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THE RELATIONSHIP BETWEEN EXCHANGE RATE VOLATILITY AND STOCK INDEX RETURN: EVIDENCE FROM TURKEY

SCAN ME

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Abstract

Exchange rate fluctuations do not affect only the companies and individuals that engage in foreign currency-based transactions. As economic exposure features, even entities with no foreign currency assets and obligations are affected from the movements in exchange rates. Exchange rates, in fact, are closely related with several macroeconomic variables including stock prices and returns. Investigations into the relationship between exchange rate fluctuations and stock returns are widely observed among financial participants and academic circles. This study aims at exploring the link between exchange rate volatility and stock returns by investigating the US Dollar/Turkish Lira (USD/TRY) exchange rate volatility and Borsa Istanbul 100 Index (BIST-100) returns. In the study, 406 days of data for the period 11.03.2020-28.10.2021 were included in the analysis. Augmented Dickey-Fuller (ADF) unit root test was used to analyze the stationarity of the variables.

As a result of the test, it is seen that the series are stationary at the I(0) level. After performing the stationarity test, ARMA (2,2) from linear stationary stochastic models and EGARCH (2,2) from general autoregressive conditional variable variance models were estimated to model exchange rate volatility. Then, Granger causality test was used to see if there is a relationship between exchange rate volatility and stock returns. The findings put forward the existence of bidirectional causality relationship between the variables. As the time span of the data period overlaps with the pandemic period, it appears that causality relationship obtained by the study is like the ones that held in the studies in the pre-pandemic period.

1. Introduction

Decision making entities have been exposed to increased volatility in the exchange rates since the end of the Bretton Woods System in 1973 when countries started to adopt the floating exchange rate system. Economic exposure posits that even the persons and companies with no foreign currency assets and liabilities are affected from fluctuations in exchange rates. On the other hand, market stock prices and returns are important in that they are major inputs in measuring the wealth maximization of shareholders, which is the main target of companies. In this context, as Savaş & Can (2011) puts forward, especially the interactions between exchange rate volatility and stock index returns attract the attention of investors, savers, financial participants and governments. The current study aimed to examine the relationship between the US Dollar/Turkish Lira (USD/TRY) exchange rate volatility and the Borsa Istanbul 100 (BIST-100) index return using daily data for the period from 11.03.2020 to 28.10.2021.

There are studies in the literature to explain the relationship between the exchange rates and the stock returns. While a few of these studies did not find a relationship between the variables, the results of the majority of them confirm the existence of a type of relationship. In addition to studies showing that there is a one-way causality relationship from exchange rates to stock markets

(for example, Abdalla and Murinde, 1997; Wu, 2000; Kumar, 2019), there are also studies that find a one-way causality relationship from stock markets to exchange rates (for example, Ajayi & Mougoue, 1996; Granger et al., 2000; Hatami & Irandoust 2002). On the other hand, some study findings reveal bidirectional causality (for example, Dornbush & Fisher, 1980; Oskooee & Sohrabian, 1992; Muhammad & Rasheed, 2004). However, some studies such as Franck & Young (1972) and Chow et al. (1997) concluded that there is no causal relationship between the exchange rates and the stock markets. Resultantly, it appears that there is no fixed pattern about the relationship between the exchange rates and the stock markets, though most of the studies features a type of causality effect. This situation has been an important motivation in the present study, which has led to the examination of the relationship between exchange rate volatility and stock index return.

Moreover, the starting date of the data period, 11.03.2020, is the date when the first case of the COVID-19 outbreak in Turkey was announced by the Ministry of Health of Turkey ((https://covid19.saglik.gov.tr/TR-66494/pandemi.html). The study, therefore, will have the capacity to reflect whether causality relationships observed in pre-pandemic period holds during the pandemic period.

Stock and currency markets are exposed to the influence of several variables. The next section of the study will firstly provide a literature review on the factors with the influence on foreign exchange rates and stock returns in general, which is followed by the review of the studies focusing on the interaction between foreign exchange rate and stock returns. In the study, the causality effect between exchange rate volatility and stock index return in Turkey was examined by using daily data on US dollar/Turkish lira (USD/TRY) exchange rate and BIST 100 index for the time period of 11.03.2020-28.10.2021.

