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ANALYSIS OF THE RELATIONSHIP BETWEEN MACROECONOMIC VARIABLES and BIST-30 STOCK RETURNS

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ABSTRACT

Keywords:

BIST-30,

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JEL Codes:

E44, G10, N20

In addition to the fundamental macroeconomic indicators such as inflation and interest rate which are very important for foreign investors, the Credit Default Swap (CDS), that shows the credit risk level of the country, is an important research topic. Therefore, in this study, it is aimed to examine the effects of Turkey CDS and selected macroeconomic variables on the Istanbul Stock Exchange (ISE) 30 index (XU30). For this purpose, Granger Causality Relations, Impulse-Response Charts and Variance decomposition were made under the VAR model for 2010: 06 and 2020: 02 monthly periods. According to the results of the study, it was concluded that there was no Granger Causality relationship from variables to XU30 and XU30 stock returns toward selected macroeconomic indices either. However, it is found that shocks in CDS for two and a half months were responded negatively by XU30 returns at the significant beginning. Also, the positive and significant impact of the interest rate is worth to consider.

MAKROEKONOMİK DEĞİŞKENLER ve BIST-30 GETİRİLERİ ARASINDAKİ İLİŞKİNİN ANALİZİ

ÖZ

Anahtar Kelimeler:

BIST-30,

Makroekonomik Değişkenler,

VAR

JEL Kodları:

E44, G10, N20

Uluslararası yatırımcılar için çok önemli olan enflasyon ve faiz oranı gibi temel makroekonomik göstergelere ek olarak, ülkenin kredi riski seviyesini gösteren Kredi Temerrüt Takas (CDS) önemli bir araştırma konusudur. Bu nedenle, bu çalışmada CDS rakamlarının ve seçilmiş makroekonomik değişkenlerin Borsa İstanbul'da BİST 30 (XU30) üzerindeki etkilerinin incelenmesi amaçlanmıştır. Bu amaçla 2010: 06 ve 2020: 02 aylık dönemlerine ait verileri alınarak VAR modeli kapsamında Granger Nedensellik İlişkileri, Etki-Tepki Grafikleri ve Varyans Ayrışması analiz edilmiştir. Çalışmanın sonuçlarına göre, değişkenlerden XU30'a ve XU30 hisse senedi getirilerinden seçilen makroekonomik endekslere doğru Granger Nedensellik ilişkisi olmadığı sonucuna varılmıştır. Bununla birlikte, CDS'deki şokların iki buçuk ay boyunca, başlangıçta anlamlı XU30 getirileri ile olumsuz yanıt verdiği bulunmuştur. Ayrıca faiz oranında gerçekleşen bir şokla son üç dönemde XU30 endeksi olumlu tepki verdiği dikkat çekmiştir.

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1. INTRODUCTION

It has increased the interaction of the economies of developing countries with the financial markets and made them more sensitive to the transactions in the markets. Also, we can say that the sudden volatility in the financial markets of these countries today has essential effects both on the economies of these countries and on the global economy. On the other hand, Stock Exchanges are the leading actors in the financial markets.

In this context, what the macroeconomic variables are that are affecting the prices and returns of stocks traded in the financial markets is a meaningful discussion and research topic. Among the macroeconomic variables in question, the first variable that comes to the fore is the credit risk of the countries. There are many globally prestigious instruments to measure the credit risk of countries. CDS (Credit Default Swap) premiums have a reputable place for these vehicles.

In this study, CDS premiums were used to represent the country's credit risk. In addition to the country's credit risk, macroeconomic variables such as inflation and interest rates also have important effects on stock prices. On the other hand, the reason for choosing the BIST-30 is; XU30 is the index of 30 powerful companies in the Turkey capital market which their stocks are traded in the Istanbul Stock Exchange. Furthermore, BIST-30 in addition to their highest trading volume, highest capitalization ratio, and highest market value on the ISE, it has a substantial value in presenting the Turkey Capital Market in its best way. With the importance of the BIST-30, CDS, inflation, and interest rate mentioned above, in this article, it is aimed to reveal the relationship between BIST 30 index with selected macroeconomic variables such as CDS Premiums, inflation and interest rate.

The research generally consists of five chapters. In the second part, after the introduction, the literature studies are given to determine which variables will be used in the research process. In the third part, the data set and which methods are used in the research is explained. In the fourth chapter, analysis and the findings are mentioned. Finally, in the fifth section, the result of the study is included.

2. LITERATURE REVIEW

In this study, since the relations between CDS, inflation, interest rate and BIST-30 index will be investigated, the relationships in this context are explained in the literature review. The studies on this subject are summarized below.

