDL) cointegration model. The traditional unrestricted error-correction model in the linear ARDL model developed by Pesaran, Shin, and Smith (2001) without short-run and long-run asymmetries can be expressed in equation 1 as follows:

$$\Delta y_t = \alpha + \theta y_{t-1} + \delta x_{t-1} + \sum_{i=1}^{p-1} \pi_i \Delta y_{t-i} + \sum_{i=0}^{q-1} \mu_i \Delta x_{t-i} + \varepsilon_t \tag{1}$$

where α denotes intercept. The parameters of μ_i and π_i and the parameters of δ and θ represent the short and the long-run coefficients, respectively. The ε_t denotes the error term.

To examine the asymmetric effect, the nonlinear asymmetric long-run co-integrating regression in the NARDL model takes the following form:

$$y_t = \sigma^+ x_t^+ + \sigma^- x_t^- + u_t \tag{2}$$

In equation 2, $\sigma^+$and σ^- represent the long-run coefficients of the vector of regressors (x_t) which can be decomposed as $x_t = x_0 + x_t^+ + x_t^-$. The decomposition of the independent variable x_t into its positive changes $\left(\Delta x_t^+\right)$ and negative changes $\left(\Delta x_t^-\right)$ are the partial sum process that can be specified as in equation 3:

$$x_t^+ = \sum_{i=1}^{t} \Delta x_i^+ = \sum_{i=1}^{t} \max(\Delta x_i, 0) \text{ and } x_t^- = \sum_{i=1}^{t} \Delta x_i^- = \sum_{i=1}^{t} \min(\Delta x_i, 0) \tag{3}$$

The asymmetric error correction model can be obtained by associating equation 2 to the linear ARDL model in equation 1. Then, the general form of the NARDL model can be expressed as follows:

$$\Delta y_t = \alpha + \theta y_{t-1} + \delta^+ x_{t-1}^+ + \delta^- x_{t-1}^- + \sum_{i=1}^{p-1} \pi_i \Delta y_{t-i} + \sum_{i=0}^{q-1} \left(\mu_i^+ \Delta x_{t-i}^+ + \mu_i^- \Delta x_{t-i}^-\right) + \varepsilon_t \tag{4}$$

where $\delta^+ = -\theta\sigma^+$ and $\delta^- = -\theta\sigma^-$. In equation 4, $\mu_i^+$and μ_i^- denote the positive and negative short-run adjustments to changes in the explanatory variable x_t.

Equation 4 represents the short- and long-run asymmetric effects of the GEPU, ROILP, and GPR on real stock returns in Turkey. Following Shin, Yu, and Greenwood-Nimmo (2014), some steps should be done before the estimation of the NARDL model in equation 4. The first step is to apply unit root tests to be sure that the variables used in the model are not I (2). Second is the estimation of equation (4) with standard ordinary least squares (OLS). Third, the bounds test approach is used to search for the asymmetric long-run relationship among the levels of the series y_t, x_t^+ and x_t^- by employing the F-statistics (F_{PSS}) and t-statistics (t_{BDM}) proposed by Pesaran, Shin, and Smith (2001) and Banerjee, Dolado, and Mestre (1998) respectively. The F_{PSS} is used to test the joint null hypothesis of no cointegration against the alternative of cointegration. It can be specified as

$$H_0 : \theta = \delta^+ = \delta^- = 0 \textit{ versus } H_1 : \theta \neq \delta^+ \neq \delta^- \neq 0 \tag{5}$$

Additionally, the t_{BDM} is conducted to test the long-run cointegration relationship defined by the joint null hypothesis of $H_0 : \theta = 0$ against $H_1 : \theta < 0$. Fourth, the Wald test is employed to assess the null hypothesis of$\delta^{+} = \delta^{-}$ and $\sum_{i=0}^{q-1} \mu^{+} = \sum_{i=0}^{q-1} \mu^{-}$ for the long and short-run symmetry respectively. If the rejection of both null hypotheses of the short-run and long-run symmetry occurs, the nonlinear ARDL model can take the following form:

$$\Delta y_t = \alpha + \theta y_{t-1} + \delta x_{t-1} + \sum_{i=1}^{p-1} \pi_i \Delta y_{t-i} + \sum_{i=0}^{q-1} \left(\mu_i^{+} \Delta x_{t-i}^{+} + \mu_i^{-} \Delta x_{t-i}^{-} \right) + \varepsilon_t \tag{6}$$

$$\Delta y_t = \alpha + \theta y_{t-1} + \delta^{+} x_{t-1}^{+} + \delta^{-} x_{t-1}^{-} + \sum_{i=1}^{p-1} \pi_i \Delta y_{t-i} + \sum_{i=0}^{q-1} \mu_i \Delta x_{t-1} + \varepsilon_t \tag{7}$$

