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The Relationship Between the Stock Market Volatility, Liquidity, Exchange Rate Return, and Stock Return During the COVID-19 Period: The case of the BIST 100 Index

COVİD-19 Döneminde Hisse Senedi Volatilitesi, Likidite, Döviz Kuru Getirisi Ve Hisse Senedi Getirisi Arasindaki İlişki: BİST-100 Örneği

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Abstract

The COVID-19 Pandemic, emerged in China at the end of 2019, negatively affected many sectors on global scale. This study examined the period between March 11, 2020, when the first case was seen in Turkey, and May 23, 2022, when the pandemic measures were largely lifted. The study aims to research the relationship between stock exchange return, stock exchange volatility, liquidity, and exchange rate return; and to research the movement characteristics of selected variables in different regimes by using Markov Switching Method during the COVID-19 period. The results showed a negative correlation between the BIST-100 Index Return of Borsa Istanbul (BIST) and volatility and exchange rate returns. Simultaneously there is a positive correlation between the BIST-100 Index Return and liquidity. Furthermore, it has been determined that the data movements in the examined period occurred within the framework of two different regimes. It has been observed that the probability of the BIST-100 Index Return, volatility, and exchange rate returns to remain in the same regime is high, and the probability of switching from one regime to another is relatively low.

Keywords: Volatility, exchange rate, BIST, stock return, emerging markets

JEL Codes: C32; C58; G15

Öz

2019 yılı sonunda Çin'de ortaya çıkan COVID-19 Pandemisi'nin küresel ölçekte pekçok sektör üzerinde olumsuz etkisi olmuştur. Bu çalışmada, Türkiye'de ilk COVID-19 vakasının görüldüğü 11 Mart 2020 ile salgın tedbirlerinin büyük ölçüde kaldırıldığı 23 Mayıs 2022 tarihleri arasındaki zaman dilimi incelenmiştir. Çalışma kapsamında, Markov Switching Yöntemi kullanılarak Borsa İstanbul'daki hisse senedi getirileri ile likidite, volatilite ve döviz kuru getirileri arasındaki ilişki incelenmiştir. Çalışmanın amacı, COVID-19 döneminde borsa getirisi, borsa oynaklığı, likidite ile döviz kuru getirisi arasındaki ilişkiyi ve seçilen değişkenlerin farklı ekonomik trendlerdeki hareket özelliklerini araştırmaktır. Sonuçlar, Borsa İstanbul'da (BIST) işlem gören BIST-100 endeks getirisi ile volatilite ve döviz kuru getirisi arasında negative yönlü bir korelasyon olduğunu göstermiştir. Aynı zamanda BIST-100 endeks getirisi ile likidite arasında pozitif yönlü bir korelasyon bulunmuştur. Ayrıca incelenen dönemde verilerin hareketlerinin iki farklı rejim çerçevesinde gerçekleştiği tespit edilmiştir. BIST-100 endeks getirisi,

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volatilite ve döviz kuru getirilerinin aynı rejimde kalma olasılığının yüksek, bir rejimden diğerine geçme olasılığının ise görece düşük olduğu görülmüştür.

Anahtar Kelimeler: Volatilite, döviz kuru, BİST, hisse senedi getirisi, gelişmekte olan piyasalar

JEL Kodları: C32; C58; G15

1. INTRODUCTION

The COVID-19 first appeared in Wuhan, China, in December 2019 and quickly spread all over the world. The World Health Organization (WHO) announced the coronavirus outbreak as a pandemic on March 11, 2020. Although its effect has decreased recently with vaccines, according to WHO data, it has been transmitted to around 550 million people worldwide since it emerged and has caused the death of approximately 6.5 million people (covid19.who.int). Since the emergence of the coronavirus, countries have applied various drastic precautions to prevent the spread of the disease. Many industries have suffered as a result of these restrictions. There have been serious fluctuations in the financial markets after the COVID-19 pandemic. Financial markets have faced crises caused by the pandemic many times. For instance, the epidemics of SARS, H1N1, H5N1, Ebola, and Zika had a relatively limited impact on the financial markets. However, the recent COVID-19 pandemic has greatly affected the global economic system due to its consequences.