2. Literature Review

Exchange rates play important role in the economic systems. As exchange rate and exchange rate volatility, especially in developing countries like Turkey, affect many macroeconomic variables (like export-import, foreign trade, current account deficit, inflation, interest rate, economic growth, money supply, oil price, purchasing power parity, stock prices, etc.), several macroeconomic variables are known to affect exchange rate and exchange rate volatility, too (Kartal et al., 2018). In fact, there are studies in the literature focusing on the relationship between foreign exchange rate and variables such as international trade prices and volume (Cooper, 1969: Hooper & Kohlhangen, 1976, Gümüş ,2002; Şahin & Durmuş, 2019), foreign trade balance (Arize, 1994), interest rates (Dekle et al., 2002; Wilson & Sheefeni, 2014: Karaca. 2005), inflation rates (Berüment & Yücel, 2008: Yenice & Yenisu, 2019; Tandoğan, 2020), domestic investments (Koç & Değer, 2010) and export volume (Kasman & Kasman, 2005; Saatçioğlu & Karaca, 2010; Dursun & Çelikkaya, 2022).

Similarly, literature review reveals studies which explore the link between stock prices and various factors including, inflation rates (Bodie, 1976; Jaffee & Mandelker, 1976; Fama, 1981; Ely & Robinson, 1997; Al-Khazali, 2003; Geetha, et al ., 2011; Mukherjee & Naka, 1995; Maysami & Koh, 2000), interest rates (Fama & Schwert, 1977; Moosa, 1998; Omağ, 2009; Sayılgan & Süslü, 2011), economic growth (Eyüboğlu, 2018; Sayılgan & Süslü, 2011), money supply (Fama, 1981; Omağ, 2009)), real eonomic activity (Fama, 1981; Kaul, 1987), industrial production index (Mukherjee & Naka, 1995; Nishat & Shaheen, 2004; Humpe & Mcmillian, 2007; Akel & Gazel, 2014), oil prices (Gay, 2008; Chen et al ., 1986; Kaul & Seyhun, 1990; Kuwornu & Owusu-Nantwi, 2011), gold prices (Temelli & Şahin, 2019; Güngör & Polat, 2020) and COVID-19 pandemic (Ölmez & Ekinci, 2020; Ersin et al., 2022)

When the literature review is narrowed down to the causality effect between exchange rates and stock prices, studies mostly reveal either one-way or two-way relationship. One way relationship is found in some studies (for example, Abdalla & Murinde, 1997; Nydahl, 1999; Wu, 2000; Kumar, 2019; Solnik, 1987; Smith, 1992; Dimitrova, 2005; Okorie et al., 2018; Kim, 2003; Adjasi et al. 2008; Delgado et al . 2018; Elmas & Esen, 2011; Savaş & Can, 2011; Ceylan & Şahin, 2015; Kendirli & Çankaya, 2016; Aydın, 2017; Yamak et al., 2018; Durmuş et al ., 2019; Açık et al, 2020; Kayral, 2020). Some other studies, however, unearthed two-way causality effect between stock prices and foreign exchange rates (for example, Oskooee & Sohrabian, 1992; Qiao, 1996; Granger et al. 2000; Muhammad & Rasheed 2004; Aliyu, 2009; Nurmakhanova, 2019).

When it comes to the causality effect between foreign exchange volatility and stock returns, which is the subject of this paper, there are studies in the literature both in international and Turkish context. Only a limited number of studies do not reveal any causality effect between exchange rate volatility and stock prices. Chkili & Nguyen (2014), for example, tested the relationship between the two variables by using the stock prices data of BRICS countries (Brazil, Russia, India, China, South Africa) and exchange rate volatility for the period 1997-2013. As a result of the study, they did not find any relationship between exchange rate volatility and stock market retunes. Similarly, in their study examining the link between exchange rate volatility and stock market returns using data from 2006-2016, Dahir et al., (2018)

found no effect between exchange rate volatility and stock returns for China.

On the other hand, there are studies confirming one way relationship between those two variables. As a frequently cited study in the literature on the subject, Koutoulas & Kryzanowski (1996) investigated the relationship between Canadian stock market and exchange rate volatility using data from the period 1962-1988. As a result of the analysis, they concluded that the stock market is affected by exchange rate volatility. Using the data for the period 1990-1998, Bodart & Reding (2001) investigated whether exchange rate volatility had a significant effect on industrial sector stocks. They found that exchange rate volatility had a significant effect on expected stock returns. Mlambo et al. (2013), using the GARCH model on monthly data for the period 2000-2010, examined the effects of exchange rate volatility on the Johannesburg Stock Exchange. As a result, they found out that there was, though weak, a relationship between exchange rate volatility and the stock market. Perera (2016) researched the effect of Euro exchange rate volatility on Equity Price Index (ASPI) returns for the Colombo Stock Exchange (CSE) using six-year daily data from 2010 to 2015. Resultantly, it was determined that Euro exchange rate volatility had a positive and significant effect on ASPI return volatility. Bagh et al., (2017), investigating the effect of exchange rate (USD) volatility on the Pakistani stock market by using 2003-2015 data, found that there was a positive and significant relationship between Pakistan exchange rate volatility and the stock market.