Equations 6 and 7 represent the short and long-run asymmetry in the cointegrating NARDL model respectively. Fifth, the effect of the positive and negative cumulative dynamic multipliers associated with unit changes in x_t^{+} and x_t^{-} on explanatory variable y_t in the NARDL model can be derived as follows:

$$m_h^{+} = \sum_{j=0}^{h} \frac{\partial y_{t+j}}{\partial x_t^{+}} \quad and \quad m_h^{-} = \sum_{j=0}^{h} \frac{\partial y_{t+j}}{\partial x_t^{-}} \tag{8}$$

where $(h = 0, 1, 2, \ldots)$. For the equation 8, if $h \to \infty$, then $m_h^{+} \to \sigma^{+}$and $m_h^{-} \to \sigma^{-}$, the long-run coefficients of $\sigma^{+}$and σ^{-} with respect to the positive and negative changes of the independent variables are calculated as $\sigma^{+} = -\frac{\delta^{+}}{\theta}$ and $\sigma^{-} = -\frac{\delta^{-}}{\theta}$.

3. Data and Preliminary Analysis

The study uses monthly data covering the pre-COVID-19 period of 1997:01–2019:12 and full-sample period of 1997:01–2020:12 to estimate the effects of the GEPU, ROILP, and GPR on real stock returns in Turkey. In the study, real oil prices is derived by multiplying the oil price and the exchange rate (national currency per US dollar) deflated by the consumer price index of Turkey. Real stock returns are calculated as the difference between continuously compounded returns on the stock price index and the inflation rate proxied by the growth in the same period of the previous year of the consumer price index of Turkey. All the variables used in the study that are expressed in natural logarithm are the Borsa Istanbul share price index (BIST), the global economic policy uncertainty index, the geopolitical risk index for Turkey, and the oil prices (Europe Brent Spot Price FOB (Dollars per Barrel)). The monthly data is downloaded from the databases of the Central Bank of the Republic of Turkey (CBRT), the US Energy Information Administration (EIA), the Organization for Economic Co-operation and Development (OECD), and the website of policy uncertainty (http://www.policyuncertainty.com).

The summary statistics presented in Table 1 show that the highest mean and median values are observed in the LGEPU and LGPR. In Table 1, the skewness value for the LRBIST and LROILP time series is negative, indicating the two series are long left-tailed, whereas the LGEPU and LGPR time series exhibit positive skewness, which shows the LGEPU and LGPR time series are long right-tailed. All the series have an approximate kurtosis value of three (3) indicating a mesokurtic property. However, according to the Jarque-Bera test, only the LGPR time series has a characteristic of normal distribution.

Table 2 in panel A and B present the results of correlation matrix and variance inflation factor (VIF) to determine the presence of multicollinearity for the full-sample period. The results in Table 2 indicate that there is a positive correlation among the variables and also the values of VIF corresponding to the variables is less than 5. Thus, the overall results imply that there is no problem of multicollinearity.

Table 1. Summary statistics and normality test.

	LRBIST	LGEPU	LROILP	LGPR
Mean	3.290278	4.728983	0.430021	4.706147
Median	4.216486	4.679723	0.481174	4.698386
Maximum	5.397315	6.062468	1.205115	5.528899
Minimum	−1.671728	3.888132	−0.830483	3.826853
Std. Dev.	2.061767	0.458314	0.399040	0.331818
Skewness	−1.025797	0.531257	−0.625821	0.068296
Kurtosis	2.645483	2.735186	3.170204	2.568356
Jarque-Bera	52.01662	14.38875	19.14690	2.459691
Probability	0.000000*	0.000751*	0.000070*	0.292338
Sum	947.6000	1361.947	123.8460	1355.370
Sum Sq. Dev.	1220.004	60.28473	45.69979	31.59958
Observations	288	288	288	288

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

Table 2. Correlation matrix and variance inflation factor.