This study examined the time period when the effects of the COVID-19 pandemic on the economy and financial markets were felt intensely. It examines the relationship between stock returns and liquidity, volatility, and exchange rate returns in Turkish stock markets. In the literature research conducted by us, no other study was found that examined the characteristics of these variables against the trends observed in the period under review.

An introduction and literature research were made in the first part of our study. In the second part, information about the applied method is given, and the data set is introduced. The findings obtained within the scope of the research are explained in the third chapter. A general evaluation was made by discussing the results within the scope of the findings in the last part of our study.

2. LITERATURE REVIEW

In the literature, many studies examine the effects of the COVID-19 pandemic on financial markets. Some studies have examined the effects of the COVID-19 crisis on equities such as clean energy metals (Liu, Qiao and Hun, 2022), oil prices (Corbet, Hou, Hu and Oxley, 2021; Narayan, 2022a), oil and gold prices (Ahmed and Sleem, 2022). In addition, there are many studies examining the effects of the COVID-19 pandemic on financial markets (Baker et al., 2020; Eichenbaum, Rebelo and Trabandt, 2020; Kheni and Kumar, 2021; So, Chu and Chan, 2021; Haroon et al., 2021; Marobhe and Kansheba, 2022; Zhao, Yang, Wen and Zhang, 2022). When these studies are examined, it has been observed that some of the studies focused on the effects of the pandemic on stock market volatility (Baek, Mohanty and Glambosky, 2020; Mirza, Naqvi, Rahat and Rizvi, 2020; Albulescu, 2021; Izzeldin, Muradoğlu, Pappas and Sivaprasad, 2021; Shahzad, Naeem, Peng and Bouri, 2021; Christopoulos, Kalantonis, Katsampoxakis and Vergos, 2021; Engelhardt, Krause, Neukirchen and Porsch, 2021; Topcu, Yagli and Emirmahmutoglu, 2021; Uddin, Chowdhury, Anderson and Chaudhuri, 2021; Wang, Xu and Sharma, 2021; Bakry et al., 2022; Diaz, Henríquez, and Winkelried, 2022; Sreenu and Pradhan, 2022; Vera-Valdes, 2022; Xu, 2022). In addition, exchange rate returns volatility (Feng, Yang, Gong and Chang, 2021; Honarmandi and Zarei, 2022; Yıldırım, Erdoğan and Tarı, 2022; Geng and Guo, 2022), stock return (Yiu and Tsang, 2022; Handoyo, Ibrahim and

Indrawan, 2022); returns and volatility (Rakshit and Neog, 2021; Bissoondoyal-Bheenick, Do, Hu and Zhong, 2021; Pyo, 2021; Ozdemir, Ercan, Grima and Romānova, 2021; Song, Bouri, Ghosh and Kanjilal, 2021; Li et al ., 2021; Kusumahadi and Permana, 2021; Wasiuzzaman, 2022), exchange rate returns and return (Torbecke, 2021; Narayan, 2022b), stock price and exchange rate returns (Hoshikawa and Yoshimi, 2021; Rai and Garg, 2022;), liquidity and return (Park and Newaz, 2021; Almutairi, 2022; Cardillo, Bendinelli and Torluccio, 2022), studies examining stock return, volatility and liquidity together have also been observed (Just and Echaust, 2020; Hong, Bian and Lee, 2021; Al-Maadid, Alhazbi and Al-Thelaya, 2022).

Some studies found a negative relationship between stock market return and volatility (Dimitriou and Simos, 2011; Chandra and Thenmozhi (2015), Jin (2017), Carr and Wu (2017), and Dahmene, Boughrara and Slim (2021). In addition, in some studies, on the contrary, a positive relationship was found between volatility and stock return (Li, Yang, Hsiao and Chang, 2005; Tan, Xiao, Huang and Zhou, 2021). Li et al. (2005) used the E-GARCH model in their study and examinedthe relationship between expected stock returns and volatility in the 12 largest international stock markets from January 1980 to December 2001. They find evidence of a significant negative relationship between expected returns and volatility in 6 out of the 12 markets when applying the Parametric EGARCH-M model. In contrast, most markets showed a positive but insignificant relationship during the sample period. On the other hand, Tan et al. (2021) implemented a fractionally co-integrated vector auto-regression (FCVAR) model. He examines at the time frame from February 2002 to December 2019. The global financial crisis occurred between January 2008 and December 2009, and while there is a positive relationship across the entire sample, a negative relationship was discovered during the financial crisis period.