In their research on the relationship between stock performance of US companies and US dollar volatility using data from 1973-1990, Bartov & Bodnar (1994) found that the volatility in the USA dollar negatively affected the stock returns of the companies. Kho & Stultz (2000) analysed the effects of exchange rate volatility on the banking sector stock prices and determined that the exchange rate volatility effect in Indonesia and the Philippines on the stock price indices was negative. Kanas (2000) investigated the volatility effect between the stock market and the foreign exchange market for six industrialized economies (USA, UK, Japan, Germany, France and Canada). According to the results, a unidirectional relationship was found from stock returns to exchange rate volatility in all countries except Germany. In his study, Apte (2001) searched for the volatility effect between stock and foreign exchange markets using the data for the 1991-2000 period for the Indian economy. As a result of his study, he confirmed a unidirectional relationship from the foreign exchange market to the stock market. Chue and Cook (2008) analyzed the effects of exchange rate volatility on stock price indices in emerging markets and found that most of the emerging markets were negatively affected by exchange rate volatility between 1999 and 2002. In the study of Adjasi et al. (2008) on the relationship between the stock market the exchange rate volatility in Ghana stock market, a negative relationship between exchange rate volatility and stock returns was specified. Sichoongwe (2016) obtained a similar result, in his analysis of the effect of exchange rate volatility on the Zambian stock market using the data for the period 2000-2015. As a result, he determined that there was a negative relationship between exchange rate volatility and stock market return.

There are also studies that find a bidirectional relationship between exchange rate volatility and the stock prices. For example, Murinde & Poshakwale (2004), who investigated the relationship between the stock market and exchange rate volatility in European markets using the data of the 1994-2003 period found that there was a bidirectional interaction for Poland and the Czech Republic in the pre-Euro period. Yang & Doong (2004) examined the volatility relationship between stock and foreign exchange markets for G-7 countries. As the result of their study, they determined that there is a bidirectional relationship between exchange rate volatility and the stock market. Wu (2005), who studied the volatility relationship between stock and foreign exchange markets by conducting research on the economies of Japan, South Korea, Indonesia, Philippines, Singapore, Thailand and Taiwan, confirmed a bidirectional relationship between stock returns and exchange rate volatility. Dahir et al. (2018) examined the link between exchange rate volatility and stock market returns using data for 2006-2016 period and found that there was a bidirectional causality relationship between the variables for South Africa as well.

Similar to the ones in the international context, studies in Turkey on the subject rather display the existence of causality effect between the variables. Özçiçek (1997), as one of those studies, investigated the relationship between stock index returns volatility and exchange rate (USD/TRY) volatility, by conducting Granger causality test for the data for the 1994-2001 period. As a result, it was determined that there was a bidirectional relationship between stock index returns volatility and exchange rate (USD/TL) volatility. Examining the relationship between exchange rate volatility and stock market indices, Aydemir & Demirhan (2009) found a bidirectional causality relationship between the variables as a finding of their study. İşcan (2011) worked on the data for the period 2001-2009 using the Johansen cointegration test and the Granger causality test. According to the results of the analysis, it was concluded that there was a one-way causality relationship from stock prices to exchange rate volatility. Şahin & Sekmen (2013) investigated the relationship between exchange rate (USD) volatility and stock market return by applying Engle-Granger cointegration test to the data covering

1986-2012 period. According to the research findings, it was concluded that the volatility in the exchange rate had a significant effect on the returns of the companies operating in the ISE. Using the data of 42 companies operating in the trade and manufacturing sectors traded in the ISE 100 index for 2006 to 2014, Boyacıoğlu & Çürük (2016) investigated the effect of exchange rate volatility on stock returns. They observed that exchange rate volatility had a positive effect on stock returns.

In summary, the literature research shows that majority of the studies examining the relationship between exchange rate price volatility and stock prices have put forward the existence of causality effect between the variables.

Therefore, in the current study, the causality effect is expected to hold between the exchange rate volatility and the stock index market. In this direction, the null and alternative hypothesis of the study are stated as follows:

H0: There is no causality effect between exchange rate volatility and stock index return.
H1: There is a significant causality effect between exchange rate volatility and stock index return.