Panel A: Correlation matrix

Variables	LRBIST	LGEPU	LROILP	LGPR
LRBIST	1			
LGEPU	0.454848	1		
LROILP	0.733361	0.313605	1	
LGPR	0.261225	0.324662	0.096164	1

Panel B: Variance inflation factor (VIF)

Variables	Coefficient Variance	Uncentered VIF	Centered VIF
LGEPU	0.034201	132.4597	1.228336
LROILP	0.040737	2.401635	1.109119
LGPR	0.059379	226.7667	1.117869
C	1.424021	244.3352	NA

The absolute value of correlation coefficient in Panel A is less than 0.8, it shows collinearity is very less likely to exist. The value of VIF in Panel B is $1 < VIF < 5$; it indicates that the variables used in the study are moderately correlated to each other.

Figure 1 presents the time-series graphs of the data used in the study. In Figure 1, the LGEPU, LROILP, and LGPR exhibit remarkably high variation over time, especially from 1997 onwards. Turkish stock market returns have experienced an upward trend over the whole sample period.

Table 3 reports the results of the ADF with structural break and the Zivot and Andrews (1992) unit root tests to determine the order of integration at the level and first difference under the assumption of the presence of intercept. The LGEPU, LROILP, and LGPR are level stationary while the LRBIST is stationary at the first differences.

Besides the ADF with structural break and the ZA unit root tests, sharp and smooth breaks unit root test (SOR) is also used in the study to determine the robustness of the unit root analysis and also to examine the integrating properties of the variables. Different from most of the traditional unit root tests, the SOR unit root test proposed by Shahbaz, Omay, and Roubaud (2018) provides a flexible testing procedure in detecting sharp and smooth breaks simultaneously in the series since ignoring the presence of structural breaks may lead to biased estimates[8]. Table 4 shows the empirical results of the SOR unit root test. The SOR unit root test also confirms that the LGEPU, LROILP, and LGPR are level stationary while LRBIST is stationary at the first differences.

Overall results in Tables 3 and 4 provide a strong justification to proceed by applying the NARDL model since the dependent variable is I (1) and all the variables are not found to be I (2).[9]

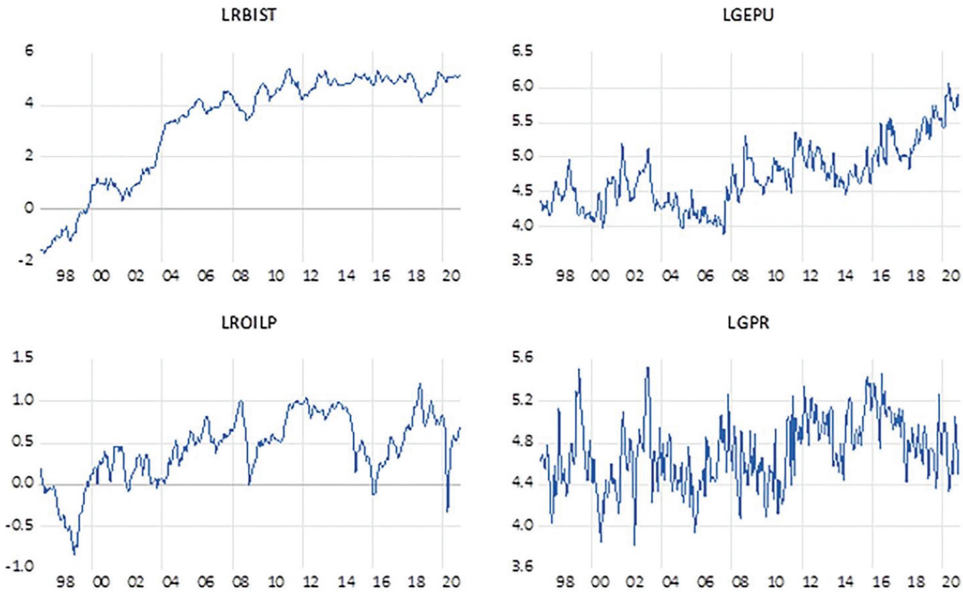

Figure 1. The figure plots the BIST real stock returns, the LGEPU, LROILP, and LGPR over the period 1997–2020.

Table 3. ADF unit root test with structural break and Zivot-Andrews unit root test results.

