yönetim ve ekonomi araştırmaları dergisi
journal of management and economics research

Cilt/Volume: 20 Sayı/Issue: 3 Eylül/September 2022 ss. /pp. 405-419
J. Ismayılov,Ö. Kiren Gürler, http://dx.doi.org/10.11611/yead.1168027

KREDİ TEMERRÜT TAKASLARI, PETROL FİYATLARI VE DÖVİZ KURLARININ TÜRKİYE'NİN ENERJİ SEKTÖRÜNE ETKİSİ: BİST ELEKTRİK ENDEKSİ ÖRNEĞİ[1]

Javid ISMAYILOV *

Asst. Prof. (Ph.D.) Özlem KİREN GÜRLER **

ÖZET

Ekonominin gelişmesi ve sürdürülebilir olması açısından enerji sektörü en temel yapı taşlarından biridir. Özellikle de Türkiye gibi enerji açısından dışa bağımlı ülkelerde enerji sektörü dış etkenlerden daha çok etkilenmektedir. Bu çalışmada ülke risk göstergesi olarak kredi temerrüt takasları ile petrol fiyatı ve döviz kurlarının Türkiye'nin enerji sektörünün bir göstergesi olan BİST Elektrik endeksine olan etkisi kısa ve uzun dönemler için incelenmiştir. Çalışmada 2008 Ekim- 2022 Nisan dönemi aylık verileri kullanılmıştır. Değişkenler arasındaki ilişkiyi analiz etmek için Gecikmesi Dağıtılmış Otoregresif Model (ARDL) modeli kullanılmış ve F sınır testi ile eşbütünleşik olduğu analiz edilmiştir. BİST Elektrik (XELKT) değişkeni bağımlı değişken kredi temerrüt takasları (CDS), Brent petrol fiyatları (brend) ve döviz kurları(DOVİZ) ise bağımsız değişkenlerdir. Tahminlenen uzun dönem parametrelerine göre kredi temerrüt takasları ve petrol fiyatları BİST Elektrik endeksine ters yönde etki etmekte, döviz kuru ise pozitif yönde etki etmektedir. Hata düzeltme modeli ile tahmin edilen kısa dönem katsayılarına göre ise kredi temerrüt takasları ve BİST Elektrik endeksi arasında negatif, petrol fiyatları ve BİST Elektrik endeksi arasında ise pozitif bir ilişki olduğu saptanmıştır. Döviz kuru ve BİST Elektrik Endeksi arasında kısa dönemde anlamlı ilişkiler saptanmamıştır.

Anahtar Kelimeler: *BİST Elektrik Endeksi, Kredi Temerrüt Takasları, Petrol Fiyatları, ARDL.*

Jel Kodları:*E44, C58, G19.*

THE EFFECT OF CREDIT DEFAULT SWAP INDEX, OIL PRICES AND EXCHANGE RATES ON TURKEY'S ENERGY SECTOR: THE CASE OF BIST ELECTRICITY INDEX

ABSTARCT

The energy sector is one of the most fundamental sector for the development and sustainability of the economy. The energy sector is more affected by external factors, especially in energy-dependent countries such as Turkey. In this study, the effects of credit default swaps, oil price and exchange rates

[1] This paper is mainly based on the doctoral dissertation of the first author under the supervision of the second author.

* Dokuz Eylül University, Institute of Social Sciences, İzmir/Türkiye, E-mail: javid.ismayilov@ogr.deu.edu.tr.
** Dokuz Eylül University, F.E.A.S., Department of Econometrics, İzmir/Türkiye, Email: ozlem.kiren@deu.edu.tr.

Makale Geçmişi/Article History

Başvuru Tarihi / Date of Application : 1 Temmuz / July 2022
Düzeltme Tarihi / Revision Date : 20 Ağustos / August 2022
Kabul Tarihi / Acceptance Date : 21 Eylül / September 2022

Araştırma Makalesi/Research Article

as country risk indicators on BIST Electricity index, which is an indicator of Turkey's energy sector, are examined for short and long periods. In the study, monthly data from October 2008 to April 2022 were used. Delay Distributed Autoregressive Distributed Lag (ARDL) model was used to analyze the relationship between variables and it was analyzed to be cointegrated with the F bounds test. BIST Electricity (XELKT) variable is dependent variable credit default swaps (CDS), Brent oil prices (brand) and exchange rates (CURRENCY) are independent variables. According to the estimated long-term parameters, credit default swaps and oil prices have an negative effect on the BIST Electricity index, while the exchange rate has a positive effect. According to the short-term coefficients estimated by the error correction model, there is a negative relationship between credit default swaps and BIST Electricity index, and a positive relationship between oil prices and BIST Electricity index. No significant relationship was found between the exchange rate and BIST Electricity Index in the short term.