The following part of the study will present the analysis conducted to test the hypothesis.

3. Analysis and the Research Findings

This study aims at investigating the relationship between exchange rate volatility and stock index return in Turkey by using the data for the time period between 11.03.2020 to 28.10.2021. In the study, the data period was originally planned to extend till the end of 2021. However, in the last two months of 2021, sudden and exceptionally large fluctuations were observed in the value of the dollar exchange rate (for example, USD crossed for the first time the threshold of 10TL on 15th November, appreciated to 16,41TL in December before coming back to 13,50TL on 20th December). This atypical fluctuations in that time period hid four previous structural breaks detected by CUSUM graphs. Therefore, data period used in the analysis was narrowed by excluding those two months.

The starting date of the period, 11.03.2020 is purposefully selected as this date represents the starting date of COVID-19 pandemic. Hence, the study results will present the causality effect pattern between the variables during the pandemic period. This is important as contagious diseases can spread over the entire geographical area over time and significantly affect the international economy and financial markets. Recently, the Covid-19 outbreak has also affected the economy and financial markets around the world. Since countries have implemented mandatory quarantine policies for precautionary purposes, economic activities have been significantly restricted. After the World Health Organization announced the global epidemic, deteriorations began to occur in the financial markets (Zhang, et al., 2020).

In the study using daily data, The US dollar/Turkish lira (USD/TRY) rate and the BIST-100 index are selected as the exchange rate and the stock market index, respectively. The data pertaining to the exchange rate are the sales price in Turkish Lira per USD while the data about the stock price is the closing price of Borsa Istanbul 100 (BIST-100) index (XU 100). The data used in the study were obtained from www.investing.com.tr and Electronic Data Distribution System (EVDS) of the Central Bank of the Republic of Turkey (CBRT). Eviews 9 package program was used in the analysis of the data.

In the study, firstly, the return series of two variables was formed. The return series is calculated by means of the following formula:

$$r_t = \ln \frac{X_t}{X_{t-1}}$$

In the formula, r_t, represents the exchange rate (stock) return on day t, , X_t represents the closing price of exchange rate (return) on day t, X_(t-1) represents the closing price of exchange rate (return) on day t-1. The descriptive statistical properties of the exchange rate (USD/TRY) return and stock return BIST 100 INDEX (XU 100) series are shown in Table 1.

Table 1. The Descriptive Statistical Properties of the Series

	Exchange Rate (USD/TRY)	BIST 100 (XU 100)
Number of Observations	406	406
Mean	0.001056	0.001011
Standard Deviation	0.009621	0.014923
Skewness	0.697509	-1.743236
Kurtosis	16.28215	13.06709
Jarque-Bera	3017.284	1920.072
J.B. Probability	0,000000	0,000000

As reported in Table.1, the logarithmic mean of the return on the exchange rate (USD/TRY) is 0.001056 while the logarithmic mean of the return on the BIST-100 index (XU 100) is 0.001011. Jarque-Bera (1987) test was used to determine whether the series of exchange rate (UDSD/TRY) return, and stock index return feature normal distribution. Since the Jarque-Bera test coefficients of the exchange rate series are significant, the series do not show normal distribution.

As the first step in the analysis, the test is made to see whether the series were stationary or not. After the stationarity test analysis, linear stochastic models (ARMA) and general autoregressive conditional heteroscedasticity (GARCH) models were estimated to model exchange rate volatility. Finally, Granger Causality test was conducted to examine the causality relationship between exchange rate (UDSD/TRY) volatility and stock index return.

In order to reach accurate and reliable results when performing time series analysis, it is necessary to make the data stationary by using appropriate unit root tests on the data. This is important as working with non-stationary series could result in spurious regression problem, which will not reflect the real relationship (Gujarati, 2004). The most widely used Augmented Dickey-Fuller (ADF) unit root test is used in this study. Augmented Dickey Fuller (ADF) Unit Root test results are shown in Table 2.

Table 2. Augmented Dickey-Fuller Unit Root Test Results

Variable	Level/First Difference	ADF Test Statistics	
		Intercept	Trend and Intercept
USD/TRY	Level	-19.07379 (0)***	-19.04996 (0)***
XU100	Level	-21.71950 (0)***	-21.71935 (0)***
Mackinnon Critical Values	1% level	-3.980880	-3.446281
	5% level	-3.420958	-2.868457
	10% level	-3.133210	-2.570520

***%1 level,

The maximum lag length is calculated according to the Schwarz Information Criteria (SIC) and is shown in parentheses.

