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The impact of global uncertainty and risks on the global tourism index

Saffet Akdağ[a*] and Ömer İskenderoğlu[b]

[a]*Tarsus University, Tarsus, Mersin, Turkey, ORCID: https://orcid.org/0000-0001-9576-6786*
[b]*Niğde Ömer Halisdemir University, Niğde, Turkey, ORCID: https://orcid.org/0000-0002-3407-1259*

Abstract

Uncertainties and risks are two leading factors affecting investors' decisions. In the presence of uncertainty, investors may postpone consumption and investment decisions due to a wait-and-see policy, whereas consumption and investment decisions may be abandoned in risky situations. Due to its high demand elasticity, in particular, it renders tourism one of the sectors most affected by the increase in uncertainty and risks. It is aimed to determine whether or not any relationship between the global Economic Policy Uncertainty index (EPU), global Geopolitical Risk Index (GPR), global Volatility Index (VIX), and global tourism index STOXX Global 1800 T&L exists. The probable relationships among the variables are tested using the monthly data obtained over the period from August 2006 to December 2018 via the Johansen cointegration test and DOLS and FMOLS cointegration coefficient estimators. As a result of the study, it is found that there is a long-term relationship between the related indexes and the global tourism index. Additionally, the VIX and the EPU indexes have adverse impacts on the tourism index.

Keywords: *Stock exchange index, EPU, Geopolitical Risk, VIX, Cointegration analysis, FMOLS and DOLS.*

1. Introduction

In the finance literature, uncertainty is expressed as unmeasurable risks. However, the development of new methods for the measurement of uncertainty in recent years may indicate that there will be new theoretical developments for finance literature after a while. New techniques for calculating risks and uncertainties that have been introduced in recent years are based on the repetition of certain keywords in country newspapers or the number of articles written on certain topics. These numbers may indicate some developments and trends in the economy of the relevant country. One of these indexes, the Global Economic Policy Uncertainty Index (EPU), was calculated for the IMF using the method developed by Baker et al. (2016). Similarly, the Geopolitical Risk Index was developed by Caldara and Locaviello (2018) using an algorithm based on the number of news stories containing geopolitical tensions in 11 international newspapers.

Another type of uncertainty is uncertainty in terms of investors' investment processes. In this regard, risk appetite is used as a measure of investors' willingness to take risks in financial markets. In the applied study, the risk appetite is determined by the volatility measurements emerging in the financial markets. Calculated using S&P500 stock options prices, the VIX indicates the expected volatility of the market, and hence, the uncertainty processes related to the investment. Under the uncertainty in financial markets, decision-making processes regarding the future are delayed and market actors wait for the uncertain processes to end. This situation causes the funds to remain idle in the economy, stagnation in the market, and consequently, high costs. As in all other sectors, the tourism sector is also affected by risks and uncertainties.

The tourism sector, in which the price elasticity of demand is high, has been one of the sectors most affected by many risk factors. For this purpose, uncertainties in economic policies, geopolitical risks, and financial risks that cause volatility in global markets are expected to affect the tourism sector of countries. This study aims to determine whether the related uncertainties and risks have impacts on the stock prices of tourism firms. For this purpose, the relationships between STOXX Global 1800 T&L and EPU, GPR, and VIX fear index are analyzed with the cointegration and cointegration coefficient estimators (DOLS/FMOLS) tests. The study consists of five sections. Firstly, the subject is introduced, and in the next section,

*Corresponding author
E-mail addresses: saffetakdag@tarsus.edu.tr *(S. Akdağ)*

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there is a literature review for the variables that are the subject of the study. Afterward, information regarding the methodology and data used in the study is given, and then the findings obtained from the study are mentioned. In the next section, the findings are interpreted and suggestions are made.

2. Literature review

The studies in the literature on whether the EPU, GPR, and VIX fear index, independent variables in the study, have impacts on stock market indexes are summarized below. In related studies, it was stated that risk and uncertainty indexes were generally effective on stock market indexes, but in a few studies, no relationship could be found among the variables. Kang and Ratti (2013) was one of the first studies conducted on the relationship between the uncertainty in economic policies, and stock market indexes.

In the study conducted in the USA, it was stated that the uncertainties in economic policies had a negative effect on the returns of stock market indexes. Another study, Li et al., (2015) was conducted in the USA. In the related study, it was determined that the shocks in the EPU negatively affected the stocks. Another study carried out in the same year was Bayar and Aytemiz (2015). In the study using data obtained from European Union countries, no causal relationship from EPU to stock market indexes could be determined. Similarly, Donadelli (2015), in which the relationship between the stock market index of 10 Asian countries and the uncertainties in the economic policies of the USA was tested, stated that no causality relationship could be detected.