In the study by Şentürk and Ducan (2014), the effects of interest rate and exchange rate dynamics on stock returns between periods 1997:01-2013:05 in Turkey were examined. In line with this goal, ADF, PP and KPSS Unit Root Tests, the impulse-response and variance decomposition analysis based on the VAR model, and Granger causality analysis were applied. According to the findings of the research, exchange rate and interest rate variables affect the stock market returns negatively for approximately three months. Besides, a one-way causality relationship has been found from the exchange rate to the stock exchange and from the interest rate to the exchange rate.

Sevinç (2014) examined the stock items and some macroeconomic variables traded in the BIST-30 index in the period of January 2003-March 2013 with the help of the Arbitrage Pricing Model to examine the effects of macroeconomic variables on stock returns. BIST-100 index, M2 money supply, current account balance, exchange rate basket, deposit interest rate, inflation rate and other selected macroeconomics are included in the analysis. As a result, it has been determined that the effects of macroeconomic variables on stock returns are significant, and stock returns can be determined with the Arbitrage Pricing Model. Contrary to the expectation that inflation will decrease stock prices with the increase in interest rates brought by inflation in the long term, modelling has emerged, and it has been revealed that there is a positive relationship between inflation and stock returns.

In the study by Conference and Isbn (2015), the link or relationship between stock prices and Credit Default Swaps (CDS) was investigated. The sample for the study consisted of BIST 30, BIST 100, BIST Bank and BIST industry. Weekly data between the period of January 2013 and April 2014 was ranged in the analysis. As a result of the research equity indexes impulses are more effective on CDS than the impulses of CDS on equity indices. Also, research shows that the BIST Bank responded

quicker to the shocks on CDS than the response of the BIST Industry to the shocks. Besides, the research showed similar effects of both of the two-sector equity indices on Turkey CDS.

Boateng (2016) empirically examines the impact of inflation, interest rate, and real gross domestic product growth rate on the Ghana Stock Exchange (GSE) stock price volatility by employing the Granger causality test. The data for the study in periods 1990-2014 was considered as annual time series. The result of the study shows that there is unidirectional causality from the Real Gross Domestic Product growth rate to the GSE stock price, while there are not found granger causality between inflation and interest rates and stock prices during the study period.

Mugambi and Okech (2016) study the relationship and effects between macroeconomics, namely inflation rate, interest rate, exchange rate, GDP with bank stock returns listed in Nairobi Securities Exchange. The data time series for the study are considered quarterly for the periods 2000-2015. At the result of employing Correlation analysis, Unit Root test, linear regression model and Ordinary Least Squares under Fixed Effects model the interest rate, exchange rate and inflation impact on bank stock return was shown significant. However, GDP shows an insignificant impact on the stock return of the Banks in NSE at 5% level of significance.

Eren and Başar (2016) in their study "effects of credit default swaps (CDS) on BIST-100 indexes" aimed to determine if there is an impact of CDS (Credit Default Swaps) on BIST- 100 index by using monthly data of period 2005:12-2014:03. After applying the unit root test on each variable and adopting the bound test approach for co-integration to the result of the test they realized short- and long-term relations between dependent and independent variables by using the ARDL approach. At the result of the research, it was found that stock prices were affected negatively in the short-term; however, there is no effect on stock prices in the long term.

Kormaz, Basçı, and Karaca in their study on (2016) investigated the relationship between some macroeconomic indices as independent variables like interest rate, inflation rate, money supply, exchange rate, industrial production index and BIST-30 returns as the dependent index. To reveal their relationship, they used the regression

model between dependent and independent variables by using the data between the period of 2005-2015. As a result of the research, it has been shown that the two variables; exchange rate and inflation rate strongly affect the ISE BIST-30 Index negatively. In other words, by increasing the exchange rate, the BIST 30 index value will reduce and also an increase in the inflation rate can decrease the ISE BIST index value. These situations affect investors' decisions.

Özmen, Karlılar and Kıral (2017) examined the relationship between the return of BIST100 index and some macroeconomics indices such as exchange rate, interest rate and consumer price index as independent variables. For this purpose, Johansen co-integration analysis, VEC and Granger causality test were applied by using monthly data covering the period 1997-2017. As a result of the research, there is not found long term relationship between variables. According to the causality analysis results, one-way causality relationship from Exchange rate to BIST100, two-way from BIST100 to Interest rate, one-way from BIST100 to CPI, two-way from Interest rate to Exchange Rate variable, two-way from CPI to Exchange Rate, and one-way causality relationship from CPI to Interest rate variable was found.

Nurasyikin, Shahnaz, and Syamimi (2017) studies the effect of the macroeconomic variables (inflation, exchange rate, and money supply) on both conventional and Islamic stock market returns in three ASEAN countries (Singapore, Malaysia, Indonesia). In the study, the Panel Least Square Regression techniques are applied on monthly data of the periods 2005:1 to 2015:12. The findings of the study show that both stock market returns are affected by Exchange and Inflation rates significantly, while Money Supply's impact is insignificant. Also, the study concludes that inflation has a more significant effect and inversely related to the stock market returns.