	Test Statistics				
Variables Full-sample (1997:01–2020:12)	*Level (Intercept)*	*First difference (Intercept)*	*Level*	*First difference*	*Decision*
ADF Unit Root Test with Structural Break					
LRBIST	−3.934778 (0) (−4.443649)	−15.76095 (0) (−4.443649)	2002M09	2011M05	I(1)
LGEPU	−4.958023 (0) (−4.443649)	−19.99972 (0) (−4.443649)	2015M12	2016M11	I(0)
LROILP	−4.638402 (1) (−4.443649)	−14.50681 (0) (−4.443649)	1999M02	2020M04	I(0)
LGPR	−9.314326 (0) (−4.443649)	−22.92056 (0) (−4.443649)	2011M01	1998M02	I(0)
Zivot-Andrews Unit Root Test					
LRBIST	−3.793287 (1) (−4.93)	−15.40292 (0) (−4.93)	2003M04	2006M02	I(1)
LGEPU	−5.918123 (1) (−4.93)	−13.15298 (2) (−4.93)	2003M04	2003M04	I(0)
LROILP	−5.459819 (1) (−4.93)	−9.817828 (3) (−4.93)	2014M10	2016M03	I(0)
LGPR	−5.948069 (3) (−4.93)	−10.80055 (4) (−4.93)	2011M02	2006M02	I(0)

The numbers in parentheses indicate the lag length and critical values at a 5% significance level respectively. The optimal lag structure is chosen based on the Schwarz information criterion (SIC).

4. Empirical Results from the NARDL Model

Table 5 in panel A reports the results of the bounds test procedure for cointegration between BIST real stock returns and the explanatory variables of the GEPU, ROILP, and the LGPR for the pre-COVID-19 period and full-sample period. The F_{PSS} and t_{BDM} statistics indicate that there is a long-run asymmetric cointegration between real stock returns and the explanatory variables at a 5% significance level for both sample periods.

Then, the Wald test is applied to test for the asymmetry between the variables in the short-run and the long-run. Table 5 in panels B and C shows the Wald test results to see the null hypothesis of the

Table 4. SOR sharp-smooth structural break unit root test results.

	t-statistics			*Critical Values*			
Variables Full-sample (1997:01–2020:12)	*Level (Intercept)*	*First difference (Intercept)*	*Frequency*	1% significance level	5% significance level	10% significance level	*Decision*
SOR Sharp-Smooth Structural Break Test							
LRBIST	−3.22 (2)	−11.57 (7)*	K = 2	−5.065	−4.528	−4.233	I(1)
LGEPU	−5.02 (2)*	−13.17 (5)	K = 4	−5.042	−4.435	−4.099	I(0)
LROILP	−5.48 (4)*	−12.63 (4)	K = 5	−4.987	−4.342	−4.019	I(0)
LGPR	−8.34 (5)*	−15.84 (5)	K = 7	−5.0064	−4.2419	−3.9039	I(0)

The numbers in parentheses indicate the frequency (K). "*" and "**" denote critical values at 1% and 5% significance levels, respectively. The values of SOR test for *ModelA* : $\widehat{\varepsilon_t} = y_t - \widehat{\alpha_1} - \widehat{\alpha_2} F_1(\hat{\gamma}, \hat{\tau})$ proposed by Shahbaz, Omay, and Roubaud (2018) is used for the hypothesis of unit root testing against the critical values.

Table 5. Bounds test for cointegration and the Wald tests results.

Panel A: Bounds test for cointegration			
Dependent Variable	F-statistics (F_{PSS})	t-statistics (t_{BDM})	Outcome
PRE-COVID SAMPLE (1997–2019) LRBIST = f (LGEPU, LROILP, LGPR)	5.346598*	−4.663333*	Cointegration
FULL SAMPLE (1997–2020) LRBIST = f (LGEPU, LROILP, LGPR)	4.629129*	−4.480653*	Cointegration
Panel B: the Wald tests for the short-run asymmetry			
Variables	WSR_{LGEPU}	WSR_{LROILP}	WSR_{LGPR}
PRE-COVID SAMPLE (1997–2019)	−0.8717 (0.3842)	−0.1108 (0.9119)	−1.2047 (0.2294)
FULL SAMPLE (1997–2020)	−0.7414 (0.4591)	−2.0662 (0.0398)*	1.5931 (0.1124)
Panel C: the Wald tests for the long-run asymmetry			
Variables	WLR_{LGEPU}	WLR_{LROILP}	WLR_{LGPR}
PRE-COVID SAMPLE (1997–2019)	−7.2499 (0.0000)*	6.9469(0.0000)*	3.1816 (0.0017)*
FULL SAMPLE (1997–2020)	−6.8766 (0.0000)*	6.5165 (0.0000)*	3.6323 (0.0003)*

