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ANALYSIS OF THE ENERGY PRICES AND GEOPOLITICAL RISK RELATIONSHIP

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Abstract

This study examines the relationship between energy prices and geopolitical risk. However, it was investigated relations between selected non-renewable energy prices and the Geopolitical Risk index (GPR). In the study, the Hatemi-J asymmetric causality relationship was run among brent oil price, gas price and geopolitical risk (GPR) index, geopolitical threats (GPR) index, and geopolitical acts (GPA) index by using monthly data in period of May 1990 and January 2021. Considering the general findings obtained from the study, it has been determined that geopolitical risk discourses have a partial relationship on energy prices. While the increase in geopolitical risk had a positive effect on oil prices, it was observed that the prices did not decrease when the geopolitical risk decreased. While the increase and decrease in geopolitical risk discourses do not explain the increase in gas prices, the increase in gas prices explains the increase in geopolitical Acts. In the light of the findings obtained from the study, it was determined that geopolitical risk is relatively more effective on brent oil prices. Therefore, while this is a benefit for brent oil producers, it is concluded that it does not have the same effect for gas producers.

Keywords: Energy prices, Brent oil, Gas, Geopolitical risk.

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1. Introduction

Although the concept of energy is a popular topic that is followed a lot in today's literature, it may lose its popularity temporarily for tomorrow. However, it is thought that this issue, in which wars broke out for the sake of it, conflicts of interest and rent fights are fought, will continue until the end of the human race. Because the resources used for this non-renewable energy have been obtained from the fossilized body of another living thing. In other words, the source of non-renewable energy is fed from the decayed body of another living thing. Therefore, their fight for an unbeatable source of energy is at the root of death. We dream of using it for energy resources that people do not die for, for the world of the future.

Energy is generally defined as the ability to produce heat obtained from objects under the earth's surface by different methods or by capturing direct sunlight. In the economic definition, the ability of an object, machine or system of materials to work is seen as energy. Looking at the historical development of energy, it is seen that it was used by humans in ancient times to spread heat and light around. Human beings meet basic household needs such as heating and cooking with wood. Because of its abundance and comfort in nature, wood was an important source of energy for humans in ancient times. However, when it was proved that this energy source could not support the growing economies in Europe and America, it turned to coal in the 19th century and to oil and natural gas in the 20th century (Şimşek and Yiğit, 2017:117–18).

Since the industrial revolution, a scare race has been started to have energy resources in the world and this race has caused many wars. There is a direct relationship between world leadership and energy sources. Some of the major crises up to conflict in the last century are the First World War, the Second World War, the Korean Crisis, the Cuban Crisis, the Vietnam War, the Arab-Israel Wars, the Suez Crisis, the First Gulf Operation, the Second Gulf Operation. The concepts of energy geopolitics and energy security have definitely taken place in the formation of some of these crises and in the formation of some of them. Over the past century, the pain of the transition from the coal age to the oil age has been experienced in our world. This period was marked by the effort to seize and control oil reserves. Political and economic power in the world is around the petroleum raw material and basically Britain first and then It has been shaped within the framework of the policies established by the United States of America (Yaşar, 2019:77). In every political regime, politics and economics have faced varying forms: politics affect the economy (Onur, 2004).

After the first oil crisis that took place in 1973, the importance of energy began to be better understood by all countries in around the world. After this date, countries have taken important steps in diversifying energy resources and using alternative energy resources, especially energy importing countries have embarked on various policies for the sustainable use of energy. In the 2000s, investigations to alternative energy gained momentum and began to increase the studies on renewable energy Today, about 20 percent of the energy consumed worldwide is derived from renewable sources (Karagöl and Kavaz, 2017:7–8).

The Geopolitical Risk index (GPR) used in the study was developed by Dario Caldara and Matteo Iacoviello. The index is composed of the number of words on geopolitical risks in 11 leading international newspapers. The GPR index reflects the automatic text search results of electronic archives of 11 national and international newspapers (Caldara and Iacoviello, 2019). The term sets searched for in the articles consist of six word groups. Group 1 cites words associated with explicit statements about geopolitical risk, as well as tensions with the military involving large regions of the world and US involvement. Group 2 includes words that are directly related to nuclear tensions. It includes statements regarding Group 3 threats of war and Group 4 terrorist threats. Finally, 5. and 6. groups considers the media coverage of real negative geopolitical events (as opposed to risks only) that could be expected to lead to increases in geopolitical uncertainty, such as terrorist acts or the beginning of a war. In this study, an index including Geopolitical Threats was used while calculating the geopolitical risk index. In the introduction part of the study, its importance for this index and energy prices is tried to explained.

