

The USA–China trade policy uncertainty and inference for the major global south indexes

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Abstract

Purpose – The recent dynamics of trade policy, especially that is associated with the United States of America (USA) and China, has not only triggered policy adjustments in two economies, it has also implied an uncertainty spillover to other economies across the globe. Consequently, the current study attempts to examine the effect of uncertainties in the USA–China trade policies on stock market indexes. In addition, the cointegration evidence between the USA–China trade policy uncertainty index and of the leading Global South fragile quintet (Brazil, Indonesia, South Africa, India and Turkey) stock market indices is investigated.

Design/methodology/approach – Mainly, the FMOLS and DOLS Granger causality analysis with cointegration coefficient estimators were employed for the dataset over the monthly data period of March 2003 and July 2019.

Findings – Accordingly, the study found a long-term relationship between the USA–China Trade Policy Uncertainty index and the stock exchange indexes. In addition, a causal relationship was established from the change in the USA–China Trade Policy Uncertainty index to the change in the stock market indexes of almost all of the examined countries (Brazil, Indonesia, South Africa, India and Turkey). In addition, the nonlinear Autoregressive Distributed Lag approach further offers evidence of asymmetric relationship among the examined indicators.

Originality/value – Moreover, this study contributed to the existing literature because it employed the indexes of BIST100, BOVESPA, BSE Sensex 30, IDX Composite and South Africa 40 in a novel approach. Thus, the study posited a useful policy guideline for associated economic uncertainties arising from the trade dispute, such as the case of the world's two largest trading giants or partners (i.e. the USA and China).

Keywords Trade policies, Uncertainty, Stock index, Causality analysis, Cointegration analysis

Paper type Research paper

1. Introduction

In reality, people make most of their decisions under uncertainty. Therefore, determining the effects of uncertainties on decision processes has been the focus of attention of researchers (Liu, 2010). Since uncertainties in the field of the economy affect all segments of society, they are carefully followed by both financial authorities and market players. Theoretically, in a period of intense uncertainty, the best option for investors is a wait-and-see policy. Expectedly, investors can postpone their investment decisions in an environment of uncertainty. This situation can also affect both national and international trade. (Bernanke, 1983; Bloom, 2009; Akdag, 2020). In recent times, the interaction between the uncertainty in trade policy and market dynamics is being exemplified by the effect of the recent escalation of the trade conflict between the USA and China (Tsai, 2017; Chen and Chiang, 2020). Consequently, the impact of the USA–China trade conflict has not only been felt in the two countries but also expected to exhibit a significant



spillover effect in the emerging markets and other active markets across the globe. Thus, this seeming effect, such as the global financial crisis of 2008, has further shown that economic policy uncertainties arising from the trade policy tussle between the two largest economies, i.e. the USA and China, have continued to influence economic dynamics. To a large extent, the trade tussle has often been attributed to the driving force of the economic and financial markets. The dynamism in the financial market and economic performance has not only reflected the importance of the two aspects, but it has continued to provide the foundation that underpins the degree of uncertainty associated with the economies across the globe. For instance, the study of [Mundell \(1963\)](#) has not only provided useful information on the dynamism between exchange rate and interest rate, but it has also further unraveled the trend of capital flow, trade balances among economies and economic expansion potential. In addition, exchange rate and interest rate dynamics account for the differential of domestic and international interest rates. More importantly, the fluidity of macroeconomic variables, and to a large extent, the variability of the economic indices are almost inseparable from other important financial indicators such as the stock market indexes ([Abbas *et al.*, 2018](#); [Sikarwar, 2018](#)).

However, the variability or otherwise called the uncertainty in the financial markets, such as the stock market, cannot be overemphasized ([Tran, 2019](#)). The surge in the volatility of the stock market after the last global financial crisis of 2008–2010 has continued to be the source of concern to policymakers and market practitioners across the globe. For instance, several studies have not only demonstrated the relationship between uncertainty and the stock market but also between the magnitude of the impact of uncertainty and the stock market, especially in the period of high volatility ([Martens and Zein, 2004](#); [Schwert, 1981](#); [Antonakakis *et al.*, 2013](#); [Karnizova and Li, 2014](#); [Yang and Jiang, 2016](#); [Xiong *et al.*, 2018](#)). Specifically, [Yang and Jiang \(2016\)](#) and [Xiong *et al.* \(2018\)](#), among several other extant studies, opined that there is a significant relationship between economic policy uncertainty and the stock market dynamics. This is why the uncertainty in the economic policy, such as the trade policy of the USA and China, has remained a rallying point for the global financial markets such as the stock markets and the global economy. Importantly, the recent USA–China trade conflict has so far revealed that trade policy uncertainty (of China and the USA economies) exerts a far-reaching effect on the emerging global markets.

Considering this motivation, examining the effect of trade policy uncertainty arising from the USA–China trade conflict cannot be more timely. Thus, the current study is primarily designed to examine the relationship between the USA and China's trade policy uncertainties and the volatility of the selected stock market indexes. Accordingly, the BIST100, BOVESPA, BSE Sensex 30, IDX Composite and South Africa 40 stock market indexes for selected countries (Turkey, Brazil, India, Indonesia and South Africa, respectively) were employed along with the trade policy uncertainty indexes for the USA and China over the period January 2000 and July 2019. Importantly, these indexes are the major indexes of the Global South [1]. From a novel perspective, the current study has the potential of making a significant contribution to existing literature. In particular, to the author's best knowledge, this is among the first empirical study that explored the indexes of BIST100, BOVESPA, BSE Sensex 30, IDX Composite and South Africa 40. Additionally, the contribution of this study to the body of knowledge is unique in the sense that it employed the trade policy uncertainty, especially for the two largest global economies (the USA and China), in a novel approach. Last, several cointegration techniques were employed in order to articulate the evidence of cointegration between the aforementioned variables.