In their study, Budak, Cangi, and Tuna (2017) tried to determine the effect of macroeconomic variables on stock returns using BIST indexes. In this context, the co-integration relationship between BIST-30, BIST-50 and BIST-100 indices and macroeconomic variables in January 2005-December 2016 was examined. According to the results of the ARDL test, it was determined that there is a co-integration

relationship between the three indices determined as dependent variables and the Exchange, Interest Rate and UFE in the long term. As a result of the established models, it is seen that the interest rate and the exchange rate are statistically significant and harmful in the long run, and the producer price index is statistically significant and positive.

Ndlovu, Faisa, Resatoglu and Tursoy in their study in (2018) examines the impact of macroeconomic variables such as inflation, money supply growth (M3), interest rates and USD ZAR exchange rate on Johannesburg Stock Exchange South Africa's stock prices by using quarterly data in period 1981Q1 to 2016Q4. To understand the relationship between the dependent and independent variables con-integration tests, variance decomposition, vector error correction model, and an impulse response function are applied. As a result of the research, there is a long run and positive relationship between interest rate, money supply, and inflation rate with the share price but the exchange rate harms stock prices during the study period. Also, according to the causality relationship, unidirectional causality was found from exchange rates and interest rates to the stock share prices. Likewise, just causality from interest rates and the exchange rates to the money supply was found.

In the study by Temizel (2018) investigates the Asymmetric causality relationship between some macroeconomic variables and stock returns in developing countries. In findings for Turkey stock market, short- and long-term interest rates, inflation, economic policy uncertainty there was no significant relationship between stock prices and oil prices, exchange rates, however, are significantly asymmetrical causality between money supply and stock price growth relationship has been determined.

Koyuncu (2018) examined the relationship between BIST-100 index and macroeconomic variables such as inflation rates, interest rates, industrial production index and real economic growth. In this study, DF-GLS unit root test, co-integration tests and FMOKS and DOLS regression analyzes were performed using the data from 1988-2016. As a result of the study, it was determined that there is a relationship between macroeconomic variables and BISt-100 in general. It has been found that an

increase in inflation and industrial production index will increase the BIST-100 index, while interest rates and real economic growth negatively affect them.

In the study by Khan and Khan (2018), the impact of the interest rate, exchange rate, and money supply on stock prices of Pakistan is determined. According to the purpose of the study, the ideal ARDL approach of bound testing is applied on monthly data for the periods 2000:05-2016:08. The findings of the study show a significant effect of interest rate, exchange rate, and money supply on the Karachi Stock Exchange in the long term, while the impact of all the selected variables is insignificant in the short term except the negative effect of the exchange rate on KSE stock prices.

In Akyol and Baltacı (2018) studies, the effects of CDS premiums, oil prices and selected macroeconomic variables on Borsa Istanbul 100 index (BIST 100) were examined. In this study, monthly data between 2006:01- 2015:09 periods were analyzed with the ARDL limit test approach. As a result of the research, significant effects of CDS premiums, oil prices, inflation rate, real interest rates, monetary expansion and economic growth on the BIST 100 index have emerged. According to the ARDL boundary test approach applied, CDS premiums, oil prices and inflation rates and real interest rates had adverse and significant effects on stock prices in the long run. Accordingly, reduction of Turkey's own credit risk level affects the positive stock market returns. In other words, the low credit risk level of the country increases stock returns, accordingly investment decisions and savings.

Eyüboğlu, S. Eyüboğlu, K. (2018) investigate the relationship between inflation rate and stock returns for periods 2006:01-2016:11. In this study, 15 Istanbul Stock Sector indices were used since inflation may have different effects on different sectors. Since the series are not stationary at the same level, co-integration analysis was done with Boundary test. The obtained results showed that all sector index returns in the study are related to both CPI in the long and short term. Besides, it was determined that the increase in CPI was negatively implicated in 11 index returns.

Temizel, Peker, Esen, & Kostakoğlu (2018) investigate the effect of interest rate, unemployment, economic growth and industrial production variables on the METALANA index in Borsa Istanbul using the VAR model. In the study, quarterly

data were used for the period 2007-2017. In the results, a causality relationship was found only from interest rate to stock index.

In the study by Javed Pervaiz, Junaid Masih, and Ten Jian-Zhou in (2018), the impact of macroeconomics (inflation, exchange rate, and interest rate) on Karachi stock market returns are examined. The data for the study was selected monthly from January 2007 till May 2017. Different statistical techniques analyze the relationship between the dependent variable KSE and independent variables. As a result of the study, it has been shown that the inflation rate hurts market performance in the selected period of study. Also, there is no significant relationship between the exchange rate and KSE stock returns.

Kamışlı, Temizel, & Sahin, (2018) analyzes the relationship between Stone-Soil sub-sector return in Istanbul Stock Exchange and macroeconomic indices such as inflation, consumer confidence index, foreign trade balance and growth variables with the VAR model. Quarterly data covering the years 2007-2017 were used in the research. By findings of this research, it was determined that the consumer confidence index and the foreign trade balance were the reason for the Stone-Soil index return. There was no causal relationship between inflation and growth variables to the stock index.