A negative correlation between return and exchange rate has been discovered in several research (Berke, (2012); Chkili and Nguyen (2014), and Xie, Chen and Wu (2020)). On the contrary, Acar Boyacioglu and Curuk (2016) examined 42 companies operating in the manufacturing sector in the BIST-100 index by using the panel data analysis method and found a positive relationship between stock return and exchange rate. In addition, Erdoğan, Gedikli and Çevik (2020) examines Islamic stock markets in three major emerging countries India, Malaysia, and Turkey, using daily data from 2013 to 2019. As a result of the study, they found a partial relationship between stock return and exchange rate.

In the majority of studies examining the relationships between stock return and liquidity, no significant relationship was revealed (Marshall and Young, 2003; Martinez, Nieto, Rubio and Tapia, 2005; Chiang and Zheng, 2015; Hartian and Sitorus, 2015; Jun, Marathe and Shawky, 2003; Narayan and Zheng, 2011; Batten and Vo, 2014; Assefa and Mollick, 2014; Dinh 2017; Leirvik, Fiskerstrand and Fjellvikas, 2017; Bhattacharya, Bhattacharya and Basu, 2019; and Boloupremo 2020). As opposed to this, Chang, Faff and Hwang (2010) examined the Tokyo Stock Exchange and discovered a significantly negative relationship between stock return and liquidity. Using panel threshold methodology, Brana and Prat (2016) found evidence that global liquidity positively impacts asset prices during tranquil periods but negatively when risk aversion rises.

3. METHOD

In this study, the Markov Switching Method was used to investigate the effect of liquidity, volatility, and exchange rate return on the returns of the BIST-100 index. In Markov Switching Models, it is not known exactly which regime is dominant at which time, but the probability of a regime being dominant at any time can be calculated. After Hamilton (1989) examined the Markov Switching Model, this model started to be used in different fields. Hamilton's work is an expanded form of Goldfeld and Quant's work (1973).

The Markov Switching Model contains many equations involving different regimes in order to characterize the structures of time series. The value of the regime transition variable in the Markov chain, which is used as the transition parameter between the regimes, is determined depending on the transition variable of the previous period (Kuan, 2002: 40).

A two-regime Markov regime change model is expressed as shown in Equation 1:

$$y_t = \begin{cases} c_0 + \sum_{i=1}^{p} \emptyset_{1i} y_{t-i} + \varepsilon_{t0} & if\ s_t = 1 \\ c_1 + \sum_{i=1}^{p} \emptyset_{2i} y_{t-i} + \varepsilon_{t1} & if\ s_t = 2 \end{cases} \quad (1)$$

The parameters $\emptyset_{1i}$ and $\emptyset_{2i}$ in Equation 1 are autoregressive delay parameters of the first and second regimes. The parameters ε_{t0} andε_{t1} represent independent white noise series. The term s_t, on the other hand, indicates the first-order Markov chain showing the transition probability between regimes and takes one of the values 0 or 1. If the examined time series is in the lower regime, the s_t value is 1, if it is in the upper regime, the s_t value is 2.

Accordingly, the two-regime Markov chain transition probabilities matrix is defined as follows:

$$\mathrm{P}= \begin{matrix} P_{11} & P_{12} \\ P_{21} & P_{22} \end{matrix}$$

According to the matrix above;

$P_{11} = [S_t = 1|S_{t-1} = 1] = p$; Possibility of switching from 1st to 1st regime,

$P_{12} = [S_t = 2|S_{t-1} = 1] = 1 - p$; Possibility of switching from 1st to 2nd regime,

$P_{21} = [S_t = 1|S_{t-1} = 2] = q$; Possibility of switching from 2nd to 1st regime,

$P_{22} = [S_t = 2|S_{t-1} = 2] = 1 - q$;. Possibility of switching from 2nd to 2nd regime.

While P_{11} indicates the probability that the system stays in regime 1 after one period, P_{12} indicates the probability of transition from regime 1 to regime 2. Similarly, P_{22} indicates the probability that the system stays in regime 2 when it is in regime 2, while P_{21} indicates the probability of transition from regime 2 to regime 1 (Enders, 2014: 447). More generally, pij is equal to the transition probability from regime i at time t - 1 to regime j at time t.