The other part of the study is arranged such that highlights of the extant studies are provided in the next section (2). The data and methodology are captured in [Section 3](#), while the findings of the investigation are discussed in [Section 4](#). In the last [Section 5](#), the conclusion with policy implication is presented.

2. Related literature: a highlight

The increasing threats of tariff imposition and retaliations, especially among the world's largest trade partners such as the USA and China has consistently been linked with the uncertainty in global trade policy, thus affecting the volatility of the markets (Baker *et al.*, 2019). In recent times, different approaches have been employed to examine market performance from the perspective of the spillover effects from trade policy uncertainty (Feng *et al.*, 2017; Lakatos and Nilsson, 2017; Crowley *et al.*, 2018; Gozgor *et al.*, 2019; Steinberg, 2019). While using the two data-type (i.e. the firm-level and aggregate data) to construct the trade policy uncertainty, Caldara *et al.* (2020) examined the effect of trade policy uncertainty on the economy of the USA. In specific, Caldara *et al.* (2020) found and attributed the 1.5% reduction in the US investments in 2018 to the dynamics in trade policy uncertainty. In addition, Bianconi *et al.* (2020) employed the quasi-experimental variation in relation to China's preferential tariff treatment between 1990 and 2001 to examine the dynamics of trade policy uncertainty. Importantly, the study found that the annual risk premium of 6% was associated with the companies with more exposure to risk and relatively larger in sectors that shared minimal protection from globalization and extensive reliance on inputs from China.

In a related study, Gozgor *et al.* (2019) examined the relationship between trade policy uncertainty and Bitcoin returns, especially for the case of the USA. By exploring the wavelength analysis techniques, Gozgor *et al.* (2019) found a positive correlation between Bitcoin returns and trade policy uncertainty. In addition, the result showed that there are significant regime changes in both the Bitcoin returns and trade policy uncertainty in the two periods of 2010–11 and 2017–18, thus depicting a negative relationship between the two variables in the two regime periods. Similarly, Kang and Ratti (2013) and He *et al.* (2020) are among the studies that have explored the relationship between the returns of stock markets and trade policy uncertainty. In specific, He *et al.* (2020) considered the USA–China trade conflict in examining the link between trade policy uncertainty and the stock market. By employing the time-varying vector autoregressive model (TVP-SV-VAR), the result opines that the US trade policy uncertainty exerts a strong dimension of impact on both the USA and Chinese stock markets. Although the impact of the USA–China trade conflict is positive on the USA stock market, such impact is negative on the Chinese stock market.

In addition, Feng *et al.* (2017) and Crowley *et al.* (2018) examined the dynamics of trade policy uncertainty, specifically for the case of China from the perspective of export and foreign market entry. By employing the Chinese customs transactions between 2000 and 2009, Crowley *et al.* (2018) found that the volatility of trade policy uncertainty significantly affects the Chinese market products, especially by hampering the likelihood of entry and exit of Chinese products to the foreign markets. Importantly, the study revealed that the use of contingent tariffs obviously hampered the entry of Chinese products into foreign markets by about 2% per year. Similarly, Feng *et al.* (2017) examined the impact of trade policy uncertainty on the Chinese firms' export decisions to the USA and the European Union markets. Notably, the study found that the uncertainty in trade policy uncertainty simultaneously triggered firm exits and firm entries into export activity within fine product-level markets. Moreover, Feng *et al.* (2017) opined that firms that supply higher quality products at relatively lower prices easily access the export markets, while firms that produced lower quality at relatively higher prices easily exited the market. However, while Steinber (2019) revealed other macroeconomic impacts of trade policy uncertainty in the context of the BREXIT plan of the United Kingdom, other related studies have implied that economic and trade policy uncertainties significantly exert varying financial and macroeconomic impacts (Li *et al.*, 2016; Alola and Uzuner, 2020; Uzuner and Adewale, 2019; Akadiri *et al.*, 2020).

3. Data and methodology

3.1 Data

In this study, the fragile quintet (Turkey, Brazil, India, Indonesia and South Africa) countries' stock market indexes of BIST100, BOVESPA, BSE Sensex 30, IDX Composite and South Africa 40 are examined alongside the trade policy uncertainties of the USA and China. The largest possible monthly data range for BIST100, BOVESPA, IDX Composite and South Africa 40 index was used, thus covering between January 2000 and July 2019, and BSE Sensex 30 index between March 2003 and July 2019. Stock indexes data were obtained from the online source (from www.investing.com). The trade policy uncertainty index is an index created by scanning the words developed in [Caldara *et al.* \(2020\)](#), with phrases including trade policies in countries' national newspapers, trade policy and uncertainty in news and articles. Related index data are obtained from the website www.policyuncertainty.com.

3.2 Methodology

3.2.1 Unit root estimate. In the study, ADF and PP unit root tests were used to determine whether the data were stationary before Johansen cointegration and Granger causality analysis. Traditional unit root tests used to determine whether the data sets are stationary are the Extended Dickey–Fuller (ADF) test developed in the study of [Dickey and Fuller \(1981\)](#), and the Philips Perron (PP) test of [Philips and Peron \(1988\)](#). The ADF test fixed the error terms that are based on the assumption that they have variance and are statistically independent ([Asteriou and Hall, 2011](#)). On the other hand, the PP test has weaker assumptions than the ADF unit root testing and is generally considered more reliable ([Fabozzi *et al.*, 2014](#), p. 197).