Keywords: *BIST Electricity Index, Credit Default Swaps, Oil Prices, ARDL.*

Jel Codes:*E44, C58, G19.*

1. INTRODUCTION

The globalization process in the world economy has started to increase more rapidly since the 80s. Companies and financial institutions have started to invest in foreign markets as well as the local market. As a result, companies are now affected by external factors on top of local factors. This led to a problem: When investors invest in a company, they now analyze the risk level of the country they invest in so as not to risk their invested capital.

In general terms, country risk is a type of systematic risk that is outside the scope of the general risks encountered in foreign borrowing and investments, and it is caused by a country's inability or unwillingness to pay its external debts for any reason (Hoti and Michael, 2004: 541). The country risk consists of systemic factors and can be defined as the possibility of a country not fulfilling its external obligations partially or completely due to its financial, political, and economic structure (Carment, 2001).

Credit default swaps (CDS) are widely used in the literature and financial markets to measure a country's risk level. CDS is a bilateral financial contract between the protection buyer (the lender) and the protection seller, in which the lender pays a specified premium to the protection seller to insure its asset against the risk of the borrower's default (Vinod, 2009: 81). CDS may be between countries as well as private organizations. Country CDS are used for insurance purposes or speculative purposes (McDonald, 2006: 820). CDS premiums are rates that demonstrate the foreign investors' assessment of a country's economy (Chan-Lau, 2003). The 2008 global crisis saw the biggest bankruptcy in American history, i.e., the bankruptcy of 158-year-old Lehman Brothers Holdings Inc. Interestingly, the credit

rating of Lehman Brothers before the bankruptcy was declared to be AAA, which is the most risk-free level. After this incident, the trust in credit rating agencies shifted toward CDS (İlknur, 2016: 198).

CDS are not specific to private companies or financial institutions, they may be between countries as well. CDS can be bought and sold in public debt securities and Eurobonds (McDonald, 2006: 820).

The energy sector has an important place in every economy in terms of the development and sustainability of the economy. Turkey, in particular, is foreign-dependent in terms of energy; therefore, the energy sector is directly affected by external factors. The current account deficit of the Turkish economy was 219.8 billion USD during 2013–2017 and 213 million USD of which was due to energy imports (Doruk, 2021: 1738).

This study investigates the impact of CDS, oil prices, and exchange rates, which are considered to be country risk indicators, on the BIST Electricity Index, which is an indicator of the energy sector in Turkey. The study first reviews other research on the impact of CDS, oil prices, and exchange rates, which are considered to be country risk indicators, on stocks. Next, it estimates the effects of CDS, oil prices, and exchange rates on the BIST Electricity Index with the ARDL bounds testing approach using the monthly data from the period of October 2008–April 2022.

2. LITERATURE REVIEW

The factors impacting the stocks have been researched extensively in the literature. There are many studies on the energy sector, which, in Turkey, is very vulnerable to external factors. A review of these studies reveals that CDS and oil prices are among the main focal points.

Chan-Lau and Kim (2010) examined the equilibrium price relationship between CDS, bond, and equity prices in a total of eight emerging markets using the daily data for the period March 19, 2001 through May 29, 2003. According to this study, there is a strong correlation between CDS and bond prices in Brazil, Bulgaria, Venezuela, and Russia; however, there is no relationship between equity and bond prices in most countries.

Hammoudeh et al. (2013) examined the risk transfer between credit and market risk measures by focusing on four sectors associated with volatile oil prices. The results of this study revealed that there are long-run equilibrium risk relationships and short-run causal relationships between oil-related CDS, Volatility Index (VIX) and Swaption Merrill Option Volatility Estimate index. The study also found that the auto sector had the highest speed of risk adjustments in the long run.

Koy (2014) analyzed the relationship between CDS premiums and Eurobond premiums with Granger causality analysis using the data for the period January 2009 through November 2012. The results of the study demonstrated that the CDS premiums of Turkey, Italy, and France have an impact on the Eurobond premiums of these countries. According to the study, there is feedback between the Eurobond premiums and CDS premiums of the four countries, i.e., Greece, Spain, Italy, and Portugal.

In other words, there is an interaction between CDS premiums and Eurobonds of these countries. The common characteristic of these countries is that they are the countries most affected by the European debt crisis. Başarır and Keten (2016) conducted a study to investigate the short- and long-term relationship between CDS, exchange rates, and stocks of 12 developing countries using the panel causality analysis for the period January 2010 through January 2016. The findings of the study revealed that while there was no significant relationship between CDS premiums and stocks in the long term, a two-way relationship was found at a significance level of 95% in the short term and no significant relationship was found with exchange rates in the long or short term. Akyol (2018) examined the short- and long-term effects of the CDS premiums, oil prices, and basic macroeconomic indicators on the BIST100 Index using the ARDL bounds testing approach based on monthly data for the periods of 2006:01 and 2015:09. The findings of the study revealed that the CDS premiums, oil prices, and certain macroeconomic indicators have significant effects on the BIST100 Index in the long term, while the exchange rate has no significant effect in the long term. In the short term, it was found that the CDS and oil prices have a significant impact on the BIST100 Index.