The Markov Switching Method model uses a chain of hidden Markov models to manage the transition from one conditional mean function to another. It differs from other nonlinear econometric models in the mean because of this characteristic, which employs the values of the lagged variables of the series for the change in regimes.

4. ANALYSIS RESULTS

4.1. Data Set and Variables

Our study used daily frequency data covering the period between March 11, 2020, when the first COVID-19 case in Turkey was seen, and May 23, 2022, when the mask ban was

significantly lifted. Data of the BIST-100 Index Return series used in our study are from Istanbul Stock Exchange Market (https://datastore.borsaistanbul.com); data used in calculating liquidity and volatility are from Istanbul Stock Exchange Market and online database website (https://tr.investing.com); and exchange rate return data were obtained from online database website (https://tr.investing.com).

The return data examined within the scope of the study were obtained by using the equation specified in Equation 2.

$$G_t = ln\frac{x_t}{x_{t-1}} \quad (2)$$

In the equation x_t, represents the value of the variable at time t, x_{t-1} represents the previous day's value, G_t represents the return of the variable at time t, and ln is the natural logarithm function.

Although various volatility calculation methods are used in the financial literature, in our study, the volatility of the BIST-100 index was obtained by taking the square root (standard deviation) of the variance value of the relevant series. Variance and Standard Deviation formulas are shown in Equation 3 and Equation 4 (Karabıyık and Anbar, 2007: 65).

$$x_t = \ln(\frac{S_t}{S_{t-1}})$$

$$X = \frac{1}{n}\sum_1^n x_t$$

$$\sigma^2 = \frac{1}{n-1}\sum_1^n (x_t - X)^2 \quad (3)$$

$$\sigma = \sqrt{\frac{1}{n-1}\sum_1^n (x_t - X)^2} \quad (4)$$

In the above formulas, S_t represents the value of S in time t; S_{t-1} represents the value of S in time t-1; ln represents the natural logarithm function; x_t represents the rate of return in time t; X, represents the mean of x_t; σ^2, represents the variance; σ, represents the standard deviation; and n represents the number of observations.

In order to obtain the liquidity variable, the trading volume turnover ratio was used. In order to obtain the trading volume turnover ratio, the number of traded stocks is proportioned to the total number of stocks. In this context, the formula of liquidity is shown in Equation 5.

$$Liquidity = \frac{Trading\ Volume}{Total\ Value\ of\ Portfolio} \quad (5)$$

To calculate this ratio, the daily frequency of the BIST-100 index's trading volume in Turkish Lira (TL) is divided by the total portfolio value of the index at a monthly frequency.

Unit root tests are used to investigate the stationarity of the series. ADF (Augmented Dickey-Fuller) unit root test results for the analyzed variables are shown in Table 1. In both fixed, and constant and trend models, it is seen that all the variables are stationary at a difference of 1% significance level.

Table 1: ADF (Augmented Dickey-Fuller) Unit Root Test Results

Variables	With Constant	With Constant and Trend
BIST-100 return	-13.6995***	-13.5759***
Liquidity	-16.5825***	-16.4506***
Volatility	-9.7051***	-6.6597***
Exchange Return	-15.129***	-14.9363***
Critical values at a 1% significance level	-3.43	-2,58

*** symbol represents statistically significant values at the 1% significance level.

The Tsay and Mc.Leod.Li methods were applied to all variables in order to test the linearity of the variables studied.The results of the Tsay and Mc.Leod.Li linearity tests are presented in Table 2.

Table 2: Tsay ve Mc.Leod-Li Linearity Tests

Variables	Tsay		Mc.Leod.Li	
	Test Statistics	p Value	Test Statistics	p Value
BIST-100 Return	8.783	1.076e-05	552.0055	0.00
Liquidity	2.128	0.09572	552.0055	0.00
Volatility	7.58	2.409e-11	551.0055	0.00
Exchange Return	5.985	9.963e-39	552.0055	0.00

Considering the p values of the Tsay and Mc.Leod-Li test results in Table 2, the series of the BIST-100 Index Return, volatility and exchange rate returns are less than 0.01 for both tests; It is seen that the p-values of the liquidity series for both tests are less than 0.1. Hence, it can be said that the variables contain non-linearity findings. In this direction, it is concluded that analyzing the studied series with nonlinear methods will yield more accurate results.