Pesaran, Shin, and Smith (2001) tabulate critical values for F_{PSS} test with unrestricted intercept and no trend. The lower and upper bound with k = 3 is 3.23 and 4.35 at the 5% significance level. t_{BDM}refers to the co-integration test statistics by Banerjee, Dolado, and Mestre (1998). For k = 3 is −2.86 and −3.78 at the 5% significance level. *WSR* and *WLR* denote the Wald test for short-run and long-run symmetry that indicates the rejection of the null hypothesis of the short-run and long-run symmetry at the 5% significance level.
"*" represents at the 5% significance level

short-run and the long-run symmetry against the alternative of asymmetry between the BIST real stock returns and the explanatory variables. For the pre-COVID-19 period, the results indicate that the GEPU, ROILP, and LGPR have symmetrical effects on the BIST real stock returns in the short run. On the other hand, the results confirm that in the short run only the ROILP has asymmetrical effects on BIST real stock returns for the full-sample period. In the long run, the GEPU, ROILP, and LGPR have asymmetrical effects on BIST real stock returns for both sample periods.

The estimation results for the NARDL model as in equation (4) for the Turkish stock market are presented in Tables 6 and 7.[10] As mentioned earlier, the main focus of the study is to detect the possible existence of both short-run and long-run asymmetries in the response of Turkish stock market returns to positive and negative changes in domestic and global risk factors for two-sample periods. The statistics and diagnostics test in Tables 6 and 7 indicate that there exists no serial correlation in the model and confirms the stability of estimated short-run and long-run parameters. The magnitude of the coefficient of ECT_{t-1} reflects the speed of convergence that is significant with the correct negative sign in both sample periods. Also, the speed of convergence for the pre-COVID -19 period (14%) is higher than full-sample period (10%). Thus, this implies that the process of convergence in the Turkish stock market is comparatively prolonged due to risk factors for the full-sample period. Based on the results reported in Tables 6 and 7, positive changes in the GEPU have significant effects on real stock returns in the long-run for both sample periods. Thus, a 1% increase in GEPU is predicted to decrease the long-run real stock returns by 1.94% and 1.92% respectively. On the other hand, negative changes in the GEPU do not have statistically significant effects on real stock returns in the long run for both sample periods. This finding is consistent with the theoretical argument of Bloom (2014) that the effect of an increase in economic policy uncertainty may lead to decrease stock returns/prices by affecting both expected firms' cash-flows due to increases in discount rates and higher investment risk. Additionally, this result implies that risk-averse investors ask for a high return of risk premium since the heightened economic policy uncertainty leads to ignoring good news in the stock market.[11] This inverse relationship between the GEPU and the real stock returns has also been empirically confirmed with empirical literature such as Hoque and Zaidi (2020a), Liang, Troy, and Rouyer (2020). On the contrary, Li et al. (2020) found that changes in GEPU have positive influences on stock market volatility.

Table 6. The NARDL estimation results for the pre-COVID sample period.

Variable	Coefficient	t-statistics	Prob. values
PRE-COVID SAMPLE (1997–2019)			
Panel A: Short-Run Coefficients on BIST			
ΔGEPU_P	−0.4130	−5.4698	0.0000*
ΔGEPU_N	−0.3091	−3.3988	0.0008*
ΔROILP_P	−0.4079	−2.3855	0.0178*
ΔROILP_N	−0.4342	−2.9354	0.0036*
ΔGPR_P	0.0070	0.0969	0.9229
ΔGPR_N	−0.1072	−1.8134	0.0710**
ECT_{T-1}	−0.149194	−7.380965	0.0000*
Panel B: Long-Run Coefficients on BIST			
LGEPU_P	−1.945915	−7.288122	0,0000*
LGEPU_N	−0.431861	−1.274675	0.2036
LROILP_P	0.737059	2.475886	0.0140*
LROILP_N	−1.699470	−4.070670	0.0001*
LGPR_P	0.567608	2.092161	0.0374*
LGPR_N	0.180571	0.585544	0.5587
Statistics and diagnostics			
$Adj.R^2$		0.215959	
χ^2_{LM}		1.425956 (0,2422)****	
CUSUM and *CUSUMSQ*		Stable	

"*" and "**" indicate the level of significance at 5%, 10% respectively. "***" $Adj.R^2$ represents the estimated value of the adjusted R^2 the coefficient in the model. "****"χ^2_{LM} denotes the Breusch-Godfrey serial correlation LM tests.