In the second part of the introduction of the study, the literature summaries made in this field will be presented. In chapter 3, the econometric method and data set used in the study will be shared. In addition, the empirical method used in the study and the findings obtained from the study will be explained. In the conclusion part, the findings obtained from the study will be explained. However, by explaining the contribution of the findings of this study to the literature, the results will be interpreted in terms of investors and policy makers.

2. Literature Review

There are numerous studies have been done in the literature on energy and its component. Also the interest of this in this subject is proof of how important the subject. According to literature review, energy subject was examined relations with other financial variables such as economic growth, stock markets, exchange rates, foreign debt, current account deficit relationship, etc.

There are even studies that examine political effects. In study of Günay (2020), terrorist incidents, which are a component of geopolitical risk, have been examined, and it has been concluded that terrorist risk is more effective than political risk on tourism returns. On the other hand, there are Abdula (2020) studies where oil and gas energy resources are evaluated not only in financial markets, but also within its own established geological infrastructure and system. This study focused the relations among the energy prices (brent oil, gas) and Geopolitical Risk index (GPR) calculated by Caldara and Iacoviello (2019). It is hoped that it will contribute to the literature with this aspect. Literature summaries are given below regarding previous studies investigating their effects on energy prices.

Table 1. Literature Summary

Author	Country-Variable	Method- Date	Results
Kraft and Kraft (1978)	US	Sims method 1947-1974	A unidirectional causality relationship from Gross National Product (GNP) to energy consumption has been found.
Kling (1985)	US Crude oil prices S&P stock market index	Granger causality test 1973-1982	Stock market revenues are negatively correlated with the rise in crude oil prices.
Erol and Yu (1987)	West Germany, United Kingdom, Canada, France, Italy, Japan Economic growth and energy use	Sims method and Granger causality analysis 1950-1982 and 1950-197	Between Italy and West Germany, economic growth While a unidirectional causality relation was found towards energy consumption; Between Canada and Japan, a bidirectional causality relationship was found between economic growth and energy use.
Von et al. (1989)	USA, Japan, Germany, England Interest differences, exchange rates and oil and gold prices, stock market indices	VAR Model October 1986-October 1988	Industry effects between countries are not significant. It is not clearly predicted how stock prices will move relative to other asset prices. Empirical findings on variables such as exchange rate, oil and gold prices are weighted is seen as negative. Finally, there may be little significant impact on daily stock price changes.

Liu (2009)	China Energy use, population growth, economic growth and urbanization	ARDL boundary test and factor decomposition model.	There is one-way causality from urbanization to total energy use in both the short and long term.
Miller and Ratti (2009)	OECD Countries Real stock market index, Brent oil	Johansen Cointegration Method, Vector Error Correction Model 1971: 1 - 2008: 3 months	Oil prices and stock returns are long for OECD countries is in a negative relationship during the period.
Allegret et al. (2015)	Selected 30 countries GDP, Equity price, current balance, exchange rate, oil price, oil production value	VAR model 1980-2011	Due to the nature of demand or supply shocks, oil price shocks have had an impact on international imbalances. They commented that this effect is natural.
Eyüboğlu and Eyüboğlu (2016)	Turkey BIST sector indices, natural gas and oil prices	Johansen Cointegration Test, VECM, Granger Causality 2005:10 - 2015:09, monthly data	Between natural gas and oil prices and industry indices there is a long-term relationship. Considering the short-term dynamics, it is seen that there is a short-term relationship between oil price and Industrial, Stone-Soil, Main Metal, Chemical-Petroleum-Plastic and Forest-Paper-Press indices.
Keleş et al. (2017)	Crude Oil, crude oil futures, (WTI) and Natural Gas price and consumer confidence index components	Granger causality test January 2005 and December 2016, monthly	In the long run, there is a relationship between energy prices and consumer confidence index. Not in the short term.
Huang et al. (2020)	China Brent oil price, Shanghai composite index	Granger causality test 2006: 10-2014: 12 daily data	Both the increase in the price of oil and the decrease in the stock in addition to having significant effects on their returns As a result, the stock market affects the oil price negatively. Also, Compared to the exchange rate, oil prices changes have a greater impact on the stock market
Satrovıc and Muslija (2020)	Tourism energy consumption, economic growth and CO2 emissions, tourist arrivals.	Panel VAR model 1995-2014	There is a one-way causality from economic growth to carbon dioxide emissions. At the same time, the impulse-response analysis shows that the response of carbon dioxide emissions to jolts in economic growth and energy consumption appears positive over the decade.