Sarıgül and Şengelen (2020) conducted an analysis using the Johansen cointegration test based on the vector autoregressive model (VAR) analysis on the CDS premiums, Borsa İstanbul Bank Index, and stock value of the banks traded in Borsa İstanbul during January 2014–June 2019 in order to investigate the impact of the CDSs on the bank stocks. The study concluded that the country CDS have a long-term effect on the BİST Bank Index, ICBC Turkey, QNB Finansbank, Vakıfbank, and Garanti Bank stocks. It has been observed in the study that a one-unit increase in the country‘s CDS would negatively affect the BİST Bank Index by 283 units. The impact of a one-unit change in CDS on the bank stocks has been found to be 0.003, 0.014, 0.017, and 0.001 units for ICBC Turkey, Vakıfbank, Garanti Bank, and QNB Finansbank, respectively.

Güler et al. (2010) conducted a study to investigate the relationship between the stock prices of companies traded in the İstanbul Stock Exchange (ISE) and oil prices for the period July 10, 2000 through August 10, 2009 using Granger causality analysis. The findings of the study demonstrated that the change in oil prices has a similar effect on stock returns, energy prices, and the electricity index. It has been concluded that the oil prices, in particular, are a significant cause of the change in Borsa İstanbul Electricity Index prices.

Another study investigating the relationship between oil prices and stocks was conducted by Erhan (2010). This study differs from Güler et al. (2010) study in that it compares the oil prices with the ISE100 index instead of the ISE Electricity Index. The results of the cointegration tests revealed that there is no long-term relationship between oil prices and the ISE100 index. Abdioğlu (2014) conducted a study on the sector and sub-sectors in Borsa İstanbul and investigated the impact of the oil prices on these sectors by using daily data during 2005–2013. The Granger causality relationship was used in the study and the results demonstrated a long-term relationship between oil prices and stocks in sub-sectors

such as industrial, chemical, textile, and communication. Yıldırım et al. (2014) conducted a study to investigate the effects of energy prices on the BIST Industrial Index using Granger causality analysis. In this context, they used the monthly data from the period 1991:01 through 2013:11. The findings of the study demonstrated a long-term relationship between natural gas and crude oil prices and the stock returns of companies in the industrial sector. Avcı (2015) investigated the relationship between oil prices and BIST100 Index based on the monthly data from the period January 2003 through December 2014 using the Granger causality test applied together with the error correction model. The results of the study demonstrated a long-term causality relationship between oil prices and BIST100 Index, and the Granger causality test estimations based on the error correction model revealed that there is a one-way relationship between oil prices and stock returns. Kuzu (2017) conducted a study on the oil prices in the period 2005-01/2015-12 as well as the BIST100, BIST30, BIST Chemical, BİST Electricity, and BİST Industrial in Borsa İstanbul and certain macroeconomic indicators that are thought to have an impact on these indices. The results of the study demonstrated that the oil prices do not have a significant impact on these indices; however, the exchange rates and interest rates have a higher impact. Additionally, it was determined that shocks in macroeconomic variables have an impact in the short term but do not have a significant impact in the long term. Gürlevik and Gazel (2020) analyzed the relationship between the BIST Electricity Index and the oil prices, natural gas prices, and electricity prices using a nonlinear autoregressive distributed lag model based on the quarterly data from the period March 2010 through March 2019. The results of the study demonstrated that there is a negative significant relationship between the natural gas and electricity index in the long term, but there is no significant relationship between the oil and electricity prices. In terms of the short-term relationships, it was observed that all three independent variables have an impact on the electricity index.

3. DATA SET AND METHOD

3.1. Data Set

This study investigated the impact of CDS, oil prices, and exchange rates, which are considered to be country risk indicators, on the BIST Electricity Index. Within this context, monthly data during October 2008–April 2022 were used. The data was obtained from the investing.com financial platform. Eviews 10 econometric analysis program package was used in the study. The data used in the study are shown in Table 1.

Table 1. Variables Used in the Study and Their Descriptions

Series Name	Ticker Symbol	Description of the Variable
BIST ELECTRIC	LN(XELKT)	Borsa İstanbul Electricity Index (TRY)
Brent Oil Prices	LN(BREND)	Price of Brent Branded Oil (USD)
Credit Default Swaps	LN(CDS)	Credit Default Swap Premiums
Exchange Rate	DOVİZ	The exchange rate of the American currency as a foreign currency (USD/TRY)
Dummy variable of BIST Electric series	DU	Dummy variable showing the structural break in the BIST Electricity Index in November 2019

Borsa İstanbul Electricity Index is the dependent variable and the exchange rate, oil prices, and CDS are the independent variables in the study. The relationship between the variables was examined using the natural logarithms of the variables. Descriptive statistics for the variables are presented in Table 2.