3.2.2 Cointegration techniques. Cointegration techniques are used to determine whether at least two variables are in a long-term equilibrium relationship ([Gujarati *et al.*, 2012](#)). The Johansen cointegration test developed in the study of [Johansen \(1988\)](#) and [Johansen and Juselius \(1990\)](#) is based on the VAR analysis covering the level and lag value of the same stationary series ([Fari and Yildirm, 2009](#)). The model developed in the study of [Johansen \(1988\)](#) is largely based on the degree of a matrix and the relationship between its characteristic roots ([Enders, 2015](#)). The VAR model on which the Johansen cointegration test is based can be expressed as follows ([Greene, 2012](#)).

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

3.2.3 The long-run cointegration. The most commonly used methods for estimating cointegration coefficients are FMOLS (Full Modified Ordinary Least Square) and DOLS (Dynamic Ordinary Least Square) of [Phillips and Hansen \(1990\)](#), [Hansen and Phillips \(1990\)](#), [Saikkonen \(1991\)](#) and [Stock and Watson \(1993\)](#). The (Transformed Least Squares) estimators of [Pedroni \(2001\)](#) contributed to the use of estimators in the study of panel data. The DOLS method, which is a parametric approach, is an approach that corrects autocorrelation by adding the delayed first differences to the model. On the other hand, the Panel DOLS estimator is expressed as follows ([Breitung and Pesaran, 2008](#)).

$$y_{it} = \beta' x_{it} + \sum_{k=-\infty}^{\infty} \gamma'_k \Delta x_{it-k} + \mu_{it} \quad (2)$$

y_{it} : It refers to the dependent variable, x_{it} : argument, β : Cointegration vector, μ : Error term.

Unlike the DOLS method, the FMOLS method is a nonparametric approach. In the FMOLS method, the presence of a possible relationship between the constant term, the error term and the differences of independent variables are taken into account. The panel FMOLS estimator is as follows ([Narayan and Wong, 2009](#)).

$$y_{it} = \alpha_{it} + \beta x_{it} + \varepsilon_{it} \tag{3}$$

$$x_{it} = x_{i,t-1} + \varepsilon_{it} \tag{4}$$

3.2.4 *Granger causality.* After determining whether the series is stationary or not, the causality relationship between the stationary series was analyzed by the [Granger \(1969\)](#) causality test. In [Granger \(1969\)](#) causality test, the mutual relations of both variables were analyzed with [equations \(1 and 2\)](#) below.

$$y_t = \alpha_0 + \sum_{i=1}^n \alpha_i x_{t-i} + \sum_{j=1}^n B_j y_{t-j} + u_{1t} \tag{5}$$

$$x_t = \lambda_0 + \sum_{i=1}^n \lambda_i x_{t-i} + \sum_{j=1}^n \delta_j y_{t-j} + u_{2t} \tag{6}$$

In addition to the above linear estimation approaches, this study further seeka to reveal potential evidence of nonlinearity among the investigated indicators. While acknowledging the vulnerability of financial and associated market indicators to shock that is capable of exerting a positive and negative impact ([Olanipekun and Alola, 2020](#)), the nonlinear Autoregressive Distributed Lag (ARDL) of [Shin *et al.* \(2014\)](#) is consequently applied. Although the detail and step-by-step representation of the estimation are not presented here because of space constraints, the result is indicated in the subsequent section.

4. Findings and discussion

The statistical description of the variables used in the analysis are given in [Table 1](#).

When the relevant statistics in [Table 1](#) are evaluated, it is determined that the volatility in the BIST100 index is higher than other stock market indexes. In addition, the Chinese Trade Policy Uncertainty (China_TPU) index was found to be more volatile than the US Trade Policy Uncertainty (USA_TPU) index. Also, when the average values are analyzed, it is seen that uncertainties in China’s trade policies are higher than in the USA. In [Table 2](#), unit root test results of the variables are given.

According to the unit root test results in [Table 2](#), it shows that some of the examined series are stationary in the level while other series are stationary after the first difference. According to these results, Johansen cointegration analysis can be carried out with the level values of the series and Granger causality analysis in the difference series.

4.1 BIST 100 index and US–China trade policy uncertainty index

4.1.1 *Cointegration evidence.* This section illustrates the cointegration evidence between the BIST 100 Index and the US–China Trade Policy Uncertainty Index. Specifically, [Table 3](#)

Table 1.
Descriptive statistics

Variables	Average	Maximum	Minimum	SD
China_TPU	117.07	1425.16	7.10	177.52
USA_TPU	99.98	1374.28	10.56	161.59
BIST 100	51975.71	119528.80	7625.87	30523.95
BOVESPA	46614.77	101812.10	8622.54	22862.71
BSE Sensex 30	19089.15	39714.20	2959.790	9474.883
IDX composite	2940.44	6605.63	358.23	2029.58
South Africa 40	3079.33	6025.10	778.10	1701.07

Variables	ADF		PP	
	Constant	Constant and trend	Constant	Constant and trend
China TPU	2.5609	1.7374	−7.1757*	−9.4717*
ΔChina TPU	−4.3676*	−4.9342*	−40.3408*	−45.8449*
USA_TPU	1.9814	1.0202	−5.2901*	−6.0103*
ΔUSA_TPU	−6.0544*	−6.7745*	−24.3288*	−28.0786*
BIST 100	−0.6593	−3.9284**	−0.607516	−4.0201*
ΔBIST 100	−16.1554*	−16.1311*	−16.1569*	−16.1337*
BOVESPA	−0.0492	−1.6409	−0.2339	−1.9165
ΔBOVESPA	−13.5435*	−13.5622*	−13.5323*	−13.5488*
BSE Sensex 30	−0.4772	−2.6684	−0.4569	−2.8268
ΔBSE Sensex 30	−13.9743*	−10.7681*	−13.9757*	−13.9404*
IDX composite	0.2077	−3.4195	0.1255	−3.4195
ΔIDX composite	−13.2474*	−13.2538*	−13.2892*	−13.2941*
South Africa 40	−0.3325	−2.9113	−0.3325	−2.8943
Δ South Africa 40	−17.2104*	−17.1804*	−17.2023*	−17.1724*