Mohamed and Ahmed (2018) investigate the effects of 6 macroeconomic variables (interest rate, inflation, GDP, industrial production, money supply, and import prices) on the Jordanian Financial Market stock returns (Amman Stock Exchange) in the periods between 1976-2016 by using annual data. However, the macroeconomic variables data for the study are considered quarterly. In the estimation part, Autoregressive Distributed Lag (ARDL) was conducted. Finally, as findings of the study, the relationship was shown positive, and the impact of the industrial production and money supply on the stock return was positive and significant, while the effect of the import prices and inflation on the stock return was negative and significant.

In the study of Topaloğlu and Karakozak (2018), the relationship between the banks operating in the banking sector stock returns and macroeconomic factors was investigated by using quarterly data series for the periods 2007: 12-2017: 9. In the

study, while the (BIST-Bank) in the Istanbul Stock Exchange stock returns used as the dependent variable, the inflation, gold price, money supply, exchange and interest rates are included as independent variables. The relationship between stock returns and macroeconomic factors was investigated by using "Panel Data Analysis". As a result of the research, while there was a negative and statistically significant relationship between stock return, money supply, exchange and interest rates. However, no relation was found between stock return, gold price and inflation rate.

Innocent, Shukla & et al. (2018) studies the effect of some macroeconomic variables like exchange rate, GDP growth rate, interest rate, and inflation rate on Rwanda Stock Exchange performance for six years. For this purpose, monthly time series data was used by the VAR method, which is involved in impulse response functions and Variance Decomposition Analysis. As findings of the study, GDP, exchange rate, and inflation are significant and negatively affected the stock market performance while the effect of the interest rate was insignificant and negative.

Temizel, Yetkin, & Kostakoğlu (2018) investigate the effects of macroeconomic variables on Istanbul Stock Exchange Tekstil, Leather sub-sector by using the VAR model. In the study, quarterly data for the period 2007-2017 were analyzed. In the study, exports, foreign trade balance, dollar rate, growth and inflation have been chosen as macroeconomic variables. In the findings obtained, it was observed that the foreign trade balance was the cause of the stock index. No causality relationship could be determined from other macroeconomic variables to the stock market index.

In the study of Tuna (2019), the co-integration relationship between BIST-Bank Index (XBANK) and gold prices, the exchange rate (USD) and interest rates were analysed using the data series from January-2010 to December-2015. According to the results of the ARDL test, there is a positive and statistically significant relationship between the BIST-Bank Index and exchange rate but a statistically significant and negative relationship with Gold prices and Interest rates.

When we look at the national and international studies that were mentioned above, it is seen that we have encountered very few studies examining the relationships between macroeconomic variables and BIST-30 stock returns. There are

very few studies, especially on the relationships and effects of macroeconomic variables with the BIST-30. Furthermore, in analyzation, the relationships between macroeconomic variables and stock prices or returns in Turkey and abroad were conducted by using different methods. This study contributes to financing literature in terms of determining the effect of macroeconomic variables determined based on the literature on BIST-30 stock returns by using the VAR model.

3. DATA SET AND METHODOLOGY

3.1. Data Set

In this part of the study, to determine the effect of independent variables on dependent variables; the tables obtained from the analyses made by installing various tests and models and the comments to them are included. In the research, the relationship between some macroeconomic variables and stock returns was examined. As a result of the literature review conducted as macroeconomic variables, dollar exchange rate, inflation rate and Turkey CDS were preferred. BIST 30 (XU30) index in Istanbul Stock Exchange (BIST) is obtained as stock returns. The data set included in the study consists of monthly data covering the period June-2010 to February-2020. All of the macroeconomic variables and XU30 index data used in the study were obtained from "Thomson Reuters DataStream". This study was conducted through data obtained from the database; therefore, Ethics Committee permission was not required.

The hypotheses for the study are:

H_0: Macroeconomic variables have a significant effect on BIST-30 stock returns.

H_1: Macroeconomic variables do not affect BIST-30 stock returns.

The names, abbreviations and calculations of the variables in the study are as follows:

Table 1. Name and Abbreviation of The Variables

Abbreviation	Name & Calculation
DLOBIST30	dln (BIST-30)
DLOTURCDS	dln (Turkey CDS)
DLOTURINFR	dln (Turkey Inflation Rate)
DLOTURINTR	dln (Turkey Interest Rates)

*(dln) represents the first difference of the natural logarithm of the data above.