Table 2. Descriptive Statistics of Variables

	LNXELKT	LNBREND	LNCDS	LNDOVIZ
Average	3.5823	4.2667	5.5448	1.1225
Median	3.4827	4.2523	5.4798	1.0188
Greatest value	4.8984	4.8354	6.3760	2.6858
Smallest value	2.7656	3.1241	4.7846	0.3597
Standard deviation	0.4383	0.3548	0.4019	0.6332

3.2. Method

Augmented Dickey–Fuller (ADF) and Philips–Perron (PP) unit root tests—which are more traditionally used in the literature—were used to investigate whether a unit root is present in the data set used in the study. In the Dickey–Fuller (1979) approach, the error terms are assumed to be statistically independent and homogeneous, while in the Phillips–Perron (1988) approach, the error terms are assumed to be weakly dependent and heterogeneous (Gujarati, 2004). Hypothesis tests for ADF and PP are as follows:

H_0: $\delta=0$ (the series contains unit root or the series is non-stationary)

H_1: $\delta<0$ (the series does not contain unit root or the series is stationary)

While the relationship between the variables was solved with normal classical regression models, the coefficient of multiple correlations (R^2), corrected coefficient of correlation with very high values, and Durbin–Watson statistics with very low values were also calculated. Although the results seem significant, it also leads to the problem of spurious regression (Granger and Paul, 1974). Most variables show a trend and because of this trend, variables that are not statistically significant demonstrate false-significant results. Phillips (1986) suggested analytical regression theory for such models and found that

the t and F significance tests showed different asymptotic behaviors in such regressions. These results are inevitable in long-term time series (Phillips, 1998).

ARDL cointegration analysis was used in the study to avoid the spurious regression problem. Pesaran, Shin, and Smith (2001) suggested that the most basic feature of the ARDL model, which they proposed in their study, is that it gives stable results even when the series are stationary at different degrees. Another feature of the ARDL test is that it gives strong results for a small number of observation units. The ARDL model—in which the unconstrained error correction model is used—gives more robust results compared to other cointegration tests (Nkoro & Aham, 2016).

ARDL (p, q_1,…q_k) model will be as shown in equation

$$Y_t=a_0+a_1t+\sum_{i=1}^{p}\psi_i y_{t-i}+\sum_{j=1}^{k}\sum_{l_j=0}^{q_j}\beta_{j,l_j}x_{j,t-l_j}+\varepsilon_t \quad (1)$$

y_t is the dependent variable and $x_{j,t}$ =1,…,k are independent variables. a_0 is the fixed term,a_1 is the trend coefficient, ψ_i are coefficients of the lagged values of the dependent variable, β_{jl_j} is the coefficient of the lagged values of the independent variables in the model, and ε_t, is the error term.

F-bounds test is used to test the cointegration in the ARDL model. The F value is calculated by estimating the restricted error correction model using the least squares method.

$$\Delta y_t=a_0+a_1t+b_0y_{t-1}+\sum_{j=1}^{k}b_jx_{j,t-1}+\sum_{i=1}^{p-1}c_0\Delta y_{t-i}+\sum_{j=1}^{k}\sum_{l_j=1}^{q_{j-1}}c_{j,l_j}\Delta x_{j,t-l_j}+\sum_{j=1}^{k}d_j\Delta x_{j,t}+\varepsilon_t \quad (2)$$

The error correction model obtained from this model would be

$$EC_t=y_t-\sum_{j=1}^{k}\frac{b_j}{b_0}x_{j,t} \quad (3)$$

The following hypothesis test is used to determine whether there is a cointegration relationship between the variables.

$$H_0: b_0=b_j=0,\ \forall_j$$

$$H_1: b_0\neq b_j\neq 0,\ \forall_j$$

After calculating the F values for the boundary test, these values are tested by comparing them with the significance levels developed by Pesaran Shin, and Smith (2001). If the obtained F value is greater than the limit values of I(0) and I(1), the H_0 hypothesis is rejected, which means that there is cointegration between the series (Pesaran et al., 2001).

4. RESULTS

The study used ADF and PP unit root tests to test whether the series are stationary at the level or the first difference. The test results are presented in Table 3. Table 3 shows that LNBREND variable is stationary at the 0.10 significance level in the fixed model based on the ADF test results, while the other

variables are stationary at the first difference. However, the PP test results show that all variables are stationary at the first difference.