Note(s): * Significant at 1% significance level while Δ indicate the first difference

Table 2.
Unit root test results

$BIST100 = \alpha + \beta_1 \text{China TPU}_{t-i} + \beta_2 \text{USA TPU}_{t-i} + \varepsilon_t$			
H_0	H_1	Trace statistics	Maximum eigenvalue statistics
$r = 0$	$r \geq 1$	50.8453*	35.1521*
$r \leq 1$	$r \geq 2$	15.6931**	15.2410**
$r \leq 2$	$r \geq 3$	0.4521	0.4521

Note(s): * 1%, ** 5% significance level. The H_0 and H_1 respectively indicate the null and alternate hypothesis

Table 3.
Johansen cointegration test results

shows the results of the Johansen cointegration test, in which the BIST100 index is employed as the dependent variable while the USA–China Trade Policy Uncertainty indices are included in the analysis as the independent variable.

Regarding the results in Table 3, where the Johansen cointegration test results are evaluated, it shows that at least two vectors are cointegrated. Accordingly, the variables act together in the long term. In other words, the USA–China Trade Policy Uncertainty index affects the BIST100 index in the long run.

4.1.2 The long-run estimates. In order to determine in which direction this effect is, FMOLS and DOLS tests, which are cointegration coefficient estimators, were conducted. The results of the related tests are given in Table 4.

In regard to the test results of the cointegration coefficient estimators in Table 4, the result revealed that the US Trade Policy Uncertainty index has a negative effect on the BIST100

DOLS results		
	Coefficient	t-statistic
China_TPU	498.7136	3.2994*
USA_TPU	−635.0495	−2.6582*
FMOLS results		
	Coefficient	t-statistic
China_TPU	130.5392	11.3488*
USA_TPU	−32.45809	−2.6992*

Note(s): * 1%, ** 5% significance level

Table 4.
DOLS VE FMOLS test Sonuçları

index according to both FMOLS and DOLS tests. In this context, as uncertainties in US trade policies increase, the BIST100 index is affected negatively, thus indicating the high vulnerability of the BIST100 index to the dynamics of the US Trade Policy Uncertainty. However, the effect of China's Trade Policy Uncertainty index on the BIST100 index is found to be positive. Indicatively, as uncertainty in China's trade policies increases, the BIST100 index is positively and significantly affected. In Table 5, causality results from the change in the US–China Trade Policy Uncertainty index to the change in BIST100 index are also given.

4.1.3 Granger causality evidence. According to the Granger causality analysis results in Table 5, it was determined that there is a causality from the change in the USA–China Trade Policy Uncertainty index to the change in the BIST100 index. In this context, it can be stated that the uncertainties are one of the reasons for the changes in BIST100 index.

4.1.4 Nonlinear ARDL evidence. As earlier indicated, the nonlinear ARDL test results showing the relationship between USA_TPU and positive and negative shocks in China_TPU indices and BIST100 index are given in Table 6.

According to the result of the FPSS test in Table 6, we find that there is a nonlinear cointegration between the variables. In specific, the result revealed that a positive shock in the USA_TPU index has a negative effect on the BIST100 index, while a negative shock in the USA_TPU does not have a significant effect on the BIST100 index both in the short run. It is interesting to mention that there is no long-run effect for either positive or negative shock.

In addition, a positive shock in China_TPU has a positive effect on the BIST 100 index, while the impact of a negative shock in the China TPU exerts a negative effect on the BIST100 index in the short run. Similarly, the long-run effect of a shock in China_TPU indices does not have a significant effect on the BIST100 index. By considering the diagnostic perspective of the estimation, further estimation shows that there is no autocorrelation problem in the model (X^2_H : LM test), there is no changing variance (X^2_{SC} : ARCH Test), and the structure of the model is correct (X^2_{FF} : Ramsey Reset Test).

Table 5.
Granger causality
test results

Direction of causality	F-statistic	Lag	Results
Δ China_TPU $\rightarrow$ Δ BIST 100	2.1797*	12	Granger has causality
Δ USA_TPU $\rightarrow$ Δ BIST 100	1.81378*	12	Granger has causality
Note(s): * Significant at 5% significance level			

Table 6.
Nonlinear ARDL
test results

Variable	Long-run parameters		Short-run parameters	
	Coefficient	Statistics	Coefficient	Statistics
USA_TPU ₊	−707.0811	−1.0262	−10.4559**	−2.4830
USA_TPU _−	−692.9225	−1.0054	4.8049	0.9358
China_TPU ₊	193.9082	0.6565	8.1012**	2.0710
China_TPU _−	167.3357	0.6986	−13.5488**	−2.4049
ECM _{t-1}			−0.1947*	−6.4433
F _{PSS}	4.2347**			
Diagnostic test				
	Statistics	p value		
X^2_{SC}	1.6161	0.2017		
X^2_H	1.5237	0.2184		
X^2_{FF}	0.5007	0.6172		
Note(s): * and ** are respectively the 1 and 5% statistical significance level				

4.2 The BOVESPA index and the US–China trade policy uncertainty index

4.2.1 Cointegration evidence. The presentation in Table 7 shows the results of the Johansen cointegration test between the BOVESPA Index and the USA–China trade policy uncertainty. While the BOVESPA index is employed as the dependent variable, the USA–China Trade Policy Uncertainty indices are incorporated in the analysis as independent variables.