3. Methodology

3.1.The Aim of the Study and Method, Data

This study aimed to examine the interaction between energy prices and geopolitical risk. However, it was taken considered the energy prices consist of brent oil prices, gas prices obtained from investing.com. For the geopolitical risk variables, it was used Geopolitical Risk indexes (GPR), Geopolitical Threats index(GPRT), Geopolitical Acts index(GPA) prepared by Caldara and Iacoviello (2019) obtained from policyuncertainty.com. On the other hand, Hatemi-J (2012) Asymmetric Causality causality test was conducted between May 1990- January 2021 by using monthly (369) observations data. These dates were determined for the data gap because the widest data range was taken into account for all variables. The data Firstly, Lee- Strazicich Unit Root Test (LS) was used to ensure the stability of the obtained all data. The (LS) test has advantages in terms of determining structural breaks on the dates and beside of that, it was shared with the break dates in table.1

Lastly, the effect of geopolitical risk variables on energy prices will be studied in two ways. In addition, it will tested the existence of a relationship between each energy prices and Geopolitical Risk indexes. The abbreviated variables for the study are presented below.

Table 2. Data Set

Variable	**Variables Description**	**Time Period**	**Period of Dates**	**Source of Datas**
GPR	Geopolitical risk index	May 1990 January 2021	Monthly	policyuncertainty.com
GPRT	Geopolitical threats			
GPA	Geopolitical Acts			
BRENT	Brent oil price			www.investing.com
GAS	Gas price			

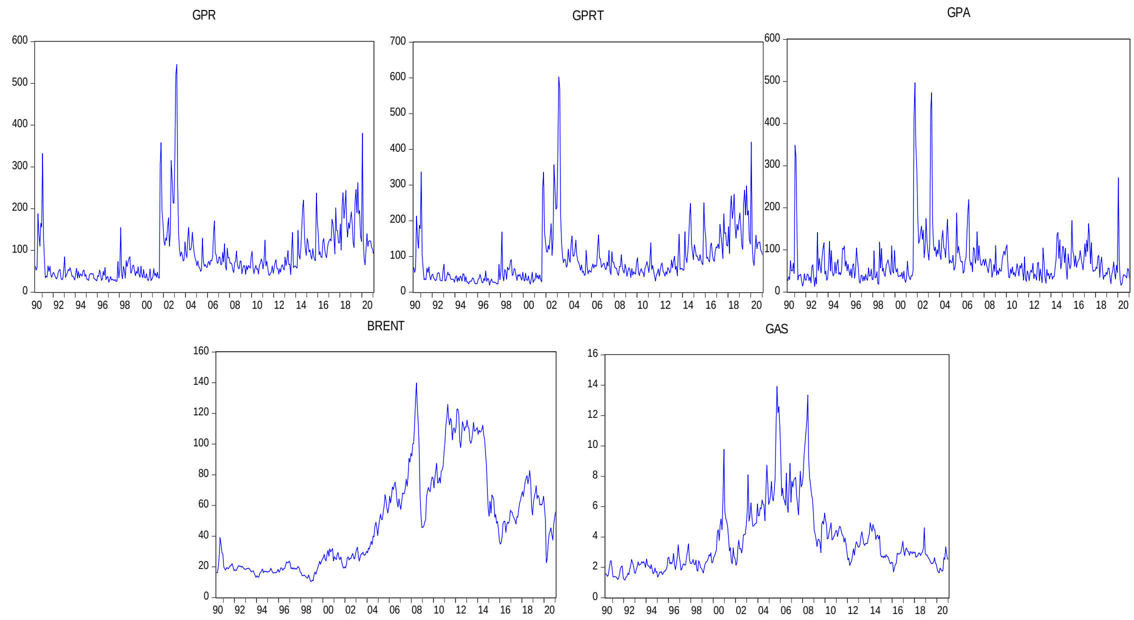

Figure 1. *Charts of Series*

3.2.The Research Hypotheses

In the research, two hypotheses have been established that question the existence of a causality relationship between the variables. These hypotheses established for study are as follows.