3.2. Methodology

In this part of the research, the results obtained from econometric analysis using EVIEWS-10 package program are given. Then the VAR method is used to test the relationship between chosen macroeconomic indicators and the BIST 30 index (XU30). Before passing to the effect of macroeconomic variables, which are the independent variables in the study, on the BIST index returns, some tests and procedures must first be carried out for the validity and reliability of the analysis. In this context, the unit root test of the variables (dependent and independent) included in the study was performed first. Because the study consists of a time series, all series must be stationary. Since the stability in models established in the time series carries an indispensable necessity, analysis can be started only after the stability in all series is achieved.

Yule (1926) is one of the first studies that state the data should be stationary in the analysis to be made with macroeconomic data. Stationarity means that the "mean and variance" of the relevant time series will not change depending on time. In the stationary time series, shocks will be temporary, and over time, the effects of shocks will disappear when the series returns to long-term strain values. It was also stated in the study of Granger and Newbold (1974) that shows in the analysis to be performed with non-stationary datasets. There is a possibility to face the problem of false

regression, which means that there seems to be a non-realistic relationship between variables (Akdağ, 2019).

If all series used in the econometric analysis is not stationary, it will reflect a false relationship in the estimation results to be obtained due to the high probability of encountering false regression in the models created. If the series is not stationary in the level values, if the analysis is made by taking the differences, the fake regression problem will be eliminated, and thus it will be possible to obtain more accurate and reliable results. Due to reliability purpose of the study here, the Descriptive Statistics & Tests of the variables are given in Table 2.

Table 2. Descriptive Statistics

	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
DLOBIST30	0.006313	0.063460	-0.439889	3.657277	5.829112	0.054228
DLOTURCDS	0.003018	0.102983	0.469189	4.424662	14.06604	0.000882
DLOTURINFR	0.008004	0.009570	1.542286	10.16378	294.0323	0.000000
DLOTURINTR	0.004090	0.115915	5.596843	39.15503	6923.677	0.000000

In this study, first of all, stationarity of all the series are tested by using Unite Root Test and (Individual Root -Fisher- ADF) test type. The desired probability value is less than 10%. Because of the non-stationarity of the series, their logarithm of the first difference is calculated. The result of the Unit Root Test on macroeconomic variables and BIST-30 before stationarity and after stationarity is given as follows in Table 3 and 4.

Table 3. ADF Unit Root Test

Augmented Dickey-Fuller Test Statistic Before		
ADF Unit Root Test for Variables	**Intercept (Probability)**	**Trend and Intercept (Probability)**
BIST-30	0.6701 > 0.1	0.1372 > 0.1
TURCDS	0.1322 > 0.1	0.0295 < 0.1
TURINFR	1.0000 = 0.1	0.9992 > 0.1
TURINTR	0.6105 > 0.1	0.0716 < 0.1

Table 4. ADF Unit Root Test After Stationarity

Augmented Dickey-Fuller Test Statistic After First difference and Log.		
ADF Unit Root Test for Variables	**Intercept (Probability)**	**Trend and Intercept (Probability)**
DLOBIST30	< 0.1	< 0.1
DLOTURCDS	< 0.1	< 0.1
DLOTURINFR	< 0.1	< 0.1
DLOTURINTR	< 0.1	< 0.1

3.2.1. VAR Analysis

After all the series are made stationary, vector autoregressive models (VAR) analysis is used to determine the effect of various macroeconomic indicators on the index returns. In order to make healthy predictions as a result of VAR analysis, the optimal Lag Interval must be determined in the models created.

As a result of the analysis made in the model created for the XU30 dependent variable, it was determined that the best results were obtained in the models when the Lag Intervals for Endogenous was 10. In this context, since there is no autocorrelation and heteroskedasticity problem for the VAR models installed below, the ideal lag interval was estimated as 10. The positions of the inverse roots of the "AR Characteristic Polynomial" of the predicted model in the unit circle are given in Figure 1.
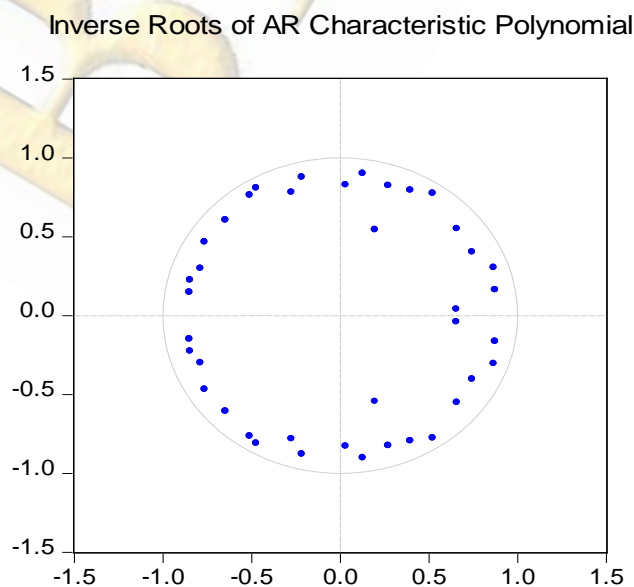

Figure 1. Inverse Roots of AR Characteristic Polynomial

As you can see from the results in Figure 1, we can say that the model established does not have the problem of stationarity since the Invers Roots of the "AR Characteristic Polynomial" are not located outside the circle.