For both USD/TRY and XU 100 series, as Tablo.2 shows, the null hypothesis of unit root is rejected since the test statistics are smaller than the Mackinnon critical values at 1%, 5% and 10% significance levels. Therefore, it was concluded that both data sets are stationary at the level and the degree of stationarity is I(0).

Since the exchange rate return series (USD/TRY) is stationary at level, attempt is made to estimate the appropriate volatility model. For this purpose, based on the evaluation of coefficient of determination (R^2), Akaike information criterion (AIC), Schwartz Bayesian information criterion (SBIC), maximum likelihood ratio (LogL), and F-statistics, the most suitable model for the exchange rate data is determined as ARMA (0,0). Then, ARCH-LM test was applied at different lag lengths by using the residual series obtained from the ARMA (0,0) model. ARCH-LM test statistics and R2 values of errors at different lags confirmed at 1% significance level the existence of ARCH effect in the time series. As the next step, then, the volatility of the exchange rate series is estimated.

A dummy variable was created to represent the structural breaks detected by CUSUM graphs. Then, ARCH, GARCH and EGARCH models were evaluated by including the dummy

variable. Out of the several ARCH, GARCH and EGARCH models estimated, the GARCH (2,1) model was determined as the most appropriate model in the modelling of exchange rate volatility. GARCH (2,1) model estimation statistics is reported in Table 3.

Table.3. GARCH (2,1) Model Estimation Results

Parameter		Coefficient	
α_0		1.27E-05***	
α_1		0.114786***	
α_2		0.160196**	
β_1		0.534028**	
Dummy		0.000526***	
$\alpha + \beta$		0,80901	
$Q^2(5)$	2.7100	ARCH LM(5)	0.529645
$Q^2(10)$	13.819	ARCH LM(10)	1.614125
$Q^2(15)$	0.245	ARCH LM(15)	1.425752
AIC	-6.780543	LogL	1381.450
SBIC	-6.731204	THEIL Coefficient	1,000000

*** %1 level, ** %5 level

For the GARCH(2,1) model, the α and β parameters were found to be positive and statistically significant at 1% level. The sum of the α and β coefficients is less than one, indicating that volatility is predictable, and the effect of shocks is temporary. There is long memory in volatility as the sum of the GARCH parameters is 0,809. Structural breaks, in fact, are causing volatility to increase more than expected. After the model estimation, the Q2 statistics for different lags were checked in order to test the validity of the predicted model. The Q2 statistics related to the model were found to be statistically insignificant for all lags. This confirms that there is no autocorrelation problem in the established model. Finally, ARCH-LM test was applied in order to determine whether the presence of ARCH effect in the predicted model disappeared. The statistically insignificant ARCH-LM test results for different lags pointed out that the ARCH effect disappeared.

Prior to conducting analysis to see whether there is any causality between foreign exchange volatility and stock returns, a stationarity test is performed for foreign exchange rate volatility series, results of which are reported in Table 4.

Table 4. Augmented Dickey-Fuller Unit Root Test Results for USA/TRY Volatility Series

Variable	Level/First Difference	ADF Test Statistics	
		Intercept	Trend and Intercept
USD/TRY Volatility Series	Level	-6.440202***	-6.435775***

***%1 level

The maximum lag length is calculated according to the Schwarz Information Criteria (SIC),

Exchange Rate Volatility Mackinnon critical values; -3,446402 at the 1% level -2,868511 at the 5% level -2,570549 at the 10% level.

The test statistics lower, as shown in Table 4, than Mackinnon critical values at 1%, 5% and 10% significance levels confirm the stationarity of USD/TRY volatility series at the level. Given that both the exchange rate volatility and the stock return series are stationarity at the level, Granger causality test can be applied to the time series data.

Causality analysis reveals whether the future estimated values of a variable in a time series are affected by its past periods or by the past periods of other time series variable with which it is related. If, for example, the lagged values of the X variable have a

significant effect on the Y variable, then the X variable is called the Granger cause of Y variable. On the other hand, both variables might be Granger cause of each other, or there might be no Granger causality between two variables (Granger, 1988). Granger causality relationship is expressed with the following model (Granger, 1969):

$$Y_t = \sum_{i=1}^{m} \lambda_i Y_{t-i} + \sum_{i=1}^{m} b_i X_{t-i} + u_1 f$$
$$x_t = \sum_{i=1}^{m} \sigma_i X_{t-i} + \sum_{i=1}^{m} \theta_i Y_{t-i} + u_{2f}$$

In the equation, λ_i,b_i,σ_i, θ_i parameters show the lag coefficients, while u_1 f, 〖u〗_2f are for the uncorrelated white processes. M value represents the common lag degree for all variables. In the formula of Granger (1969), X is related both to its own past values and to the past values of Y whereas Y is related to its own past values and the past values of X.

