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## BIST Tourism and BIST Electricity Index Relationship

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### ABSTRACT

In this study, which is based on daily data, the relationship between BIST electricity index and BIST tourism index was measured between 2012:M9 and 2022:M9 periods. The aim of the study is to measure the relationship between BIST electricity index and BIST tourism index. VAR Granger causality test was applied to determine whether there is any causal relationship between the variables. It has been determined as a result of the analysis that the BIST electricity index has no effect on the BIST tourism index. Two-way ineffectiveness was determined among the variables. In addition, it was obtained as a result of the analysis that the applied correlation relationship was weak between these variables. The results obtained from the study are important in terms of measuring the effects among BIST indices.

**Keywords:** Tourism, Energy, Stock Market, BIST Tourism Index, BIST Electricity Index

**JEL Classifications:** L83, L32, O13, Q43

## 1. INTRODUCTION

Considering that oil prices are the direct driver of tourism supply and demand, tourism is highly dependent on oil prices. Theoretically, oil prices affect tourism activities directly and/or indirectly (Kisswani et al., 2020). The development of the tourism sector is one of the main strategies for diversification (Elhaj and Bousrih, 2021). Given that higher oil prices are inevitable, without understanding how oil prices affect tourism travel patterns, it is clear that it will be difficult for managers and policy makers to implement their anticipated tourism plans (Kisswani et al., 2020).

According to Meo et al. (2018), when oil prices increase, this affects travelers' wages through higher inflation rates, which in turn affects travelers' choice between destination country options and travel budgets. In addition, higher oil prices increase the fees paid for tourism activities in the countries visited. This can have a negative impact on the traveler's budget and thus on destination choices and tourist activities. It is also known that increases in oil prices directly affect airlines, increasing travel

costs, especially in long travel distances (Dogrul and Soytaş; 2010, Meo et al., 2018).

Many countries are trying to increase their competitiveness in order to attract tourists and meet their needs. Competitiveness is rather a relative concept depending on the variables in question. Many competitiveness models have emerged in recent years. While some of these models focus on the resources, climate and geography of the destinations, others consider the adoption level of sustainability and prices as the main factors affecting competitiveness (Rouby, 2019). Giampiccoli and Mtapuri (2014) argue that diversification of tourism products is necessary to face world competition and stimulate the tourism sector by attracting more foreign investors. In order for tourism to develop in a country, the industry must be competitive in the international arena and have an effective performance (Palang and Tippayawong, 2019).

Ajala et al. (2021), in their study investigating the effect of oil prices on the exchange rate and stock prices in the Nigerian Stock Exchange, they used the NARDL model and revealed that

the changes in the oil price affect the exchange rate and stock prices asymmetrically. Alamgir and Amin (2021), in their study, examined the relationship between the stock market indices of 4 South Asian countries and oil prices for the period 1997-2018 with the NARDL model, and according to the analysis findings, there is a positive relationship between the oil price and the stock market index. In addition, the reaction of the stock market index to positive and negative oil price shocks has an asymmetrical nature. In the study, it was determined that the Efficient Market Hypothesis is not valid for South Asian countries.

Asaad (2021), in his study, analyzed the relationship between oil price, gold price, exchange rate and Iraqi Stock Exchange stock prices. In his study, which used ARDL cointegration test and Granger Causality Test, it was Determined that there was no cointegration between the variables in the pre-Covid-19 period and the effects of oil price, gold price and exchange rate on Iraqi Stock Exchange stocks were insignificant according to the results of the short-term model. Das (2021), in his study in which he investigated the relationship between stock returns, exchange rates and crude oil prices in the Indian Stock Exchange between 1999 and 2021 using wavelet analysis technique, found that shocks in developed markets had a spillover effect in the Indian market. Endri et al. (2021), in their study aiming to determine the economic variables that affect the stock returns of the mining sector companies traded in the Indonesian Stock Exchange, they determined that oil prices have a positive and significant effect on stock returns.

Fasanya et al. (2021), ARDL and NARDL models were used in their study in which they analyzed the relationship between stock returns and oil prices in the Gulf Cooperation Council countries, using the weekly data set between 1992 and 2016. They determined that the risks are very sensitive to the oil price specification. In a study conducted by Özçalık and Eren (2022), the reaction of investors to the tourism stock market indices of the COVID-19 epidemic was analyzed by the “event study” method.