In the second stage, after drawing and controlling the AR Roots Graph in order to establish the VAR model, the data series must meet first two of the three conditions (Autocorrelation, Heteroskedasticity and Normality). However, in these tests, the expected probability value is greater than 10%. The Autocorrelation LM Test and Heteroskedasticity Tests' results for the study are given as follows in Table 5 and Table 6.

Table 5. VAR Residual Serial Correlation LM Tests

Sample: 2010M06 2020M02
Included observations: 106

Null hypothesis: No serial correlation at lag h					
Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	23.21917	16	**0.1080**	1.487729	(16, 177.8)	0.1084
2	15.34060	16	**0.4998**	0.961839	(16, 177.8)	0.5005
3	17.58590	16	**0.3487**	1.109435	(16, 177.8)	0.3494
4	23.00202	16	**0.1137**	1.472932	(16, 177.8)	0.1141
5	14.88323	16	**0.5332**	0.931993	(16, 177.8)	0.5338
6	18.55065	16	**0.2927**	1.173406	(16, 177.8)	0.2933
7	20.33133	16	**0.2057**	1.292360	(16, 177.8)	0.2062
8	14.39723	16	**0.5691**	0.900359	(16, 177.8)	0.5697
9	17.72254	16	**0.3404**	1.118474	(16, 177.8)	0.3410
10	16.64010	16	**0.4092**	1.047044	(16, 177.8)	0.4099

Table 6. VAR Residual Heteroskedasticity Tests (Levels and Squares)

Sample: 2010M06 2020M02
Included observations: 106

Joint test:

Chi-sq	df	Prob.
774.8775	800	**0.7317**

Also, Normality, Autocorrelation and White Heteroskedasticity analysis were performed for the error terms in the VAR model. Based on Figure 1, Table 5 (Autocorrelation LM Tests) and Table 6 (VAR Residual Heteroskedasticity) test results, it is possible to say that the VAR Model which are established for this analysis is reliable and stable. Also, it does not have the problem of stagnation. Finally, it provides all of the necessary assumptions.

After performing these steps and choosing the suitable (Lag Intervals for Endogenous), the VAR model was established regarding do our analysis. Finally, Granger Causality test, Impulse-Response graphics and Variance Decomposition table are analysed during this article according to the aim of the study.

4. ANALYSIS

In this section, the analysis and the results obtained are given.

4.1. Granger Causality/Block Exogeneity Tests

Statistical Granger causality is obtaining the future estimated values of a time series variable by influencing the past period values of itself or another related time series variable (Takim, 2010). In other words, if the knowledge of the historical values of the X variable allows Y to be predicted more precisely, the X variable is the reason causal for the Y variable in the sense of Granger. After this short definition, the results of the "Granger Causality" analysis between the variables for this research are given in Tables 7 and 8.

Table 7. VAR Granger Causality/Block Exogeneity Wald Tests

Sample: 2010M06 2020M02
Included observations: 106

Dependent variable: DLOBIST30			
Excluded	Chi-sq	df	**Prob.**
DLOTURCDS	5.665235	10	**0.8426**
DLOTURINFR	10.99469	10	**0.3579**
DLOTURINTR	6.122596	10	**0.8049**
All	27.30248	30	0.6073

Dependent variable: DLOTURCDS			
Excluded	Chi-sq	df	**Prob.**
DLOBIST30	9.974282	10	**0.4428**
DLOTURINFR	4.367204	10	**0.9293**
DLOTURINTR	8.144893	10	**0.6147**
All	30.84572	30	0.4230

Dependent variable: DLOTURINFR			
Excluded	Chi-sq	df	**Prob.**
DLOBIST30	9.083843	10	**0.5242**
DLOTURCDS	18.79264	10	**0.0430**
DLOTURINTR	22.13540	10	**0.0144**
All	51.83892	30	0.0079

Dependent variable: DLOTURINTR			
Excluded	Chi-sq	df	**Prob.**
DLOBIST30	8.786307	10	**0.5525**
DLOTURCDS	11.00473	10	**0.3571**
DLOTURINFR	8.432756	10	**0.5866**
All	29.73305	30	0.4794

Table 8. Result of Var Granger Causality/Block Exogeneity Wald Tests

H₀ Hypotheses (Granger Causality Is Not Exist.)			Probability Value	Result
DLOTURCDS	≠ >	DLOBIST30	0.8426	Accept
DLOTURINFR	≠ >	DLOBIST30	0.3579	Accept
DLOTURINTR	≠ >	DLOBIST30	0.8049	Accept
DLOBIST30	≠ >	DLOTURCDS	0.4428	Accept
DLOBIST30	≠ >	DLOTURINFR	0.5242	Accept
DLOBIST30	≠ >	DLOTURINTR	0.5525	Accept

The "Granger Causality" test results in Table 7 are analysed in Table 8. According to the results here in Table 8, it has been determined that there is no causality relationship from the changes in inflation, CDS and interest rate to XU30 change. Also, as you can see in Table 8, there is no "Granger Causality" from XU30 stock returns to selected macroeconomics either.