Table 7. The NARDL estimation results for the full-sample period.

Variable	Coefficient	t-statistics	Prob. values
FULL SAMPLE (1997–2020)			
Panel A: Short-Run Coefficients on BIST			
ΔGEPU_P	−0.3734	−5.0806	0.0000*
ΔGEPU_N	−0.2878	−3.1470	0.0013*
ΔROILP_P	−0.7937	−3.1613	0.0018*
ΔROILP_N	−0.0360	−0.1555	0.8765
ΔGPR_P	−0.2319	−3.1753	0.0017*
ΔGPR_N	−0.1078	−1.7824	0.0706**
ECT_{T-1}	−0.105546	−5.745094	0.0000*
Panel B: Long-Run Coefficients on BIST			
LGEPU_P	−1.927849	−7.118460	0,0000*
LGEPU_N	−0.404007	−1.171841	0.2424
LROILP_P	0.694708	2.203926	0.0284*
LROILP_N	−1.492343	−3.630653	0.0003*
LGPR_P	0.441937	1.730687	0.0847**
LGPR_N	−0.017833	−0.060364	0.9519
Statistics and diagnostics			
$Adj.R^2$		0.212998	
χ^2_{LM}		1.326070 (0.2040)****	
CUSUM and *CUSUMSQ*		Stable	

"*" and "**" indicate the level of significance at 5%, 10% respectively. "***" $Adj.R^2$ represents the estimated value of the adjusted R^2 the coefficient in the model. "****"χ^2_{LM} denotes the Breusch-Godfrey serial correlation LM tests.

Tables 6 and 7 also show that the positive and negative changes in the ROILP have a statistically significant impact on real stock returns in the long run for both sample periods. Thus, a 1% increase in ROILP causes to increase the real stock returns by 0.73% and 0.69% while a 1% decrease in ROILP causes to increase the real stock returns by 1.69% and 1.49% in the long run. But, a 1% increase in ROILP causes to decrease in the real stock returns by 0.79% in the short-run for the full-sample period.

From both theoretical and empirical point of view, Kilian and Park (2009) and Le and Chang (2015) argue that asymmetric response of stock returns/prices to oil price depends on differences in the oil characteristics of the economy (oil-exporter or oil importer) and the nature of the shock (demand or supply). Siddiqui, Mahmood, and Margaritis (2020) noted that an increase in oil prices is perceived as good (bad) news for oil-exporting (importing) countries and the stock returns/prices are expected to respond positively (negatively). Hatemi-J, Shayeb, and Roca (2017) also point out that stock markets consider an increase (decrease) in oil prices as good (bad) news since they account for an indication of an increase in demand for oil which signifies growth (contraction) in the economy. The result of the study reveals that the BIST real stock returns respond to bad news negatively in the short-run for the full-sample period. This implies that an oil price increase leads to a decrease in the stock returns in the existence of high uncertainty in the short run. The results also indicate that Turkish stock returns reaction to good news (a fall in oil price) events is larger than bad news (a rise in oil price) in the long run for both sample periods. Turkish stock markets probably interpret oil price decreases in the long run as a good signal that stimulates the economy because Turkey is already so dependent on oil. The results are in line with the previous empirical study of Narayan and Gupta (2015). But, it contradicts the findings of Sadorsky (1999) and Siddiqui, Mahmood, and Margaritis (2020).