In a study conducted by Huseynli (2022a), the relationship between economic growth and tourism revenues in Turkey in the 2005-2020 period was analyzed. In order to make effective investments in the tourism sector, the financial performances of the companies are the right guides (Hsu and Jang, 2007). When tourism-related airlines, entertainment venues, restaurants and hotels are considered, tourism investments should be balanced for the healthy functioning of the economy (Inoue and Lee, 2011). The tourism industry has an extremely strategic importance for many economies, given its contribution to the domestic product.

Considering all these, the aim of this study is to investigate the interrelationship between BIST tourism index and BIST electricity index. It should be noted that the number of BIST investors increased by 66% in 2020 and 20% in 2021, reaching 2.3 million from 1 million, thus more than 100% new investors entered the market (Pilatin, 2022).

## 2. THEORETICAL BACKGROUND

### 2.1. Tourism Sector and BIST Index

As one of the biggest tourism destinations, Turkey uses the tourism sector as a major factor in the economic development of the country's economy. Like many developing countries, Turkey has given priority to the development of the tourism sector as part of its economic growth strategy (Gunduz, and Hatemi, 2005). In a study by Onder and Durgun (2008), the causal relationship between tourism revenues and employment in Turkey for the period 1980-2007 was examined. In a study by Gokovali (2010), the contribution of tourism to GNP for Turkey was empirically investigated using the OLS procedure for the 1985-2005 period. A study by Kantarci and Karakaya (2016) tries to explain the effects of the tourism sector on the development of Turkey. The study conducted by Lider (2018) is to examine the competitiveness of Turkey as a popular healthcare destination in the world. A study by Saint Akadiri et al. (2020) explores the causality between the newly introduced geopolitical risk index, tourism and economic growth in the case of Turkey for the period 1985-2017.

Macroeconomic factors such as the number of tourists, real investments, incentives given by countries to the tourism sector, global economic developments, international income, touristic product prices, service diversity, advertising and political stability, as well as inflation, growth and changes in exchange rates are also important for economic development and development. They are among the determinants of tourism revenues (Öncel et al., 2016). The tourism sector comes to the forefront with the functions of bringing income and foreign exchange to the economic development of countries (Çelik Oğuz and Topbaş, 2011). In a study by Huseynli (2022b), the relationship between tourism and renewable energy was examined in Egypt, Kenya and Ethiopia. Demirkale and Can (2021) applied VAR and Impact-Response analysis using monthly data between 2008 and 2020 to analyze the relationships between the Dollar exchange rate, interest rates, oil prices and BIST Tourism index. The findings obtained from the analysis results are that oil prices affect the BIST Tourism index positively and weakly.

In a study conducted by Pala (2021), the financial performances of the companies included in the BIST tourism index during the 2016-2020 periods were analyzed by CILOS and MAIRCA, Multi-Criteria Decision Making methods. In a study conducted by Konak and Türkoğlu (2022), 9 companies operating in the BIST Tourism Index between 2012 and 2018 were examined. When the financial performance analysis studies in the tourism sector are examined, it is seen that the financial statement ratios are frequently used as criteria.

### 2.2. Energy Sector and BIST Electricity

Özmerdivanlı (2014) analyzed the relationship between the BIST-100 index and oil prices with the Granger Cointegration and Granger Causality test, and according to the findings, there is a long-term relationship between oil prices and the BIST100 index, and there is unidirectional causality from the BIST-100 index to oil prices. Kendirli and Çankaya (2016) analyzed the causality relationship between crude oil prices and BIST-100

index and BISTUization index in their study, and in the analysis findings, one-way causality was determined from BIST-100 index to other variables, as well as from BIST-Transportation index to crude oil prices. Sandal et al. (2017), in their study investigating the causality relationship between gold and crude oil prices and the BIST-100 index, it was determined that there was no cointegration relationship between the variables and there was no unidirectional causality from crude oil prices to stock prices by using the Johansen Cointegration Test and Granger Causality Test. Oralbaykızı (2019) analyzed the relationship between oil prices and BIST-100 and 3 different sector indices and concluded that the effect of the change in oil prices differed on a sectoral basis.

Yavuz and Sağlam (2020) analyzed the relationship between stocks and oil price shocks, using the data of BIST index and Brent oil prices, and an inverse relationship was found between the variables. It was also determined that increases in oil prices cause a stronger negative asymmetric relationship compared to decreases. In a study conducted by Huseynli and Huseynli (2022), the causality relationship between BIST energy index values and stock prices of Enerjisa, which is the energy company with the highest brand value in Turkey, was investigated in the January 2011-June 2022 period. Altinoz and Umut (2022), in their study, analyzed the effects of changes in exchange rates and oil prices on BIST indices with the Johansen Cointegration Test, and according to the findings, although the effect of changes in oil prices on most sector indices is positive, this relationship is significant for a small number of sectors.