When the results in Table 7, where the Johansen cointegration test results are included, it is seen that at least two vectors are cointegrated. Accordingly, the variables act together in the long term. In other words, the USA–China Trade Policy Uncertainty index affects the BOVESPA index in the long run.

4.2.2 The long-run evidence. In order to determine in which direction this effect is, the FMOLS and DOLS tests, which are cointegration coefficient estimators, were conducted. The results of the related tests are given in Table 8.

Regarding the test results of the cointegration coefficient estimators in Table 8, the investigation found that the US Trade Policy Uncertainty index has a negative effect on the BOVESPA index according to both FMOLS and DOLS tests. In this context, as uncertainties in USA trade policies increase, the BOVESPA index is significantly affected negatively. However, the effect of China's Trade Policy Uncertainty index on the BOVESPA index is found to be significant and positive. Therefore, as uncertainty in China's trade policies increases, the BOVESPA index is positively affected.

4.2.3 Granger causality evidence. In Table 9, causality results from the change in the USA–China Trade Policy Uncertainty index to the change in BOVESPA index are given.

$\text{BOVESPA} = \alpha + \beta_1 \text{China TPU}_{t-i} + \beta_2 \text{USA TPU}_{t-i} + \varepsilon_t$			
H_0	H_1	Trace statistics	Maximum eigenvalue statistics
$r = 0$	$r \geq 1$	41.79402*	26.25665*
$r \leq 1$	$r \geq 2$	15.53737*	15.46789*
$r \leq 2$	$r \geq 3$	0.0695	0.0695

Note(s): * 1%, ** 5% significance level

Table 7.
Johansen cointegration
test results

DOLS results		
	Coefficient	<i>t</i> -statistic
China_TPU	569.7129	6.044278*
USA_TPU	−839.3813	−5.634260*
FMOLS results		
	Coefficient	<i>t</i> -statistic
China_TPU	1319.271	5.1945*
USA_TPU	−619.0689	−2.1774**

Note(s): * 1%, ** 5% significance level

Table 8.
DOLS and FMOLS
test results

Direction of causality	<i>F</i> -statistics	Lag	Result
$\Delta \text{China_TPU} \rightarrow \Delta \text{BOVESPA}$	1.9416**	10	Granger has causality
$\Delta \text{USA_TPU} \rightarrow \Delta \text{BOVESPA}$	3.51087**	2	Granger has causality

Note(s): ** Significant at 5% significance level

Table 9.
Granger causality
test results

According to the Granger causality analysis results in Table 9, it has been determined that there is a causality from the change in the USA–China Trade Policy Uncertainty index to the change in the BOVESPA index. In this context, it can be stated that the related uncertainties are one of the reasons for changes in BOVESPA index.

4.2.4 Nonlinear ARDL evidence. In Table 10, nonlinear ARDL test results also indicate the relationship between the shock in USA_TPU China_TPU indices and the BOVESPA index.

According to the F test result in Table 10, it is seen that there is a nonlinear cointegration between the variables. Concerning the short-term effect, a negative shock in the USA_TPU index exerts a significant and positive effect on the BOVESPA index, while a positive shock in the USA_TPU index does not have a significant effect. Contrarily, a negative and positive shock in the China_TPU index does not have a significant effect on the BOVESPA index. In the long run, neither positive nor negative shock in both the USA_TPU and China_TPU indices exert a significant effect on the BOVESPA index. According to the diagnostic test results, it is seen that there is no autocorrelation problem in the model (X^2_H : LM test), there is no changing variance (X^2_{SC} : ARCH Test) and the structure of the model is correct (X^2_{FF} : Ramsey Reset Test).

4.3 The IDX composite index and the US–China trade policy uncertainty index

4.3.1 Cointegration evidence. Table 11 shows the results of the Johansen cointegration test, in which the IDX Composite index is the dependent variable while the USA–China Trade Policy Uncertainty indices are included in the analysis as the independent variables.

From the results of the Johansen cointegration test in Table 11, it is found that at least one vector is cointegrated. Accordingly, the investigated variables act together in the long term among the variables. In other words, the USA–China Trade Policy Uncertainty index affects the IDX Composite index in the long run.

Table 10.
Nonlinear ARDL
test results

Variable	Long-run parameters		Short-run parameters	
	Coefficient	Statistics	Coefficient	Statistics
USA_TPU ₊	0.9545	0.011837	−4.5666	−1.4942
USA_TPU _−	−70.7704	−0.8147	12.9025*	3.4473
China_TPU ₊	−8.4217	−0.2033	−0.5189	−0.1976
China_TPU _−	23.2949	0.5811	1.4598	0.6056
ECM _{<i>t</i>−1}			−0.0522*	−3.9390
<i>F</i> _{PSS}	2.7512**			
Diagnostic test				
	Statistics	<i>p</i> value		
<i>X</i> ² _{SC}	1.6021	0.2038		
<i>X</i> ² _{<i>H</i>}	3.1604	0.0768		
<i>X</i> ² _{FF}	1.7329	0.0845		
Note(s): * Significant at 5% significance level, ** significant at 1% level				

Table 11.
Johansen cointegration
test results

IDX composite = $\alpha + \beta_1$ China TPU $_{t-i} + \beta_2$ ABD TPU $_{t-i} + \varepsilon_t$			
H_0	H_1	Trace statistics	Maximum eigenvalue statistics
$r = 0$	$r \geq 1$	57.4084*	51.0980*
$r \leq 1$	$r \geq 2$	6.3103	5.9278
$r \leq 2$	$r \geq 3$	0.3825	0.3825
Note(s): * 1% significance level			

4.3.2 The long-run evidence. In order to determine the direction of the impact or relationship, the cointegration coefficient estimators of FMOLS and DOLS tests were conducted. The results of the related tests are given in Table 12.