4.2. Impulse Responses

In this part of the study, the Impulse-Response function results between dependent and independent variables are included. In this context, the results of the Impulse-Response function between XU30 returns and macroeconomic indices (Inflation Rate, interest rate and CDS) are included. The Impulse-Responses functions reveal the effect of shocks occurring in one of the independent variables on another dependent variable.

Impulse-response functions generally measure the impact of a standard deviation shock in one of the terms random error on the present and future values of the internal variables. The primary purpose of these functions is done to see the dynamic responses in the variables as a result of the shocks that occur and to examine the adaptation process to the shocks (Özata & Esen, 2010).

In the study in which the relationship of various macroeconomic indicators or variables on the XU30 index returns is examined, ten periods are taken as a basis in the effect-response functions. The test results are presented in Figure (2) below. In this way, the responses of the variable against the change of 1 unit in the shocks arising in the other variables are revealed.

Figure 2 shows the "Impulse-Response" function graph regarding the impact of shocks that occur in CDS index (DLOTURCDS), Turkey's Inflation Rate (DLOTURINFR), Interest Rates (DLOTURINTR) on the return of the BIST 30 or XU30 index (DLOBIST30).

Graph 1 in Figure 2. shows how a standard error shock in CDS (within the selected period) affects the changes in XU30. As you can see from the chart, at the beginning "one" unit shock that occurs in CDS affects negatively XU30 for approximately two periods, but from the second period, it is generally about stable throughout the period. In other words, it supports the Granger causality results.

According to Graph 2, the "one" standard error shock in inflation shows a fluctuating direction on XU30 during the periods under consideration. Although it starts with a positive effect from first, there is no significantly statistically strong relationship between them, it is also gradually weakening throughout the periods.
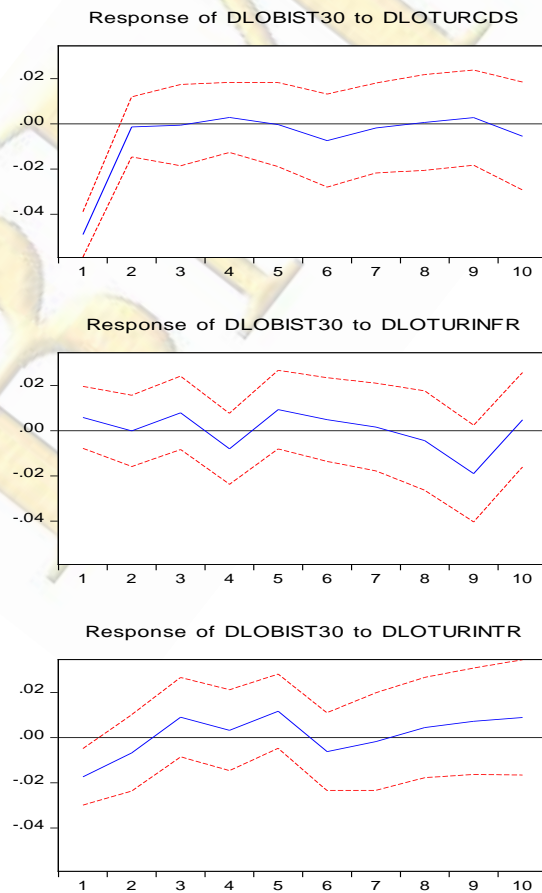

Figure 2. Response to Generalized One S.D. Innovations ± 2 S.E.
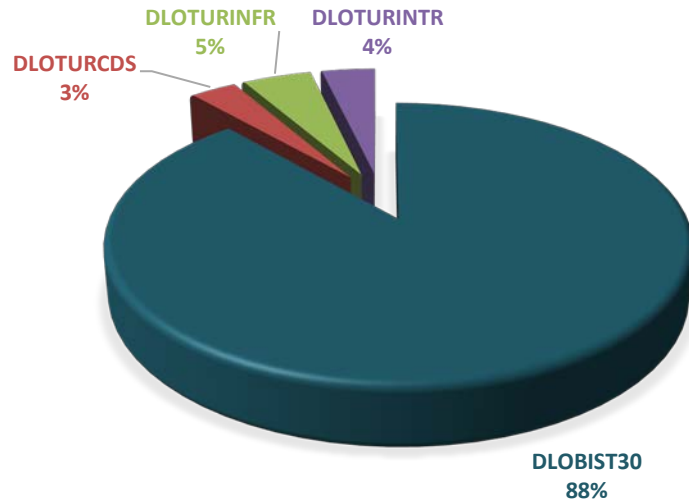
Figure 3. VAR Variance Decomposition of DLOBIST30

Graph 3 in Figure 2 shows the shocks in the interest rate and the response of XU30. There is no significant relationship between the two indices. However, it starts with a negative impulse, and it is about stable throughout the concerned periods. As you can see the line which shows the impulse and response goes down and up so stable and ends with a positive impact about three periods 8, 9 and 10.