Baker et al., (2016) was one of the first studies conducted on the relationship between the EPU index and stock market indexes. In the related study, the EPU index was created by scanning the words expressing uncertainty from the national newspapers and it was determined that there was a close relationship between the EPU and the share price volatility. Wu et al., (2016), in which the causality relationship between EPU and stock market indexes of 10 selected countries was tested, detected a causal relationship from EPU to stock market indexes only for the United Kingdom. Chen et al., (2017), which was carried out specifically for China, determined that the uncertainties in China's economic policies negatively affect the return of stock market indexes. In the study of Hu et al. (2018), which tested the relationship between China's stock market indexes and the USA's EPU index, it was stated that the shocks in the EPU negatively affected the stock market index with a one-week delay.

Korkmaz and Güngör (2018), which was conducted on the effect of the global economic policy uncertainty index on BIST indexes, concluded that the EPU decreased the returns of the relevant indexes and that the indexes had a significant positive relationship with the return volatility. Similar to the previous study, Tiryaki and Tiryaki (2019), which was carried out specifically for Turkey, stated that the EPU index of the USA had a negative effect on stock market indexes in the short and long run. Chaing (2019), in which G7 countries' data were used, claimed that the EPU had a negative effect on the stock market index returns. In the Jeon (2019) study conducted in Korea in the same year, it was concluded that the USA's EPU index had a negative effect on Korea's stock market indexes. Another independent variable used in the study was the GPR index. İltaş et al. (2017) was one of the first studies aimed at determining the relationship between the geopolitical risk index and stock market indexes. In the study, the relationship between the GPR index and the returns of the stocks of 204 companies traded on the BIST was analyzed using the regression method.

As a result, it was stated that geopolitical risks negatively affected stock returns. Akdağ et al. (2018), in which panel cointegration and panel causality analyses were performed, similarly investigated the effect of the GPR index on the stock market indexes of 12 countries. A long-term relationship among the variables was determined. It was stated that GPR had a negative effect on stock market indexes. Moreover, in the related study, unilateral causality was found from the change in the GPR to the change in stock market prices. Similarly, Apergis et al. (2018), in which causality analysis was used, tested the relationship between the GPR and both the returns and volatility of the stocks of 24 global defense companies. As a result of the analysis, it was stated that GPR was successful in predicting the volatility of stocks, but not in predicting stock returns. Balcilar et al., (2018), in which BRIC countries' data were used, tested the relationship between geopolitical risk and the returns and volatility of the stock market indexes of the countries performing the quantile causality analysis. As a result of the analysis, it was stated that geopolitical risks increased the volatility of stocks. Besides, it was stated that Russia was the country most affected by geopolitical risks, whereas India was the country most resistant to geopolitical risks. Pan (2018), in which panel regression analysis was used, tested the relationship between the GPR index and the stock returns of 17 countries.

According to the test results, it was stated that the increase in the GPR index negatively affected the stock returns. In the same year, Rawat and Arif's (2018) study, which performed the quantile regression analysis using the data obtained from BRIC countries, stated that Brazilian and Russian stock market indexes were more sensitive to geopolitical risks and were negatively affected, but Indian and Chinese stock markets were resistant to geopolitical risks. In the study of Bouras et al., (2019) using the GARCH method, the relationship between the GPR index and the returns and volatility of the stock market indexes of 18 developing countries was tested. The study stated that the GPR index did not affect the stock market returns much, but had a significant effect on the volatility of the stock markets. Bouri et al. (2019), in which a non-parametric causality test was performed, tested the relationship between the GPR index and the Dow Jones Islamic World stock index. According to the

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test results, it was stated that the GPR index affected the volatility of the Dow Jones Islamic World index, but not its returns.

Demiralay and Kılınçarslan (2019), in which four global tourism and travel indexes (TOXX Travel & Leisure Global, STOXX Travel & Leisure Asia-Pacific, STOXX Travel & Leisure Europe, and STOXX Travel & Leisure North America) were used as dependent variables, tested the effects of the relevant indexes of geopolitical risks on global tourism and travel indexes via both linear regression and quantile regression analyses.

The results of the analyses stated that geopolitical risks generally had a negative effect on tourism and travel indexes and such effects were more affected by negative developments related to geopolitical risks. Fleming et al. (1995) was one of the first studies conducted in the USA to determine the relationship between VIX and stock market indexes, and it concluded that the VIX was successful in estimating the volatility in the S&P 100 index and had a negative effect.