### 2.3. Studies in the Literature between BIST Tourism and Energy Indices

In a study conducted by Şahin et al. (2017), it was determined that the financial performances of 8 enterprises traded in the BIST Tourism Index were evaluated with the Gray Relational Analysis Method, which is one of the multiple decision making techniques, by using the liquidity, leverage and profitability ratios in line with the financial data of 2019, 2020 and 2021. evaluation has been made. In his study, Kiracı (2019) analyzed the relationship between oil prices, Dollar index, Dollar rate and BIST-Tourism index with Granger Causality and Hatemi-J Asymmetric Causality tests, and asymmetric and Granger causality relationships were determined between the variables.

In a study conducted by Yaman and Korkma (2020), the volatility spillover effect between exchange rates and BIST Tourism Index (XTRZM) returns was examined. In a study conducted by Yildirim et al. (2020), the monthly data of the variables covering the period between March 2010 and February 2020 were examined with the VAR model. Dollar rate, 5-year Turkey CDS premiums and Fear index were used to represent macroeconomic variables, BIST Tourism, which is the sub-index of Borsa Istanbul, was chosen as the indicator of stock index returns.

In the study conducted by Süslü and Gök (2021), the relations between BIST Tourism Index stock prices and macroeconomic factors (gold prices, money supply, exchange rate, inflation rate, interest rate and oil prices) were investigated by using monthly data for the period between 2006M1 and 2018 M12. In the study

conducted by Süslü and Gök (2021), the relations between BIST Tourism Index stock prices and macroeconomic factors (gold prices, money supply, exchange rate, inflation rate, interest rate and oil prices) were investigated by using monthly data for the period between 2006M1 and 2018 M12. Demirkale and Can (2021) applied VAR and Impact-Response analysis using monthly data between 2008 and 2020 to analyze the relationships between the Dollar exchange rate, interest rates, oil prices and BIST Tourism index. The findings obtained from the analysis results are that oil prices affect the BIST Tourism index positively and weakly.

In a study conducted by Konak and Türkoğlu (2022), by using the data of 9 companies operating in the Borsa Istanbul Tourism Index between 2012 and 2018, the ownership and capital structure of the companies were considered together and their effects on company performance were examined. In a study conducted by Nazlıoğlu (2022), the variables of Global Tourism Index, BIST Tourism Index and Exchange Rate (Dollar/TL) were used monthly frequency for the period of August 2006-February 2022, dynamic relations between the variables, impulse-response functions based on VAR model, variance. decomposition and Granger causality analysis.

## 3. RESEARCH METHODOLOGY

### 3.1. Data Set

September 2012-September 2022 daily data were used for the variables included in the analysis in the study. In order to evaluate the response of the BIST tourism index to an increase in the prices of the BIST electricity index, impulse-response functions based on the VAR model were used. In addition, Granger causality test was applied to determine whether there is any causal relationship between the variables. For this purpose, a series of tests are included in the study before proceeding to the Granger analysis.

Many macroeconomic time series contain unit roots dominated by stochastic trends developed by Nelson and Plosser (1982). Unit roots are important in examining the stationarity of a time series because a non-stationary regressor invalidates many standard empirical results (Dritsakis, 2008). The concept of cointegration was first introduced by Granger (1981) and Granger and Granger (1983). It has been further expanded by Engle and Granger (1987). Cointegration describes the existence of an equilibrium or stationary relationship between two or more time series, each of which is not stationary separately.

### 3.2. Analysis Method

The aim of this study is to investigate the reciprocal relationship between BIST tourism index and BIST electricity index. Any change that occurs due to political, economic or global causes has a positive or negative effect on the country's economy. In terms of tourism, it is known that Turkey has a significant impact on an international level. On the other hand, an increase in electricity prices may cause an increase in the financing costs of the tourism sector, as in many other sectors, and may adversely affect tourism. This may reflect itself on the BIST tourism index values.

A decrease in electricity prices due to global developments may reduce the costs of many products and services, and may also reflect



positively on the tourism sector in terms of reduced transportation costs. For this purpose, the effect of a change in BIST electricity index values on the BIST tourism index was examined in this study. Necessary analyzes were made using the “EViews 10” analysis program. The mobility of the series used in the study over the years is given in the tables below (Tables 1 and 2).