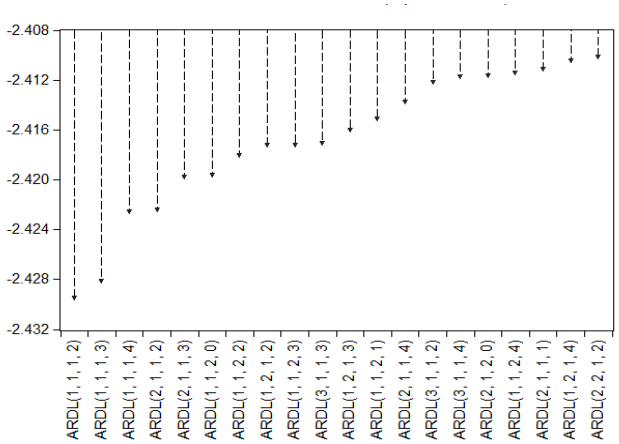
Table 3. Unit Root Test Results

	ADF		PP	
	I(0)	**I(1)**	**I(0)**	**I(1)**
LNXELKT				
Stationary	−0.2207	−11.0032*****	−0.1615	−11.0247*****
Stationary Trend	−1.3002	−11.1340*****	−0.9120	−11.1543*****
LNBREND				
Stationary	−2.6144***	−10.6539*****	−2.4332	−10.5013*****
Stationary Trend	−2.4546	−10.6826*****	−2.2490	−10.5378*****
LNCDS				
Stationary	−1.9958	−13.3482*****	−2.0203	−13.3866*****
Stationary Trend	−3.0003	−13.3577*****	−3.0340	−13.4427*****
LNDOVİZ				
Stationary	1.5741	−11.9559*****	2.0990	−11.9333*****
Stationary Trend	−0.7961	−12.1564*****	−0.5113	−12.3043*****

*p < =0.01, ** p < =0.05, ***p < =0.10

The Akaike information criterion was used to determine the lag length suitable for the ARDL model used. When Figure 1 was examined, it was found that the appropriate lag length according to Akaike information criteria was ARDL(1,1,1,2).

Figure 1. Determining the Appropriate Lag Length



Cointegration analysis was performed with the F-bounds test in order to demonstrate cointegration. F-bounds test results are presented in Table 4. The calculated F statistical value was compared with the lower and upper limit values developed by Pesaran (2001). Since the calculated F value of 7.1 was greater than the lower and upper limit values of 5.62 and 6.908 at the 0.01 significance level, the null hypothesis was rejected; as a result, it was found that there was a cointegration between

the variables. According to the estimated ARDL(1,1,1,2) model, it was determined that there is a long-term cointegration relationship between the Electricity Index indicators and oil prices, exchange rates, and CDS. Thus, there will be no spurious regression problems in the analyses to be performed with the level values of the variables.

Table 4. ARDL(1,1,1,2) Model Bounds Test Results

H_0: No cointegration				
k	**F statistic**	**Significance level**	**Lower limit I(0)**	**Upper limit I(1)**
3	7.1039	10%	3.588	4.605
		5%	4.203	5.32
		1%	5.62	6.908

After determining that the variables are cointegrated, the long-term coefficients of the ARDL model were estimated. Table 5 presents the results with respect to the long-term estimation parameters. These findings show that Brent oil prices are statistically significant at the 15% level of significance, and a 1% increase in oil prices causes a 0.21% decrease in the BIST Electricity Index in the long term. Since oil is an important input in the energy sector, rising oil prices increase costs and negatively affect stock prices.

CDS and exchange rate coefficients are statistically significant at the 1% significance level. A 1% increase in CDS, which are considered to be a measure of the country's risk level, would have a 1.31% negative impact on the BIST Electricity Index. The coefficient of this variable is important in terms of economic considerations because investors would avoid investing in the country due to the increased country risk. According to the model, exchange rates have a positive impact on stocks in the long term. If the exchange rate increases by 1%, the BIST Electricity Index will increase by 2.48% in the same direction.

Table 5. Long-Term Coefficients of ARDL

Variable	**Coefficient**	**Standard error**	**t statistic**	**P value**
LNBREND	−0.2101	0.1421	−1.4782	0.1414
LNCDS	−1.3317	0.2272	−5.8612	0.0000
LNDOVİZ	2.4763	0.4364	5.6742	0.0000

After the calculation of the long-term coefficients in the analysis, an error correction model was created by adding a lagged series of error terms obtained from the long-term model to the model. A one-period lag obtained from the long-term estimation model is now included in the model as ECM (−1). The error term is expected to be between 0 and −1. The closer the ECM(−1) coefficient is to −1, the higher the long-term correction of short-term deviations in the series.