H_0: There is no causal relationship between GPR, GPRT, GPA and BRENT, GAS.

H_1: There is causal relationship between GPR, GPRT, GPA and BRENT, GAS.

3.3.Lee-Strazicich Unit Root Test

In time series analyzes, the fact that the variable is stationary (not unit-rooted) or not (unit-rooted) is very important for the continuation of the analysis. It will not be possible to examine other movements of non-stationary variables and this will not be able to generalize the time series to other periods. For this reason, time series that are not in a stationary state will not have an applicable value for estimation purposes. If there is more than one non-stationary time series, the regression analysis with these time series will be fake or meaningless (Gujarati 2016:320).

In time series, ADF (1981), Phillips and Perron (1988), Elliot, Rothenberg and Stock (1996), Ng and Perron (1995), Ng and Perron (2001), KPSS (1992) unit root tests have been developed to test the stationarity (Iltas and Demirgünes 2020:350–51). While choosing the appropriate model, the features of the time series are determined at the first stage. Time series are divided into two as stationary series and non stationary series. This distinction is very important for time series analysis. Because the series must be stationary in order to be tested in probability theory. However, in practice, it is seen that the series are generally not stationary, that is, they are unit rooted. In such cases, it is ensured that the series become stable by taking the differences of the series (Yurdakul 2000:31).

Zivot and Andrews (1992) and Lumsdaine and Papell (1997) have alternative hypotheses stating that the series is stationary (without unit root) with structural breaks, despite the basic hypothesis that the series without structural break is unit rooted. The point that is criticized here is that the series can actually conform to the breakable unit root process. Lee and Strazicich (2003, 2004) brought a new unit root test to the literature as a correction to these criticisms. According to this new test, structural breakage can be allowed in each of the basic and alternative hypotheses.

As a correction to these criticisms by Lee Strazicich (2003, 2004), a new unit root test has been added to the literature. According to this new test, structural breakage can be allowed in each of the basic and alternative hypotheses.

The method used in the LM unit root test is as follows;

$$y_1 = \delta Z_t + e_t \qquad e_t = \beta e_{t-1} + \varepsilon_t \tag{1}$$

In equation (1), the Z_t exogenous variables vector shows error terms with the property $\varepsilon_t \sim iid\, N(0, \sigma^2)$) .its includes two changes in the level is expressed as A $Z_t = [1,\ t, D_{1t}, D_{2t}]$ Here; for $D_{jt} = 1$, $t \geq T_{bj} + 1,\ \ j = 1{,}2$ and 0 for other stuations. . T_{bj} indicates the break time. Model C contains 2 changes in trend and level, model $Z_t = [1,\ t, D_{1t}, D_{2t}, DT_{1t}, DT_{2t}]$. Here; $DT_{jt} = t - T_{bj}$ for $t \geq\ T_{bj} + 1,\ \ j = 1{,}2$ and 0 for other cases. While the process of data creation (DGP) includes breaks under the basic hypothesis (β = 1), it is in the form of an alternative hypothesis (β <1). Lee and Strazicich used the following equation to obtain the LM unit root test statistics.

Lee and Strazicich used the following equation to obtain LM unit root test statistics.

$$\Delta y_t = \delta' \Delta Z_t + \emptyset \tilde{S}_{t-1} + u \tag{2}$$

$\tilde{S}_t = y_t - \tilde{\psi}_x - Z\delta$, t=2,…,T; and $\tilde{\delta}$ value is the coefficient obtained from ΔZ_t in the regression of Δ_{yt}. $\tilde{\psi}_x$, is resulted with $y_1 - Z_1\delta$ where y_1 and Z_1 are the first elements of y_t and Z_t in the order specified (Lee and Strazicich 2003:1083).

Critical values accepted for single and double fracture unit root tests are obtained from the studies. for a single fracture in Lee and Strazicich (2004), two fractures in Lee and Strazicich (2003). If a test statistic greater than the critical values is obtained, the unit root basic hypothesis containing the structural break is rejected (Yılancı 2009: 331).