Giot (2005), another study conducted in the USA, stated that there was a negative relationship between the returns of stock market indexes and the VIX. The data obtained from 15 countries were used in the study of Korkmaz and Çevik (2009). It was stated that the VIX affected the stock market indexes. In Sarwar's (2012) study, it was stated that there was a negative relationship between the VIX and the returns of the US, India, China, and Brazil stock market indexes. However, a similar relationship could not be detected with the stock market indexes of Russia. In Kaya et al. (2014) utilizing OECD countries' data, it was stated that there was a long-term relationship between OECD countries' stocks and VIX. Kaya and Coşkun (2015), which was carried out in Turkey, stated that there was unidirectional causality from VIX to BIST 100 index and VIX negatively affected BIST 100 index.

Similarly, in Erdoğdu and Baykut (2016) conducted specifically for Turkey, a long-term relationship could not be determined between VIX and BIST Bank index, but unilateral causality was determined from VIX to BIST Bank index. Chen et al., (2017) found that VIX had a negative and significant effect on Chinese stock market indexes. Sarwan and Khan (2017), which was conducted in the same year, stated that the VIX negatively affected the stock returns of Latin American countries.

In the study of İskenderoğlu and Akdağ (2018), the relationship between stock market indexes of 11 countries and VIX was tested. It was stated that there was causality from the VIX to the stock market indexes of nine other countries, excluding the Germany and USA. In another study, Akdağ et al. (2019) investigated the effect of VIX on tourism indexes. According to the findings of the study, the changes in the VIX in a significant part of the countries under examination, the increase in the tourism index was found to be the cause of the decrease.

3. Data and method

In the study, the monthly frequency data of EPU, GPR, and VIX risk appetite index and STOXX Global 1800 T&L index obtained over the period between August 2006 and December 2018 were used. STOXX Global 1800 T&L index, which is one of the independent variables of the study, consists of tourism companies from various Countries of Europe and Asia, most of which are US tourism companies, that have tourism company characteristics (www.stoxx.com). The Economic policy uncertainty (EP) index, which is calculated using the method developed by Baker et al., (2016), is calculated on a monthly basis, and it is calculated separately for Europe in general and 26 countries, especially the global economic policy uncertainty index. The EPB index is calculated by scanning the national newspapers of the countries and considering various keywords such as economic policy and uncertainty.

The EPB was obtained from the website www.policyuncertainty.com. The geopolitical risk (GPR) index has been started to be calculated at the Federal Reserve Board with the study of Caldara and Iacoviello (2017). In the related study, geopolitical risk is defined as the risk associated with wars, acts of terrorism, and tensions between states that affect the normal and peaceful course of international relations. The geopolitical risk index has been created with an algorithm that counts the frequency of the articles in the newspapers published in the USA, England, and Canada on the international geopolitical risks. GPR data were obtained from the website www.policyuncertainty.com. The volatility index (VIX), which is also accepted as the global risk appetite index, is calculated by using the American-style call and put option price activity, which includes the S&P 100 index, which has been calculated since 1993 and has 30 days to maturity. VIX data was obtained from the Chicago Options Exchange (CBOE) website http://www.cboe.com/.

Determining whether the dependent and independent variables used in the study are stationary is the primary step of the application in similar studies. Stationarity can be examined by means of unit root tests. Yule (1926) stated in his study that in the case of analysis with economic data, the data should be stationary. The Augmented Dickey Fuller-ADF- tests developed in the study of Dickey and Fuller (1981) and The Philips & Perron-PP- tests developed in the study of Philips and Peron (1988) are the most frequently used unit root tests. ADF assumes that the error terms are statistically independent and have constant variance (Asteriou and Hall, 2011:345). The PP test, conversely, has weaker assumptions and is generally accepted to be more reliable than the ADF test (Fabozzi et al., 2014:197).