Error correction model values are presented in Table 6. The ECM(−1) variable is negative and statistically significant. The error correction coefficient value of −0.1502 means that the change in the dependent variable is adjusted 15.02 percent faster and returned to its normal course. The exchange rate variable coefficient is insignificant in the short term, while other variables are significant at the 1% significance level. However, a lagged coefficient of a lagged exchange rate variable is found to be statistically significant. The coefficients for Brent crude oil and CDS variables are found to be statistically significant at the 1% significance level. Contrary to the long-term estimations, there is a positive relationship between oil prices and BIST Electricity Index in the short-term estimations. If oil prices increase by 1%, BIST Electricity Index will increase by 0.13% in the short term. CDS have a negative impact on the BIST Electricity Index and are statistically and economically significant. A 1% increase in CDS will have a 0.36% negative impact on stock prices.

Table 6. ARDL(1,1,1,2) Error Correction Model Results

Variable	Coefficient	Standard Error	t statistic	P value
C	1.6476	0.3067	5.3722	0.0000
TREND	−0.0034	0.0007	−5.0652	0.0000
ΔLNBREND	0.1298	0.0503	2.5814	0.0108
ΔLNCDS	−0.3608	0.0522	−6.9181	0.0000
ΔLNDOVIZ	0.1121	0.1552	0.7224	0.4712
ΔLNDOVIZ(-1)	−0.2623	0.1094	−2.3966	0.0178
DU	0.1224	0.0240	5.0857	0.0000
ECM(-1)	−0.1502	0.0279	−5.3830	0.0000
$\boldsymbol{R^2 = 0.499637}$				
$\boldsymbol{\bar{R}^2 = 0.477039}$				
DW = 1.88				
F statistic value = 22.1107				
F probability value = 0.0000				

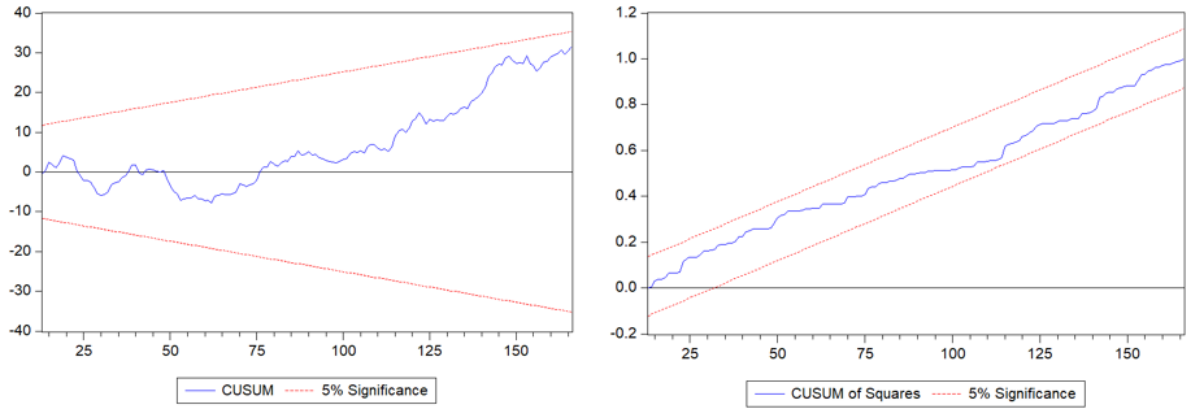
In the estimated ARDL(1,1,1,2) model, problems such as heteroscedasticity, specification error, normal distribution of errors, and serial correlation should also be tested. Table 7 presents the results of the aforementioned tests performed on the model. Table 7 shows that since all calculated statistical values are greater than the 0.05 significance level, the H_0 hypothesis is rejected for all tests. Therefore, there are no serial correlations, normality problems, specification errors, and heteroscedasticity in the model.

Table 7. Diagnostic Test Results of the ARDL (1,1,1,2) Model

	Diagnostic Test Results	
	Test statistics (probability values)	**Tests used**
Serial Correlation Test	0.6220 (0.5383)	LM
Heteroscedasticity	1.5325 (0.1328)	Breusch–Pagan-Godfrey
Specification Test	0.59 (0.6213)	Ramsey–Reset
Normality Test	1.0999 (0.5798)	Jarque–Bera

Figure 2 presents the Cusum and CusumSq test results. According to the findings, Cusum and Cusum-Q test results are within the critical limits at the 5% significance level. In other words, it confirms the hypothesis that the coefficients of the ARDL(1,1,1,2) model are stable in the long term.

Figure 2. CUSUM and CUSUM-Q Test Results



5. CONCLUSION

Since Turkey's energy sector is foreign-dependent, the impact of oil prices and exchange rates stand out as global factors. Additionally, CDS—which are indicators of the economic risk level of the country—negatively impact share prices.

The aim of this study is to estimate how and how much oil prices, exchange rates, and CDS impact the Turkish energy sector. In this context, the short- and long-term relationships between the variables were examined using monthly data during 2008–2022.