In addition, Tables 6 and 7 report positive changes in the GPR that have statistically significant effects on the BIST real stock returns in the long run. Thus, a 1% increase in GPR leads to an increase in real stock returns by 0,56% and 0,44% for both sample periods. But, there is no significant long-run effect of negative changes in the GPR on real stock returns. This positive sign may be attributed to the risk-taking behavior of the domestic investors because the GPR data describes low volatility as reported in preliminary analysis. Thus, the result may imply that domestic political uncertainties affect the Turkish stock market positively. This finding can be explained by the fact that domestic investors may not be sensitive to domestic political changes. Thus, they consider country-specific risks as an opportunity to diversify in their portfolios in the case of an uncertain economic and political environment. The results are partially in line with the previous studies of Hoque and Zaidi (2020b) and Gunay (2016). Hoque and Zaidi (2020b) find that the country-specific geopolitical risk has negative effects on Turkish stock market returns only in a high volatility regime. Also, Gunay (2016) finds that the risk level of recent periods in the Turkish stock market is significantly lower than the early regimes, and the risk level trend for all regimes has a negative slope. Also, the results of the study indicate that the Turkish stock market does not respond to political events as significantly as in the past.

5. Concluding Remarks and Policy Implications

This study examines the impacts of the global economic policy uncertainty, real oil prices, and country-specific geopolitical risks on the Turkish stock market by using the NARDL framework for two sample periods. The empirical results confirm the existence of asymmetry in the long-run relationships for both sample periods while only real oil prices exhibit the asymmetry in the short-run for the full-sample period. The main findings of the study are as follows. Firstly, the GEPU asymmetrically influences the real stock market returns in Turkey within our sample periods. The positive shocks depress the real stock returns as it is expected. Thus, it may imply that Turkish stock returns are highly sensitive to the external sources of uncertainties caused by the changes in the GEPU. Secondly, the ROILP has significant effect on the BIST real stock returns. In addition, the BIST real stock return respond to bad news negatively in the short-run for the full-sample period while the reaction to good news dominates the bad news in the long run for both sample periods. Lastly, the GPR has a significantly positive effect in the long run on the BIST real stock returns.

The empirical results suggest that the policymakers should consider the asymmetries in the risk factors to evaluate any policies since the real stock returns react more to the bad news caused by the global factors than the domestic one. Therefore, the policymakers should rather observe the reaction of stock returns/prices indicator for the policy responses to mitigate the effect of the shocks. The findings also confirm that domestic and foreign investors in the Turkish stock market may take a pessimistic stance when risk or uncertainty increases. Thus, they overreact to bad news and underreact to good news. This implies that risk-averse investors need to be compensated.

Notes

1. See Fama (1970) for the Efficient Market Hypothesis (EMH) and Ross (1976) for the Arbitrage Pricing Theory (APT).
2. The Asian economic crisis in 1997, uncertain domestic economic and political environment in Turkey in 2002 and 2016, global financial crisis in 2008–2009, sovereign debt crisis in Europe in 2010–2012, geopolitical tensions and European immigration crisis in 2015, oil supply shocks in 2014–2015, the U.S. Presidential election in 2016, Brexit in 2017 and coronavirus pandemic (COVID-19).
3. Push factors include monetary and prudential policies in systemically large economies and global risk appetite; while pull factors include institutions, policies, and macroeconomic fundamentals, including growth prospects, in recipient countries (See IMF, 2012).
4. See Davis (2016) for Global Economic Policy Uncertainty (GEPU) starts from 1997. The GEPU Index is a GDP-weighted average of national EPU indices for 16 countries that account for two-thirds of global output. Each national EPU index reflects the relative frequency of own-country newspaper articles that contain a trio of terms pertaining to the economy, uncertainty and policy-related matters.
5. See Degiannakis, Filis, and Arora (2017) theoretical transmission mechanisms for the impact of oil price changes to the stock market returns/prices.
6. See Caldara and Iacoviello (2017) for country-specific GPR indexes that are constructed for 18 emerging economies. The GPR indexes reflect the geopolitical events and risks for the specific country.
7. See Hatemi-J (2012) and Narayan (2020b).
8. For more details, see Shahbaz, Omay, and Roubaud (2018).
9. The results for the summary statistics, correlation analysis and unit root tests for the pre-COVID-19 period are not reported due to space considerations and are available upon request.
10. The results for the dynamic multipliers are not reported for brevity. Based on the suggestions of an anonymous referee, an alternative oil price measure (WTI crude oil) is used to estimate the model and also a proximate estimation of the same model is conducted for Indonesia for the robustness. They are available upon request.
11. See, Veronesi (1999)

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