Cointegration analyzes are used to determine whether there is a long-term equilibrium relationship between the variables (Gujarati and Porter, 2012:762). To perform a cointegration analysis between the variables, the related series must be equally integrated and not stationary. (Dikmen, 2012:321). Johansen cointegration test was developed in the

study of Johansen (1988) and Johansen and Juselius (1990) and is based on VAR analysis, which includes the level and lag value of stationary series at the same level. (Tari and Yıldırım, 2009:100). Related VAR Model is given in Equation (1) (Greene, 2012:1006).

$$y_t = \Gamma_1 y_{t-1} + \Gamma_2 y_{t-2} + \cdots + \Gamma_p y_{t-p} + \varepsilon_t \quad (1)$$

The cointegration relationship can be tested with the "trace statistics". The trace statistics can be shown as in Equation (2) (Greene, 2012).

$$\gamma_{tr} = -T \sum_{i=r+1}^{M} ln[1 - (r_i^*)^2] \quad (2)$$

DOLS (Dynamic Ordinary Least Square - Dynamic Least Squares) developed in the study of Saikkonen (1991) and Stock and Watson (1993), and FMOLS (Full Modified Ordinary Least Square - Fully Transformed Least Squares) developed in the study of Phillips and Hansen (1990), Cointegration They are the most widely used methods for estimating the coefficients. DOLS and FMOLS estimator is given in equation (3) and equation (4 and 5) (Breitung and Pesaran 2008:310; Narayan and Wong, 2009:2774).

$$\gamma_{it} = \acute{\beta} x_{it} + \sum_{k=-\infty}^{\infty} \acute{\gamma}_k \Delta x_{it-k} + \mu_{it} \quad (3)$$

$$y_{it} = \alpha_{it} + \beta x_{it} + \varepsilon_{it} \quad (4)$$

$$x_{it} = x_{i,t-1} + \varepsilon_{it} \quad (5)$$

Below is the explanation of the symbols.
β: cointegration vector, x_{it}: independent variable, γ_{it}: dependent variable, μ: error term

4. Findings

This study, in which the relationship between the EPU, GPR, and VIX risk appetite index and the STOXX Global 1800 T&L index was tested, first of all, calculates the descriptive statistics of the data of the variables used in the analysis. The relevant statistics are presented in Table 1.

Upon evaluating the descriptive, it is seen that the highest volatility is in the GPR; whereas the lowest volatility is in the STOXX Global 1800 T&L index. In the study, the unit root tests are performed on the variables prior to the Johansen Cointegration analysis and the cointegration coefficient estimators DOLS and FMOLS analysis. Unit root test results are presented in Table 1.

As regards the cointegration test results shown in Table 3, it is determined that there are at least two cointegrating vectors among the variables, so there are long-term relationships among the variables. In Table 4, the cointegration coefficient estimator DOLS and FMOLS test results are presented. Upon evaluating the unit root test results, it is determined that the series are not stationary at the level, but are stationary in the difference series. The results of the Johansen cointegration test performed to determine whether a long-term relationship exists among the variables used in the analysis are presented in Table 3.

Table 1. Descriptive statistics

Variables	Mean	Maximum	Minimum	Standard Deviation
lnSTOXX Global 1800 T&L	5.650640	6.211744	4.890349	0.341243
lnEPU	4.828111	5.741603	3.916534	0.387150
lnGPR	4.449560	5.481530	3.701455	0.432169
lnVIX	2.888588	4.092510	2.252344	0.369125

Table 2. Unit root test results

Variables	PP		ADF	
	Constant	Constant & Trend	Constant	Constant & Trend
lnSTOXX Global 1800 T&L	-0.2661	-1.8675	-0.2563	-1.8595
ΔlnSTOXX Global 1800 T&L	-19.3571*	-11.9722*	-4.0290*	-4.1411*
lnEPU	-2.1832	-3.4996**	-2.0876	-2.9748
ΔlnEPU	-13.8036*	-13.7540*	-13.8313*	-13.7836*
lnGPR	-3.5397**	-7.0080*	-1.3907	-1.9248
ΔlnGPR	-62.1969*	-57.5975*	-15.9931*	-15.9442*
lnVIX	-2.4242	-3.5406**	-1.8289	-3.2036
ΔlnVIX	-14.9329*	-14.9174*	-14.9570*	-14.9301*

*Significant at the 1% significance level.

Table 3. Johansen cointegration test results

STOXX Global 1800 T&L $= \alpha + \beta_1 EPB_{t-i} + \beta_2 JPR_{t-i} + \beta_3 VIX_{t-i} + \varepsilon_t$			
H_0	H_1	Trace Statistics	Maximum Eigenvalue Statistics
r = 0	r≥ 1	79.1942*	39.8414*
r≤ 1	r≥ 2	39.3528**	25.7358**
r≤ 2	r≥ 3	13.6169	10.2854
r≤ 3	r≥ 4	3.3315	3.3315

* Significant at 1%, **5% significance level.