First, ADF and PP unit root tests were performed to analyze the stationarity of the series. The ADF unit root test demonstrated that all variables except one variable were first-order stationary, and the PP test demonstrated that all variables were stationary. An ARDL model was created to test the cointegration between the variables, after which an F-bounds test was performed and it concluded that the variables were cointegrated. Then, the estimation parameters of the variables for the long and short term were calculated.

The long-term estimations revealed that Brent oil prices have an inverse impact on the electricity index at the significance level of 15%. An increase in Brent oil prices decreases the stock prices by 21%. Since Turkey imports energy, an increase in oil prices would also lead to an increase in costs, which would have a negative impact on stock prices. In order to mitigate this impact, Turkey should move toward renewable energy resources in order to reduce its dependence on oil. CDS values also have a negative impact on the energy sector. Since high risk levels lead to a decrease in the volume of investments in the country, a decrease in stock prices is an expected outcome. A positive impact was found between the exchange rates and stock prices in the long term. It should be noted that this positive impact is caused by the devaluation of the money in the long term due to the high exchange rate.

The short-term relationship between the variables estimated by the error correction model showed that there is a positive and significant relationship between the energy sector and stock prices at the significance level of 5%. The impact of exchange rates was negative but statistically insignificant. The short-term relationship was also negative in CDS. ECM(−1) error correction coefficient was found to be −0.1502 and statistically significant at the significance level of 1%. This means that any imbalance in the series can be balanced by 15% in the long term.

The findings of the study concluded that CDS has a negative impact on the energy sector of the country both in the short and long term. Positive political and economic decisions by the economic leaders in Turkey in an effort to reduce the credit risk would create a safer and low-risk environment for foreign investors. The decrease in country risk would have a positive impact on the country's stock prices.

The results of the study also demonstrated that energy stock prices are affected by external factors such as CDS, oil prices, and exchange rates. These factors are especially important for developing countries such as Turkey which are dependent on foreign energy. Economic and political decisions toward decreasing the country's risk level and moving toward renewable energy to become less foreign-dependent would yield positive results for the Turkish energy sector.

REFERENCES

Abdioğlu, Z. ve Değirmenci, N. (2014) "Petrol Fiyatları-Hisse Senedi Fiyatları İlişkisi: BIST Sektörel Analiz" Kafkas Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 5(8): 1-24.

Akyol, H. ve Baltaci, N. (2018) "Ülke Kredi Risk Düzeyi, Petrol Fiyatları ve Temel Makroekonomik Göstergelerin Hisse Senedi Getirilerine Etkisi: BİST 100 Örneği", Kafkas Üniversitesi Sosyal Bilimler Enstitüsü Dergisi (22): 459-476.

Avcı, Ö. (2015) "Petrol Fiyatlarının Hisse Senedi Piyasasına Etkisi", Adnan Menderes Üniversitesi Sosyal Bilimler Enstitüsü Dergisi 2(3): 27-34.

Başarır, Ç. ve Murat, K. (2016) "Gelişmekte Olan Ülkelerin CDS Primleri ile Hisse Senetleri ve Döviz Kurları Arasındaki Kointegrasyon İlişkisi", Mehmet Akif Ersoy Üniversitesi Sosyal Bilimler Enstitüsü Dergisi 8(15): 369-380.

Bjornland, H. C. (2009) "Oil Price Shocks and Stock Market Booms in An Oil Exporting Country", Scottish Journal of Political Economy 56(2): 232-254.

Carment, D. (2001) "Assessing Country Risk: Creating an Index of Severity", Background Paper for the CIFP Risk Assessment Template, 1-18.

Doruk, Ö. T. (2021) "Döviz Kurunun Enerji Hisse Senetlerine Olan Etkisi: Borsa İstanbul İçin Ampirik Bir Sınama", MANAS Sosyal Araştırmalar Dergisi, 10(3): 1735-1744.

Granger, C., ve Paul, N. (1974) ''Spurious Regressions in Econometrics'', Journal of Econometrics 2(2): 111-120.

Gujarati, D. (2004) "Basic Econometrics", Fourth edition. New York: Magraw Hill Inc.

Güler, S., Tunç , R., ve Orçun, Ç. (2010) "Petrol Fiyat Riski ve Hisse Senedi Fiyatları Arasındaki İlişkinin Belirlenmesi: Türkiye'de Enerji Sektörü Üzerinde Bir Uygulama", Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi 24(4): 297-315.

Gürlevik, F., ve Gazel, S. (2020) "Enerji Fiyatlarındaki Değişimin Hisse Senedi Fiyatlarına Etkisi: BİST Elektrik Endeksi Üzerine Bir Uygulama." Ekev Akademi Dergisi 82: 119-138.