Given the test results of the cointegration coefficient estimators in Table 12, the effect of China's Trade Policy Uncertainty index on the IDX Composite index is positive according to both FMOLS and DOLS tests. Therefore, as the uncertainty in China's trade policies increases, the IDX Composite index is positively affected. However, it was determined that the US Trade Policy Uncertainty index did not have a negative but significant effect on the IDX Composite index.

4.3.3 Granger causality evidence. In Table 13, causality results from the change in the USA–China Trade Policy Uncertainty index to the change in IDX Composite index are given.

According to the Granger causality analysis results in Table 13, it was determined that there is a causality from the change in the US Trade Policy Uncertainty index to the change in the IDX Composite index. In this context, it can be stated that the change in the related uncertainties is one of the reasons for the changes in the IDX Composite index.

4.3.4 Nonlinear ARDL evidence. Table 14 shows the nonlinear ARDL test results the effects of the positive and negative shock in the USA_TPU and China_TPU indices on the IDX Composite index.

DOLS results		
	Coefficient	<i>t</i> -statistic
China_TPU	10.4372	2.3743*
USA_TPU	−3.4504	−0.6456
FMOLS results		
	Coefficient	<i>t</i> -statistic
China_TPU	36.4516	4.5628*
USA_TPU	−17.0746	−1.9461
Note(s): * 1%, ** 5% significance level		

Table 12.
DOLS and FMOLS
test results

Direction of causality	<i>F</i> -statistics	Lag	Result
$\Delta \text{China_TPU} \rightarrow \Delta \text{IDX COMPOSITE}$	1.31912	12	Granger has causality
$\Delta \text{USA_TPU} \rightarrow \Delta \text{IDX Composite}$	5.13249*	1	Granger has causality
Note(s): * Significant at 5% significance level			

Table 13.
Granger causality
test result

Variable	Long-run parameters		Short-run parameters	
	Coefficient	Statistics	Coefficient	Statistics
USA_TPU ₊	1.8583	0.8548	−0.7215*	−4.3430
USA_TPU _−	2.1062	0.9416	0.5230*	2.7894
China_TPU ₊	−2.1811	−0.8447	0.3463**	2.0998
China_TPU _−	−3.5798	−1.4444	−0.2604	−1.5108
ECM _{<i>t</i>−1}			−0.0906*	−3.9089
<i>F</i> _{PSS}	2.4839			
Diagnostic test				
	Statistics	<i>p</i> value		
X^2_{SC}	0.3376	0.7139		
X^2_H	7.2838	0.0075		
X^2_{FF}	2.3976	0.0174		

Note(s): * Significant at 5% significance level, ** statistical significant at 1% level

Table 14.
Nonlinear ARDL
test results

According to the F test result in Table 14, it is seen that there is no nonlinear long-run relationship between variables of concern. However, a positive shock on the USA_TPU and China_TPU exert a negative and positive impact on the IDX composite index in the short run, respectively. Although a negative shock in the USA_TPU exerts a positive short-run impact on the IDX composite index, a negative shock in China_TPU does not have a significant impact on IDX composite index. On the one hand, the significant value of the impact of the shock in the USA_TPU on the examined is largely associated with the significance of the US economy to the other economies across the globe. On the other hand, the regional association between China and Indonesia is a strong factor of the significant between the China_TPU and IDX composite index. According to the diagnostic test results, it is seen that there is an autocorrelation problem in the model (X^2_H : LM test), there is no changing variance (X^2_{SC} : ARCH Test) and the structure of the model is not correct (X^2_{FF} : Ramsey Reset Test). Therefore, the coefficients are not interpreted.

4.4 The South Africa 40 index and the US–China trade policy for uncertainty

4.4.1 Cointegration evidence. In Table 15, the dependent variable with the South Africa 40 index is employed, while the independent variables with the USA–China Trade Policy Uncertainty indices are employed.

Considering the results in Table 15, where Johansen cointegration test results are implied, it is seen that at least one vector is cointegrated. Accordingly, the investigated variables act together in the long term among the variables. In other words, the USA–China Trade Policy Uncertainty index affects the South Africa 40 index in the long run.

4.4.2 The long-run evidence. In order to determine in which direction this effect is, the FMOLS and DOLS tests, which are cointegration coefficient estimators, were applied. The results of the related tests are given in Table 16.

Regarding the test results of the cointegration coefficient estimators in Table 16, the effect of China’s Trade Policy Uncertainty Index on the South Africa 40 index is significant and positive according to both FMOLS and DOLS tests. Therefore, as uncertainty in China’s trade policies increases, the South Africa 40 index is positively affected. However, the result found

Table 15.
Johansen cointegration
test results

South Africa 40 = $\alpha + \beta_1$ China TPU _{$t-i$} + β_2 USA TPU _{$t-i$} + ϵ_t			
H_0	H_1	Trace statistics	Maximum eigenvalue statistics
$r = 0$	$r \geq 1$	56.0642*	50.8955*
$r \leq 1$	$r \geq 2$	5.1686	5.1629
$r \leq 2$	$r \geq 3$	0.0057	0.0057
Note(s): * 1 %, significance level			

Table 16.
DOLS and FMOLS
test results

DOLS results		
	Coefficient	t -statistic
China_TPU	12.69506	2.201360**
USA_TPU	−9.360514	−1.277110
FMOLS results		
	Coefficient	t -statistic
China_TPU	21.49831	3.390685*
USA_TPU	−11.34491	−1.629311
Note(s): * %1, ** %5 önem seviyesinde anlamlıdır		

that the US Trade Policy Uncertainty index did not have a significant effect on the South Africa 40 index.