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Table 4. DOLS and FMOLS test results

DOLS Results		
	Coefficient	t − statistics
lnEPU	-0.1406	-3.2182*
lnGPR	0.0641	1.3560
lnVIX	-0.2867	-8.5421*
FMOLS Results		
	Coefficient	t − statistics
lnEPU	-0.1957	-1.9483**
lnGPR	0.0655	0.7641
lnVIX	-0.3369	-3.9249*

$* Signifinant\ at\ \%1, ** Significant\ at\ 5\%$

According to the DOLS and FMOLS results presented in Table 4, it is determined that increases in the EPU and VIX risk appetite index negatively affected the STOXX Global 1800 T&L index. Results on the EPU index comply with of Kang and Ratti (2013), Li, Zhang and Gao (2015), Chen, Jiang and Tong, (2017), Hu et al., (2018), Korkmaz and Güngör (2018), Tiryakioğlu and Tiryakioğlu (2019), Chaing (2019) and Jeon (2019) study. However, the results of the study differ from the studies of Bayar and Aytemiz (2015) and Donadelli (2015), in which different data ranges, different countries, and different stock market indexes are used.

The results for VIX are in Fleming et al. (1995), Giot (2005), Korkmaz and Cevik (2009), Sarwar (2012), Kaya et al., (2014), Kaya and Coşkun (2015), Chen et al., (2017), Sarwan and Khan (2017) and İskenderoğlu and Akdağ (2018). However, it differs from the study of Erdoğdu and Baykut (2016). Furthermore, it is seen that the VIX has a greater impact on the STOXX Global 1800 T&L index than the EPU index. It is found to have a statistically significant effect on the GPR index. Although the related result is in line with the results of Apergis et al., (2018) and Bouri et al., (2019), it does not comply with of the studies such as İltaş, Arslan and Kayhan, (2017), Akdağ, Yıldırım and Kesebir, (2018), Pan (2018) and Demiralay et al. Kılınçarslan (2019), in which different data ranges and different indexes were used.

5. Conclusion and discussion

Uncertainty and risks are among the factors that affect investors' investment decisions. In cases of uncertainty, investors delay their investment decisions due to the wait-and-see policy. In risky situations, investors may abandon their investment decisions. In this study, it is tested whether uncertainty and risk indicators have an effect on the stocks of tourism firms. In this context, the relationship between the global economic policy uncertainty index (EPU), the World uncertainty index (WUI), the global geopolitical risk index (GPR) and the global risk appetite index (VIX), and the global tourism index (STOXX Global 1800 T&L) is tested with the Johansen cointegration, DOLS and FMOLS tests.

In the study, the monthly data of the relevant indexes obtained over the period between August 2006 and December 2018 are used. As a result of the study, a long-term relationship is determined among the tourism index and the uncertainty and risk indexes included in the analysis. It is determined that the independent variables EPU and VIX risk appetite index have a negative and significant effect on the STOXX Global 1800 T&L index. It is also found that VIX affected the STOXX Global 1800 T&L index more than the EPU index. It is determined that the GPR index does not have a significant effect on the STOXX Global 1800 T&L index.

When the results are evaluated, the effects of EPU and VIX risk appetite index on tourism stock indexes are found to be compatible with expectations. As a matter of fact, the increase in the relevant indexes indicates that the uncertainties and risks in global markets have increased, and the increasing uncertainty and risk both affect the decisions of investors and affect the consumers' spending preferences. When the uncertainty and risks in the market increase, investors would avoid investing in stocks. Because stock markets are one of the investment tools most affected by this situation (Whaley, 2000:17).

In addition, consumers will be able to reduce or postpone their consumption expenditures against the possibility of crisis due to uncertainties in the markets. In this case, the first cut in expenditures will occur in holiday expenditures with high demand-price elasticity (Song et al., 2010:378). The best example of this situation is the 2008 global crisis, which caused high levels of uncertainty in the markets. In the relevant period, it caused great decreases in tourism revenues (Papatheodorou et al., 2010:39).

Consequently, it can be suggested that investors who would invest in tourism companies should monitor micro and macroeconomic factors as well as uncertainty and risk indicators such as EPU and VIX risk appetite index during their investment decision-making process. In terms of tourism companies, it can be recommended to follow the changes in uncertainty and risk indexes such as EPU and VIX as well as economic factors in their projections and planning for the future. The analysis is carried out only on the global tourism index. It is thought that performing analyses using tourism indexes of both developed and developing countries in future studies would contribute to the literature.

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Author contribution statements

S Akdağ and Ö. İskenderoğlu contributed equally to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

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All responsibility belongs to the researchers. All parties were involved in the research of their own free will.

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