Table 3. Lee- Strazicich Unit Root Test Results

Lee Strazicich (Model C)						
Variable	Level			1. Difference		
	Test Statistics	Breaking Date	Critical Value	Test Statistics	Breaking Date	Critical Value
GPR	-4.097515**	February 1998	-3.997596	-	-	-
GPRT	-4.076202**	September 2013	-4.020256	-	-	-
GPA	-10.06824**	January 2001	-4.070254	-	-	-
BRENT	-4.020016	September 2011	-4.067609	-9.600480**	July 2004	-4.105111
GAS	-3.986297	January 2003	-4.090725	-9.786990**	April 2015	-3.973483

**: It is significant at the 5% level.

According to the LS unit root test results, it was determined variables of the GPR, GPRT, GPA are stationary at the level. The varibles of the BRENT and GAS are not stationary at the level. It has been observed that these two variables become stable after the first difference was taken.

3.4.Hatemi-J Asymmetric Causality Analysis

Before mensioned the Hatemi-J Asymmetric Causality, it was known that first time introduced to the literature the asymmetric causality test by Granger and Yoon (2002), then this test was developed by Hatemi-J (2012), and causality is investigated by dividing variables into positive and negative components. Hatemi-J Asymmetric Causality model aims to reveal hidden relationships and supports the demonstration of the asymmetrical relationship between variables.

In the case, we want to test the causality relationship between two integrated variables y_{1t} and y_{2t} (Hatemi-J 2012:449–50);

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{10} + \sum_{i=1}^{t} \varepsilon_{1i} \quad \text{and} \quad y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{20} + \sum_{i=1}^{t} \varepsilon_{2i} \tag{3}$$

Here, $t = 1, 2, \ldots T$, denotes the constant terms, y_{1t} and y_{2t} denotes initial values, ε_{1i} *and* ε_{2i} error terms. Positive and negative shocks are expressed;

$$\varepsilon_{1i}^{+} = \max\ (\varepsilon_{1i}, 0)\,, \varepsilon_{2i}^{+} = \max\ (\,\varepsilon_{2i}, 0), \varepsilon_{1i}^{-} = \min\,(\varepsilon_{1i}, 0) \quad ve \quad \varepsilon_{2i}^{-} = \min\ \ (\varepsilon_{2i}, 0),$$
(4)

However, Its expressed as $\varepsilon_{1i} = \varepsilon_{1i}^{+} + \varepsilon_{1i}^{-}$ ve $\varepsilon_{2i} = \varepsilon_{2i}^{+} + \varepsilon_{2i}^{-}$

Based on these, it is possible to regulate equations (3) and (4) as follows

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{1,0} + \sum_{i=1}^{t} \varepsilon_{1i}^{+} + \sum_{i=1}^{t} \varepsilon_{1i}^{-}, \tag{5}$$

$$y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{2,0} + \sum_{i=1}^{t} \varepsilon_{2i}^{+} + \sum_{i=1}^{t} \varepsilon_{2i}^{-}. \tag{6}$$

lastly, the positive and negative shocks in each variable are expressed in cumulative form as

$$y_{1t}^{+} = \sum_{i=1}^{t} \varepsilon_{1i}^{+}, \qquad y_{1t}^{-} = \sum_{i=1}^{t} \varepsilon_{1i}^{-}, \qquad y_{2t}^{+} = \sum_{i=1}^{t} \varepsilon_{2i}^{+}, \qquad y_{2t}^{-} = \sum_{i=1}^{t} \varepsilon_{2i}^{-}, \tag{7}$$

Then, these $y_t^+ = y_{1t}^+, y_{2t}^+$, the causality relationship between the positive components is tested through the p delayed vector autoregressive model (VAR). VAR (p) model is expressed as in equation (8);

$$y_t^+ = v + A_1 y_{t-1}^+ + \cdots + A_p y_{t-1}^+ + u_t^+ \tag{8}$$

y_t^+ indicates a variable vector of size 2x1, v is constant variable vector of size 2x1, u_t^+ is error term size of 2x1, and A_r is expressed as a parameter matrix of "r" order, which is determined using 2x2 size delay length information criteria. The following equation is used to determine the optimal lag lengt:

$$HJC = \ln(|\widehat{\Omega}_j|) + j\left(\frac{n^2 lnT + 2n^2 \ln(\ln T)}{2T}\right), \qquad j = 0, \dots, p \tag{9}$$

$(|\widehat{\Omega}_j|)$ shows j length of the lag of, the estimated VAR model's error term is variance-covariance matrix, n is the number of equations in the VAR model, and T is the number of observations.