4.3. VAR Variance Decompositions

Table 9. Variance Decomposition of DLOBIST30 using Cholesky (d.f. adjusted) Factors:

Period	S.E.	DLOBIST30	DLOTURCDS	DLOTURINFR	DLOTURINTR
1	0.062923	100	0	0	0
2	0.063341	98.68914	0.068911	2.35E-05	1.241926
3	0.065816	93.00925	2.995825	2.106729	1.888198
4	0.066435	91.58247	2.940248	3.423268	2.054011
5	0.06811	87.15932	2.809162	5.090805	4.940717
6	0.070079	86.74626	3.489076	5.001502	4.763166
7	0.070137	86.66829	3.494244	5.036955	4.800512
8	0.07138	85.09387	5.161786	5.03656	4.707785
9	0.074447	79.17805	5.13517	10.55119	5.135585
10	0.075486	77.42504	5.125205	10.63252	6.817241
	0.0688154	88.55517	3.121963	4.687955	3.634914

Cholesky Ordering: DLOBIST30 DLOTURCDS DLOTURINFR DLOTURINTR

Finally, variance decomposition analysis results in Table 9, which are presented in proportion (%). It shows how much of the change in XU30 stock returns is due to itself and how much is due to other variables. Considering the 10-year explanation rates of the independent macroeconomic variables and the dependent variable XU30 index, we can say that Interest rate (DLOTURINTR) 3.63%, Inflation rate (DLOTURINFR) 4.688%, CDS (DLOTURCDS) 3.12% and 88.5 % of XU30 is explained by its past shocks.

We can see these results below in Figure 3 as well.

5. FINDINGS AND CONCLUSION

Economic units closely follow changes in stock prices and returns. These tools provide essential information about the economic performance of companies and many economic situations such as future investment decisions or in macro-level; the economic and financial development of the country. When the literature is analyzed, it has been observed that macroeconomic and microeconomic factors have severe effects on the changes in stock prices and returns.

Besides, changes in the credit risk level of a country increase / decrease the volatility in stock prices and eventually returns. In this article, the impact of the selected macroeconomic variables such as inflation, interest rate, and one of the most dominant indicators of Turkey's credit risk "CDS premiums" on stock returns have been studied. For this purpose, the VAR Model was applied, Granger Causality Test, Impulse-Response Graphics, and variance decomposition were examined. According to the results of the research findings, Granger causality relationship between the variables was not found during the investigated periods. In addition, the shocks in the Impulse-Response charts in independent variables shows that the inflation and interest rate does not have a significant and apparent effect on the XU30 returns during the periods of study, they are fluctuating and weakening through the periods. However, the CDS shows negative effect on XU30 for about two and have a month in the beginning. As a result of its Variance Decomposition, it supports the findings and indicates that most of the changes in XU30 returns are by its effects, and among other

variables, inflation is in the first place, interest rate in the second and CDS in the third place with minimal percentages describes the changes in XU30 stock returns.

Many studies in the literature examine the relationship between macroeconomic indicators and stock prices or returns. However, in the literature, a study with examining the relationship between BIST 30 index and CDS, interest rate and inflation is not met. This study contributes to the literature in order to close this gap. Furthermore, by revealing impacts of the selected macroeconomics on stock returns, it enables national and international investors to make more effective and rational investments by considering the effects of the Turkish CDS premiums on stock returns, in their investment decisions. The findings of the study are important for individual and institutional investors as well as potential investors who aim to invest in stocks.

When the results obtained from the research are compared with the literature, Akyol and Baltacı (2018) is compatible with the negative impact of the CDS on stock returns. Concerning the positive impact of the interest rate on stock returns, with the result of Sevinç (2014) shows similarities. However, Şentürk and Ducan (2014), Budak, Cangi, and Tuna (2017), Koyuncu (2018), Akyol and Baltacı (2018) and Tuna (2019) studies found hostile relations between the interest rate and stock returns in their studies which are in opposition with the findings of this research. Furthermore, in Şentürk and Ducan (2014) 's research, one-way causality relationship was found from interest rate toward stock returns, on the other hand, Özmen, Karlılar and Kıral (2017) found two-way causality relationship between the interest rate and stock returns which are in opposition with the findings of this research.

It is thought that more effective results will be achieved in the future studies by including other financial indicators and extending the working period, or by examining same indicators on different indexes like BIST 100, BIST 50, etc. In this way, it will be possible to make more accurate projections with the credit risk of the country.

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