Before the analysis, the figural states of the data sets belonging to the variables are included. Figures 1 and 2 show the changes in the data on the variables over the years. In this context, the fluctuations in the tourism index are remarkable.

#### 4. ANALYSES AND RESULTS

In order to detect significant relationships between variables, the series must be stationary. Estimations made with non-stationary series may lead to inaccurate results (Tari, 2012). Although different methods have been developed for this purpose, the Extended Dickey Fuller (ADF) test developed by Dickey and Fuller (1981) was used to determine the stationarity of the series in this study. When applying the ADF test, the appropriate lag number Akaike (AIC) or Schwarz (SIC) information criteria can be used. One of the most used methods in investigating the causality relationship and the direction of the relationship between time series is the Granger Causality method developed by Granger (1969).

When the time series is measured, first of all, the integration degrees of the variables are found. Extended Dickey-Fuller (ADF) unit root tests were also applied in the study to measure the integrated level values of the series. According to the stationary test results applied, it has been observed that our data are not stationary in terms of level.

In this case, where stationarity is a must for the analysis, a retest was applied and it was observed that both variables were stationary in the first order. The fact that the probability values are  $<0.05$  indicates that the data is stationary.

**Table 1: Level values of series**

ADF test result	BIST electricity index		BIST tourism index	
	t-statistics	Possibility	t-statistics	Possibility
ADF testing	-0.342711	0.9017	-2.753406	0.0653
statistics				
Test critical				
values (%)				
1	-3.808546		-3.432776	
5	-3.020686		-2.862498	
10	-2.650413		-2.567325	

**Table 2: Stationarity level of first order series**

ADF test result	BIST electricity index		BIST tourism index	
	t-statistics	Possibility	t-statistics	Possibility
ADF testing	-5.719470	0.0002	-19.60229	0.0000
statistics				
Test critical				
values (%)				
1	-3.831511		-3.432776	
5	-3.029970		-2.862498	
10	-2.655194		-2.567325	

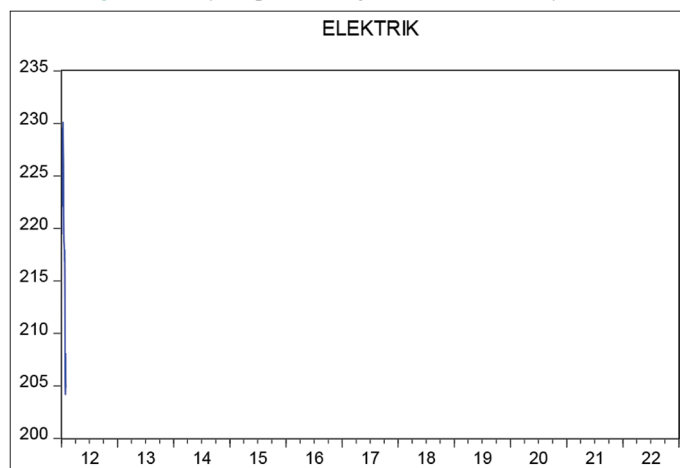
After performing the stationarity test and making the series equally stationary, the VAR model was established. The appropriate lag number of these data was determined with the help of Akaike (AIC), LL, LR, FBE, SC and HQ information criteria. Table 3 shows the appropriate lag numbers of these series. In line with this information, it is seen that the appropriate lag length is one.

After performing the assumption tests, which are important for the analysis, Granger analysis was started. The causality relationship between BIST electricity index and BIST tourism index is given in Table 4.

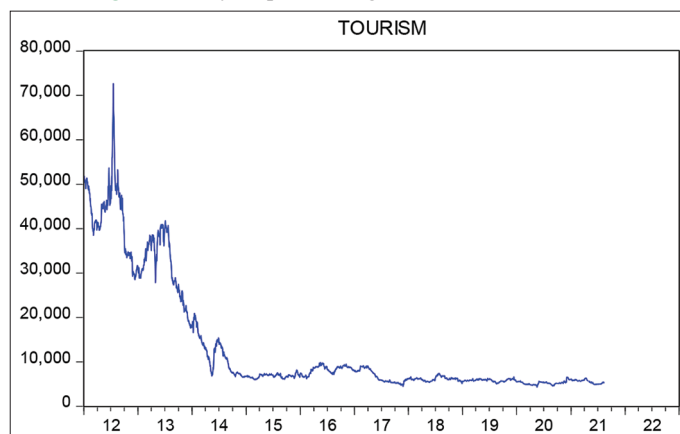
In this study, the relationship between BIST electricity index and BIST tourism index values in Turkey was analyzed. In this study, which is based on daily data, data between the periods 2012:M9 – 2022:M9 were used. The Garnger method was used to measure causality. As a result of the analysis, no causal relationship was found between the variables. Thus, these index values do not affect each other. In short, du variables are not Granger causes of each other.