As the first step in the analysis, the most reasonable lag length (k) of the VAR model must be determined. In the current study, the lag length of the VAR model which was calculated according to the Schwarz Information Criteria (SIC) was found to be 4. The model used in the Granger causality analysis is as follows:

$$USD/TRY_t = \sum_{i=1}^{m} \lambda_i USD/TRY_{t-i} + \sum_{i=1}^{m} b_i XBIST100_{t-i} + u_1 f$$
$$BIST100_t = \sum_{i=1}^{m} \sigma_i BIST100_{t-i} + \sum_{i=1}^{m} \theta_i YUSD/TRY_{t-i} + u_{2f}$$

The results of the Granger causality test is reported in Table 5.

Table 5. Granger Causality Test Results

H_0	Lag length	F statistics	Probability
BIST-100 is not the Granger cause of USD/TRY volatility BIST100→USD/TRY	2	4.76585***	0,0090
USD/TRY volatility is not the Granger cause of. BIST-100 USD/TRY→ BIST100	2	4.93859***	0,0076

***%1 significance level

As seen in Table 5, the probability value less than 0.01 shows that there is a causal relationship from stock return (BIST100) to exchange rate (USD/TRY) volatility, and the null hypothesis (H0) hypothesis is rejected. In other words, Granger causality relationship was found at 1% significance level from stock return (BIST100) to exchange rate (USD/TRY) volatility. Similarly, significant Granger causality relationship was found, at 1% significance level, from exchange rate (USD/TRY) volatility to stock returns (BIST100). Overall, the analysis results reveal that there is a bidirectional causality relationship between exchange rate volatility and stock index return.

5. Conclusions

Increasing globalization has led to acceleration in international trade relations and capital investments, rendering the management of foreign exchange risk more prominent. Economic exposure puts forward that even the decision-making entities with no assets or liabilities are affected from currency fluctuations. Both transaction and economic exposure increase as foreign exchange volatility goes up. Therefore, decision makers need to take into consideration foreign exchange volatility to make informed decisions.

On the other hand, the goal of business entities is accepted as the wealth maximization of shareholders, which is achieved by maximizing the stock price of companies. Stocks are evaluated as an investment alternative to foreign currency investments and return on stocks appear to be linked to the movements in foreign exchange rates.

The study aimed at exploring the causality effect between foreign exchange volatility and stock returns within Turkish context for the period from 11.03.2020 to 28.10.2021. As the starting day of the period, 11.03.2020, is announced by the Ministry of Health of Turkey as the date when COVID-19 pandemic started to show its effect, the time period selected for the study overlaps with the pandemic period. Hence, the research findings could shed light to the nature of the causality effect between the variables during the pandemic period. In the study using daily data, the USD/TRY is the selected foreign exchange rate while BIST 100 index return is used to represent stock returns.

The causality relationship between the exchange rate volatility and the stock index return was examined using the Granger causality test. According to the Granger causality test results, a bidirectional causality relationship was determined between exchange rate (USD/TRY) volatility and stock index returns

(BIST100). This result is consistent with several international studies that found bidirectional causality in the literature (for example, Murinde and Poshakwale, 2004; Yang & Doong, 2004; Wu, 2005; Dahir et al., 2018). The research findings are also in line with some studies in Turkey (for example, Özçiçek, 1997; Aydemir & Demirhan, 2009). However, bidirectional causality effect finding is in contrast to the findings by studies that found either no relationship between the two variables (for example Chkili & Nguyen, 2014), or one-way relationship (for example, Kanaş, 2000; Apte, 2001; Bagh et al., 2017; Bartov & Bodnar, 1994; Kho & Stultz, 2000; Chue & Cook, 2008; İşcan, 2011; Yamak et al., 2018). The reason for the differences in the findings might be due to the periods analysed, the data analysis model selected, as Kaplan & Yapraklı (2014) stated, or the sectors selected, as Kostak (2021) emphasized.

Future studies could consider comparing pandemic and post-pandemic relationships. Moreover, the relationship between exchange rate volatility and stock returns can be reconsidered at different time periods characterizing such as, economic crisis, political problems and important political events.

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