4.4.3 The Granger causality evidence. In Table 17, causality results from the change in the USA–China Trade Policy Uncertainty index to the change in South Africa 40 index are given.

According to the Granger causality analysis results in Table 17, the result posits that there was a causality from the change in the USA–China Trade Policy Uncertainty index to the change in South Africa 40 index. In this context, it can be stated that it is one of the reasons for the changes in the South Africa 40 index from the change in the related uncertainties.

4.4.4 Nonlinear ARDL evidence. In Table 18, the result of the nonlinear ARDL test of the impact of the shock in the USA_TPU and China_TPU indices on the South Africa 40 index are presented.

According to the F test result in Table 18, there is a nonlinear long-run asymmetric relationship between the variables. But, the test results indicate that a positive and negative shock in the USA trade uncertainty indices exerts a significantly negative and positive impact on the South Africa 40 index in the short run. However, the result revealed that a positive and negative impact in the China_TPU index does not have a significant effect on the South Africa 40 index in the short run. The significant value of the impact of the shock in the USA_TPU on the examined is largely associated with the significance of the USA economy to the other economies across the globe. According to the diagnostic test results, it is seen that there is no autocorrelation problem in the model (X^2_H : LM test), there is no changing variance (X^2_{SC} : ARCH Test) and the structure of the model is correct (X^2_{FF} : Ramsey Reset Test).

4.5 The BSE Sensex 30 index and the US–China trade policy uncertainty index

4.5.1 Cointegration evidence. In Table 19, the estimation shows the results of the Johansen cointegration test in which the BSE Sensex 30 index is the dependent variable while the USA–China Trade Policy Uncertainty indices are included in the analysis as independent variables.

Direction of causality	F -statistics	Lag	Result
Δ China_TPU $\rightarrow$ Δ South Africa 40	2.70175**	3	Granger has causality
Δ USA_TPU $\rightarrow$ Δ South Africa 40	2.21470**	8	Granger has causality
Note(s): ** %5 önem seviyesinde anlamlıdır			

Table 17.
Granger causality test results

Variable	Long-run parameters		Short-run parameters	
	Coefficient	Statistics	Coefficient	Statistics
USA_TPU ₊	1.7248	0.3271	−0.4298**	−2.4514
USA_TPU _−	0.3599	0.0667	0.9051*	3.3498
China_TPU ₊	−11.8284*	−3.0843	−0.0933	−0.5585
China_TPU _−	−12.2273*	−3.2159	−0.3917	−1.4182
ECM _{t-1}			−0.0854*	−5.4063
F_{PSS}	4.7483*			
Diagnostic test				
	Statistics	p value		
X^2_{SC}	0.3321	0.7178		
X^2_H	1.4231	0.2342		
X^2_{FF}	1.0413	0.2990		

Note(s): * and ** are respectively 1% and 5% statistical significant level

Table 18.
Nonlinear ARDL test results

Considering the results of the Johansen cointegration test in Table 19, it is observed that at least one vector is cointegrated. Accordingly, the estimated variables act together in the long term among the variables. In other words, the USA–China Trade Policy Uncertainty index affects the BSE Sensex 30 index in the long run.

4.5.2 The long-run evidence. In order to determine the direction of this effect, the FMOLS and DOLS tests were conducted. The results of the related tests are given in Table 20.

Given the illustrated result of the cointegration coefficient estimators in Table 20, the effect of China’s Trade Policy Uncertainty index on the BSE Sensex 30 index is significant and positive according to both FMOLS and DOLS tests. Therefore, as the uncertainty in China’s trade policies increases, the BSE Sensex 30 index is positively affected. However, the US Trade Policy Uncertainty index is found to be statistically not significant.

4.5.3 The Granger causality evidence. In Table 21, causality results from the change in the USA–China Trade Policy Uncertainty index to the change in BSE Sensex 30 index are given

According to the results of the Granger causality analysis in Table 21, it is determined that there is a causality from the change in the USA–China Trade Policy Uncertainty index to the change in the BSE Sensex 30 index. In this context, it can be stated that the change in the relevant uncertainties is one of the reasons for the changes in the BSE Sensex 30 index.

4.5.4 Nonlinear ARDL evidence. In Table 22, nonlinear ARDL test results showing the impact of the shock in USA_TPU and in China_TPU indices on the BSE Sensex 30 index are given.

Furthermore, according to the *F* test result in Table 22, there is no significant nonlinear long run between the variables. However, a positive shock on the USA trade uncertainty indices is responsible for a significant and negative impact on the BSE Sensex 30 index, while

Table 19.
Johansen cointegration
test results

$\text{BSE Sensex 30} = \alpha + \beta_1 \text{China TPU}_{t-i} + \beta_2 \text{USA TPU}_{t-i} + \varepsilon_t$			
H_0	H_1	Trace statistics	Maximum eigenvalue statistics
$r = 0$	$r \geq 1$	49.9359*	43.3749*
$r \leq 1$	$r \geq 2$	6.5609	6.2825
$r \leq 2$	$r \geq 3$	0.2784	0.2784
Note(s): * Significant at 1% significance level			

Table 20.
DOLS and FMOLS
test results

DOLS results		
	Coefficient	<i>t</i> -statistic
China_TPU	52.23227	2.1141**
USA_TPU	−12.8392	−0.4336
FMOLS results		
	Coefficient	<i>t</i> -statistic
China_TPU	66.4751	2.8375*
USA_TPU	−15.2909	−0.5985
Note(s): * %1, ** %5 önem seviyesinde anlamlıdır		