In the absence of any causality, the correlation relationship between the variables was tested. According to the result of morelation, there is a very weak relationship between these

**Figure 1: 10-year price change of BIST electricity index**



**Figure 2: 10-year price change of BIST tourism index**



**Table 3: Appropriate delay length**

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-197.3081	NA	52300958	23.44801	23.54603	23.45775
1	-172.6178	40.66624*	4618485*	21.01386*	21.30794*	21.04310*
2	-168.8523	5.316072	4884088	21.04145	21.53157	21.09017
3	-164.7340	4.845091	5155888	21.02753	21.71370	21.09573
4	-160.7423	3.756906	5911494	21.02850	21.91073	21.11620

\*Indicates the appropriate lag length for the relevant test

**Table 4: Granger causality test**

Hypotheses	F-value	Probability value (P)	Decision at 5% significance level
BIST electricity index is the cause of BIST tourism index	1.145077	0.5641	Rejected
BIST tourism index is the cause of BIST electricity index	0.233380	0.8899	Rejected

**Table 5: Correlation relationship between series**

Variable names	Tourism index	Electricity index
Tourism index	1	0.23
Electricity index	0.23	1

variables. The results regarding the correlation relationship are given in Table 5.

## 5. DISCUSSION AND CONCLUSION

In the study, the relationship between BIST tourism index and BIST electricity index was examined for the period of September 2012 – September 2022. The interrelationships between the variables were investigated with VAR-based impulse-response functions and VAR Granger causality relationship. According to the Granger causality method, it has not been determined that there is any causality relationship between the BIST electricity index and the BIST tourism index. According to the correlation relationship, it was determined that there is a weak form positive relationship between the BIST electricity index and the BIST Tourism index.

As a result of Yildirim et al. (2020) study, a one-way Granger causality relationship was found from CDS premiums to BIST Tourism index. According to the results of the studies conducted by Süslü and Gök (2021), it was found that while gold prices were the Granger cause of BIST Tourism Index stock prices, BIST Tourism Index stock prices were also the Granger cause of oil prices. According to the results of the studies conducted by Süslü and Gök (2021), it was found that while gold prices were the Granger cause of BIST Tourism Index stock prices, BIST Tourism Index stock prices were also the Granger cause of oil prices. As a result of the study conducted by Huseynli and Huseynli (2022), a bilateral causality relationship was determined between the stock prices of Enerjisa company and BIST energy index values. As a result of the study conducted by Konak and Türkoğlu (2022), it has been determined that both the ownership structures and capital structures have different levels and aspects on the financial performance indicators of the companies included in the Borsa

Istanbul Tourism Index. As a result of the study conducted by Nazlıoğlu (2022), it has been proven that there is a causality from Borsa İstanbul Tourism Index to Global Tourism Index and from USD/TL rate to Borsa İstanbul Tourism Index.

The results obtained are similar to many studies examining the relationship between stock market indices in the literature. However, studies examining the relationship between BIST indices using different econometric methods and variables are limited in the literature. When we consider the tourism index, an increase in the dollar exchange rate and oil prices, especially in developing countries, may cause foreign tourists to see the relevant country as a cheaper holiday alternative, despite the depreciation of the domestic currency. Based on this assumption, the relationship between BIST electricity index and BIST Tourism effect was tried to be measured in the study. The results obtained from the study have concluded that the changes that will occur in the BIST electricity index are not effective on the BIST tourism index. When the Granger causality analysis results are examined, no causality relationship has been detected between the BIST electricity index and the BIST tourism index. This result was found in the literature by Yildirim et al. (2020) are similar to the results. Yildirim et al. (2020), as stated in their study, a decrease in oil prices that may occur due to global developments can reduce the costs of many products and services, and may also reflect positively on the tourism sector in terms of the decrease in transportation costs. The decrease in oil prices also indirectly shows its own effect on the decrease in electricity prices. The results obtained from the study are important in terms of contributing to the literature and the sector in terms of measuring the relationship between the BIST electricity index and the BIST tourism index.

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