After the lag length is determined, the Wald statistic is used to test the H_0 fundamental hypothesis, which indicates the absence of Granger-causality between series. The VAR model equation created in order to obtain the Wald statistics is as follows.

$Y = DZ + \delta$ the equation is more clearly expressed;

$$Y: = (y_1^+, y_2^+, \dots, y_T^+)$$

$$D: = (v, A_1, A_2, \dots, A_p)$$

$$Z_t: = \begin{bmatrix} 1 \\ y_t^+ \\ y_{t-1}^+ \\ \vdots \\ y_{t-p+1}^+ \end{bmatrix} \tag{10}$$

$$Z: = (Z_0, Z_1, \dots, Z_{T-1})$$

$$\delta: = (u_1^+, u_2^+, \dots, u_T^+)$$

According to equation (10): it refers to matrixes of different sizes $Y: (n\ x\ T)$, $D: (n\ x\ (1 + np))$, $Z_t: ((1 + np)\ x\ 1)$, $Z: ((1 + np)\ x\ T)$ and $\delta: (n\ x\ T)$.

The basic hypothesis ($H_0: C\beta = 0$) which states that there is no Granger causality, is tested with the Wald statistic. The Wald statistics can be calculated with the help of the following equation;

$$Wald = (C\beta)'[C((Z'Z)^{-1} \otimes S_U)C']^{-1}(C\beta) \tag{11}$$

In the (11), it is in the form of $\beta = vec(D)$ and shows the pillar clustering operator. $\otimes$ Kronecker, C shows the indicator function including constraints. The variance-covariance matrix calculated for the unconstrained VAR model is expressed as $S_U = \frac{\widehat{\delta}'_U \widehat{\delta}_U}{T-q}$. And here, the q h represents the number of lags in the VAR model.

3.5.The Results of the Hatemi-J Asymmetric Causality Analysis

In this part of the study, the causality among the GPR, GPRT, GPA and the brent oil, gas prices was analyzed by the asymmetric causality test introduced into the literature by Hatemi-J (2012). Hatemi-J asymmetric causality test was performed with the help of Gauss 10 econometric analysis package program. The findings related to the analysis are given with the (+) and (-) symbols in a way that positive and negative causality can be seen. In addition, both variables included in the model were examined as both dependent and independent variables.

Table 4. The Results of the Hatemi-J Asymmetric Causality Analysis

Direction of causality	Test Value Wald χ2	Bootstrap Critical Values		
		%1	%5	%10
GPR (+)> BRENT (+)	8.208*	11.892	8.098	6.380
GPR (-)> BRENT (-)	6.395	11.499	8.094	6.402
BRENT (+)> GPR (+)	2.910	11.490	7.790	6.247
BRENT (-)> GPR (-)	2.072	11.808	7.992	6.338
GPR (+)> GAS (+)	2.978	12.239	8.089	6.318
GPR (-)> GAS (-)	4.228	12.264	8.219	6.552
GAS (+)> GPR (+)	4.250	14.121	9.714	7.819
GAS (-)> GPR (-)	5.167	14.237	9.691	7.831
GPRT (+)> BRENT (+)	3.958	11.926	8.147	6.406
GPRT (-)> BRENT (-)	1.884	12.199	8.133	6.341
BRENT (+)> GPRT (+)	3.090	12.232	8.234	6.476
BRENT (-)> GPRT (-)	1.768	12.057	8.108	6.497
GPRT (+)> GAS (+)	2.963	11.831	8.136	6.273
GPRT (-)> GAS (-)	4.003	12.348	8.149	6.463
GAS (+)> GPRT (+)	3.868	13.768	9.514	7.847
GAS (-)> GPRT (-)	4.545	14.158	9.698	7.895
GPA (+)> BRENT (+)	2.286	12.365	8.190	6.519
GPA (-)> BRENT (-)	0.130	12.853	8.316	6.583
BRENT (+)> GPA (+)	0.910	12.127	8.185	6.274
BRENT (-)> GPA (-)	1.413	12.560	8.074	6.337
GPA (+)> GAS (+)	1.408	10.568	4.186	2.440
GPA (-)> GAS (-)	2.293	9.113	3.863	2.418
GAS (+)> GPA (+)	10.557**	13.960	9.748	7.888
GAS (-)> GPA (-)	10.542**	14.897	9.902	8.049