Table 21.
Granger causality
test results

Direction of causality	<i>F</i> -statistics	Lag	Result
$\Delta \text{China_TPU} \rightarrow \Delta \text{BSE Sensex 30}$	3.3572*	3	Granger has causality
$\Delta \text{USA_TPU} \rightarrow \Delta \text{BSE Sensex 30}$	2.0575*	7	Granger has causality
Note(s): * Significant at 5% significance level			

Table 22.
Nonlinear ARDL
test results

Variable	Long-run parameters		Short-run parameters	
	Coefficient	Statistics	Coefficient	Statistics
USA_TPU ₊	−35.8887	−1.4080	−3.5952*	−2.6702
USA_TPU _−	−59.4585**	−2.2275	6.6198*	2.8945
China_TPU ₊	−54.2447*	−3.4928	1.9596	1.4530
China_TPU _−	−47.8281*	−3.2670	−3.4024	−1.6499
ECM _{t-1}			−0.1621*	−6.1231
F_{PSS}	6.2985*			
Diagnostic test				
	Statistics	<i>p</i> value		
X_{SC}^2	0.2113	0.8097		
X_H^2	0.7478	0.3883		
X_{FF}^2	0.0585	0.8091		

Note(s): * Significant at 5% significance level, ** statistical significant at 1% level

the significantly negative shock in the USA_TPU exerts a positive impact in the short run. In the case of the China_TPU, neither positive nor negative shock has a significant effect on the BSE Sensex 30 index. The significant value of the impact of the shock in the USA_TPU on the examined is largely associated with the significance of the US economy to the other economies across the globe. According to the diagnostic test results, it is seen that there is no autocorrelation problem in the model (X_H^2 : LM test), there is no changing variance (X_{SC}^2 : ARCH Test) and the structure of the model is correct (X_{FF}^2 : Ramsey Reset Test).

5. Conclusion and policy

Certain situations, such as the renegotiation of major trade arrangements in Europe and North America, have the potential of increasing the number of trade disputes between countries. In retrospect, the commercial tussle between the USA and China shows that trade integration or globalization prospects are far from being reached globally. In this context, the impact of the USA and China's trade policy on the indices of five countries with the largest stock market share in the world trade (Brazil, Indonesia, South Africa, India, Turkey) were investigated. In this context, monthly data of BOVESPA, BSE Sensex 30, IDX Composites, South Africa 40, BIST100 index and the USA–China Trade Policy Uncertainty index were used.

According to the results of the Johansen cointegration test conducted using these data, we found a long-term relationship between the Trade Policy Uncertainty index of both countries and the stock indexes of the countries expressed as fragile fives. The evidence of a significant long-run relationship between trade policy uncertainty and the stock markets or related macroeconomic factors as put forward in the current study is strongly supported by the extant literature (Feng *et al.*, 2017; Crowley *et al.*, 2018; He *et al.*, 2020). According to FMOLS and DOLS test results, the effect of the US Trade Policy Uncertainty index on the BIST100 and BOVESPA indexes was found to be negative and significant. Consequently, as uncertainties rise in the USA trade policies increase, the BIST100 and BOVESPA indexes are negatively affected by these developments. This result is consistent with expectations. In addition, the study further illustrates the evidence of asymmetric relationships among the examined indicators.

In fact, the Turkey Export Council is reportedly one of the destination countries with the most of the US exports. For the case of Brazil, the USA is one of the country's most important trading partners. Therefore, the uncertainties that arise in US trade policies affect the export figures. In this context, it is likely that the companies exporting to the USA and that are

especially included in the stock market indexes will be affected. In terms of China, FMOLS and DOLS test results differ from the USA. According to the test results, statistical evidence shows that the Chinese Trade Policy Uncertainty index has a positive effect on BIST100, BOVESPA, BSE Sensex 30, IDX Composite, South Africa 40 index. In other words, as uncertainties in Chinese trade policies increase, related indices are positively affected by this situation.

According to the results of Granger causality analysis, a causality relationship from the change in the US Trade Policy Uncertainty index to the change in the BIST100, BOVESPA, BSE Sensex 30, IDX Composite and South Africa 40 index is established. The result further shows a causality from the change in the Chinese Trade Policy Uncertainty index to the change in the BIST100, BOVESPA, BSE Sensex 30, South Africa 40 index.

5.1 Policy direction

According to the data of the world trade organization, it is observed that China has an important place in regard to the importing partners, thus making the partner countries vulnerable to China's trade policy uncertainty. In addition, the most important ones in terms of the products exported by China are countries called fragile fives. Consequently, it is thought that the rising level of uncertainty in Chinese trade policies should be addressed with effective and sustainable policy in order to avoid a decrease in imports from China, thus causing a positive effect on the country's financial indicators and triggering a competitive advantage due to the increasing uncertainties.

According to the results of the current study, it may be suggested that investors follow the uncertainties in the USA and China trade policies, as well as economic and financial indicators, and make changes in their positions accordingly. In this context, it may be advisable to postpone investment decisions in the stock market, especially to avoid exposure of the sector of the economy to risk arising from uncertainties in the US trade policies (Efobi et al., 2019). Such decision is essential for investment decisions in the stock market in times of uncertainty in Chinese trade policies. It is thought that looking at the effect of related uncertainty indices on other financial and economic indicators in future studies will contribute to the literature in terms of generalizing the results.

Note

1. The Cambridge dictionary describes the Global south as the group of countries that are in Africa, Latin America, and the developing parts of Asia (Cambridge Dictionary, 2020).

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