Hammoudeh, S., Liu, T., Chang, C.-L., ve McAleer, M. (2013) "Risk Spillovers in Oil-Related CDS, Stock and Credit Markets", Energy Economics 36: 526-535.

Hoti, S., ve Michael, M. (2004) "An Empirical Assessment of Country Risk Ratings and Associated Models", Journal of Economic Surveys, 539-588.

İlknur, Ç. (2016) "Kredi Derecelendirme Kuruluşlarının Öngöremedikleri Kriz ve İflaslar", Selçuk Üniversitesi Sosyal Bilimler Meslek Yüksekokulu Dergisi, 19(41): 181-205.

İşcan, E. (2010) "Petrol Fiyatının Hisse Senedi Piyasası Üzerindeki Etkisi", Maliye Dergisi 158: 607-617.

Koy, A. (2014) "Kredi Temerrüt Swapları ve Tahvil Primleri Üzerine Ampirik Bir Çalışma" International Review of Economics and Management 2(2): 63-79.

Kuzu, S. (2017) "Petrol Fiyatları ve Bazı Makro Ekonomik Değişkenlerin Borsa İstanbul'da Yer Alan Bir Takım Endeksler Üzerindeki Etkisinin Araştırılması", Yönetim ve Ekonomi 24 (2): 579-599.

McDonald, R. (2006) "Derivatives Market", Second Edition. New York: Pearson Education, lnc.

Mert, M., ve Çağlar, A. (2019) "Eviews ve Gauss Uygulamalı Zaman Serileri Analizi" Ankara: Detay Yayıncılık.

Nkoro, E. ve Aham, K. U. (2016) "Autoregressive Distributed Lag (ARDL) Cointegration Technique: Application and Interpretation", Journal of Statistical and Econometric Methods 5(4): 63-91.

Pesaran, M., Shın, Y. ve Smıth, R. (2001) "Bounds Testing Approaches to the Analysis of Level Relationships", Journal of Applied Econometrics, 16(3): 289-326.

Phillips, P. (1998) "New Tools For Understanding Spurious Regressions", Econometrica, 66(6): 1299-1325.

Sarıgül, H. ve Şengelen, H. (2020) "Ülke Kredi Temerrüt Takas Primleri ile Hisse Senedi Fiyatları Arasındaki İlişki: Borsa İstanbul'da Banka Hisse Senetleri Üzerine Ampirik Bir Araştırma" Muhasebe ve Finansman Dergisi 86: 205-222.

Vinod , K. (2009) "Credit Derivatives and Structured Credit Trading" (Revised Edition). Singapore: John Wiley & Sons (Asia) Pte. Ltd.

Yıldırım, M., Bayar, Y. ve Kaya, A. (2014) "Enerji Fiyatlarının Sanayi Sektörü Hisse Senedi Fiyatları Üzerindeki Etkisi: Borsa İstanbul Sanayi Sektörü Şirketleri" Muhasebe ve Finansman Dergisi 62: 93-108.

KATKI ORANI / CONTRIBUTION RATE	**AÇIKLAMA / EXPLANATION**	**KATKIDA BULUNANLAR / CONTRIBUTORS**
Fikir veya Kavram / *Idea or Notion*	Araştırma hipotezini veya fikrini oluşturmak / *Form the research hypothesis or idea*	Javid ISMAYILOV Asst. Prof. (Ph.D.) Özlem KİREN GÜRLER
Tasarım / *Design*	Yöntemi, ölçeği ve deseni tasarlamak / *Designing method, scale and pattern*	Javid ISMAYILOV Asst. Prof. (Ph.D.) Özlem KİREN GÜRLER
Veri Toplama ve İşleme / *Data Collecting and Processing*	Verileri toplamak, düzenlenmek ve raporlamak / *Collecting, organizing and reporting data*	Javid ISMAYILOV Asst. Prof. (Ph.D.) Özlem KİREN GÜRLER
Tartışma ve Yorum / Discussion and Interpretation	Bulguların değerlendirilmesinde ve sonuçlandırılmasında sorumluluk almak / *Taking responsibility in evaluating and finalizing the findings*	Javid ISMAYILOV Asst. Prof. (Ph.D.) Özlem KİREN GÜRLER
Literatür Taraması / *Literature Review*	Çalışma için gerekli literatürü taramak / *Review the literature required for the study*	Javid ISMAYILOV Asst. Prof. (Ph.D.) Özlem KİREN GÜRLER

Hakem Değerlendirmesi: Dış bağımsız.

Çıkar Çatışması: Yazar çıkar çatışması bildirmemiştir.

Finansal Destek: Yazar bu çalışma için finansal destek almadığını beyan etmiştir.

Teşekkür: -

Peer-review: Externally peer-reviewed.

Conflict of Interest: The author has no conflict of interest to declare.

Grant Support: The author declared that this study has received no financial support.

Acknowledgement: -