** It is significant at 5% level.

According to the results of the equation in which a positive causality relationship from the GPR index towards the BRENT variable was tested, the Wald test statistic value (8.208) was found, then it was significant because it was more than the bootstrap critical value (8.098). H_0 hypothesis was rejected, H_1 hypothesis was accepted. But for the negative causality relation, the Wald test statistic values less than bootstrap critical values. At the same time, there was no asymetrical causality relations between GPR and BRENT. H_0 hypothesis was accepted, H_1 hypothesis was rejected. According to findings of the equation in which a positive and negative causality relationship between GPR and GAS. It was observed that there was neither a symmetrical nor an asymmetric causality relationship between variables. These results are obtained by looking at the wald statistics and bootstrap values of the variables.

On the other hand, according to the results of the equation in which a positive and negative causality relationship is tested from the GPRT variable to BRENT and GAS variables were tested, the Wald test statistic values less than bootstrap critical values. H_0 hypothesis was accepted, H_1 hypothesis was rejected. The findings indicate that there is no one-way or two-way causality relationship between GPRT variable and BRENT and GAS variables.

Lastly, According to findings of the positive causality relationship from the GPA variable towards the BRENT variable was tested, the Wald test statistic value (2.286) was found, then it was not significant because it was less than the bootstrap critical value (8.190). Therefore, negative causality relationship from the GPA index towards the BRENT variable was tested, the Wald test statistic value (0.130) was found, then it was not significant because it was less than the bootstrap critical value (8.316) H_0 hypothesis was accepted, H_1 hypothesis was rejected. Likewise, it has been observed that there is no symmetric-asymmetric causality between BRENT and GPA. However, it was found that there were significant results in the equations between GPA and GAS. According to the results of the equation in which a positive and negative causality relationship is tested from the GPA to BRENT tested, the Wald test statistic values less than bootstrap critical values. On the other hands, according to results of the positive causality relationship from the GAS variable to GPA, it was decected a one-way negative and positive causality relationship. The positive causality relationship was tested from the GAS towards the GPA variable, the Wald test statistic value (10.557), bootstrap critical value (9.748). The negative causality relationship from the GAS towards the GPA variable was tested, the Wald test statistic value (10.542), bootstrap critical value (9.902). Then H_0 hypothesis was rejected, H_1 hypothesis was accepted.

4. Conclusion

The concept of energy still maintains its place as the most basic requirement of human beings and therefore society and develops in different ways over time. Likewise, this value (energy) is obtained either underground or produced by water, wind or solar energy. Therefore, the price of reaching this resource are as important as the importance of the energy source.

In this study, it was discussed the selected energy prices and the geopolitical risk (GPR) variables that is assumed to be affected by these prices. It was based Brent oil prices, gas prices which are the sources of the production. On the other hand, it was used the geopolitical risk (GPR) index and its component which are geopolitical threats (GPR) index, and geopolitical acts (GPA)index calculated by Caldara and Iacoviello (2019), which is widely mentioned in the literature recently.

To examine the empirical relationship between variables, Hatemi-J (2012) asymmetric causality test was run. In the study, according to finding geopolitical risk effect the brent oil prices, while has no causality effect on the gas price. However, it was seen that the change in the GAS price had an effect only on GPA Geopolitical Acts. Looking at the results in more detail, Brent oil prices and geopolitical risk are in a one way positive symmetrical causality relationship. Apart from that, it has been observed that the decline in brent oil prices has no effect on the geopolitical risk. Likewise, the decrease in geopolitical risk creates a causality effect on brent oil prices. There is no positive or negative causality of the increase in Brent oil prices on the geopolitical risk. However, it has been observed that the increase and decrease in GAS prices are effective on Geopolitical acts.

A partial relationship has been determined between these indices, which are formed by measuring geopolitical risk discourses, and brent oil and gas prices. Accordingly, in global markets, besides their own internal dynamics, which are considered among the price determinants of a commodity, geopolitical risk indicators also occurring in other lands are important. In this respect, it is thought that it is very important for investors to know the effects of international discourses and news on energy prices. On the other hand, these results are reached by considering the selected variables and the selected time interval. For further studies in this field, it is thought that studies involving renewable energy prices will provide a more detailed assessment on the subject.

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