4.2. Descriptive Statistics

Descriptive statistics for the variables of the study are given in Table 3.

Table 3: Descriptive Statistics

	BIST-100 Return	Liquidity	Volatility	Exchange Return
Mean	0.0014	3.0558	8.202e-03	0.0017
Median	0.0029	0.6879	5.602e-03	0.0011
Standard Deviation	0.0175	39.7086	0.0096	0.0166
Minimum Value	-0.1253	0.4322	3.255e-05	-0.2085
Maksimum Value	0.0626	726.2283	9.279e-02	0.1190
Distortion	-2.1382	16.7186	3.6671	-2.7868
Kurtosis	12.5145	281.07	20.5650	53.4942
Number of Observations	550	550	550	550

It is seen that the averages of the BIST-100 Index Return, exchange rate return, and volatility are close to zero. In the analyzed data set, it is seen that the smallest value belongs to volatility and the highest value belongs to liquidity. It has been determined that the highest standard deviation and mean are in the liquidity variable. It is seen that the standard deviations of the BIST-100 Index Return, exchange rate return, and volatility are quite low compared to the standard deviation of liquidity. It is seen that the means and standard deviations of the BIST-100 Index Return and the exchange rate return are quite close to each other. Accordingly, it is said that these two variables have similar returns and risks. It can be said that the BIST-100 Index Return is skewed to the left, so the negative returns in the BIST-100 Index Return series are more than the positive returns for the analyzed period. On the other hand, it is seen that liquidity, exchange rate return and volatility are skewed to the right.

The kurtosis coefficients of the examined variables were greater than 3, so extreme positive kurtosis was detected in all series.

4.3. Results

The correlation matrix of the variables of the study is given in Table 4.

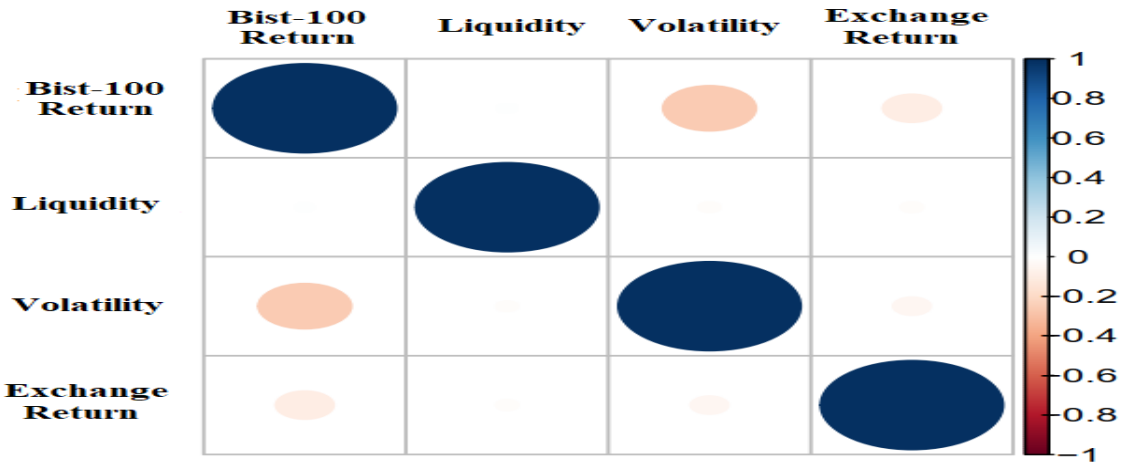
Table 4: Correlation Matrix

Variables	BIST-100 Return	Liquidity	Volatility	Exchange Return
BIST-100 Return	1	0.0098	-0.2588	-0.0999
Liquidity	0.0098	1	-0.0134	-0.0143
Volatility	-0.2588	-0.0134	1	-0.0418
Exchange Return	-0.0999	-0.0143	-0.0418	1

According to Table 4, which shows the correlation matrix of the variables, it is seen that the relationship between the variables is relatively low. It has been determined that the highest correlation is between the BIST-100 Index Return and volatility, and this relationship is at the level of -25.88%. The correlation between other variables was calculated to be less than 10%. The low correlation values indicate that there is no multicollinearity problem between the variables.

The correlation matrix, also called the correlogram, is shown in Chart 1.

Chart 1: Correlation Matrix



In the Correlation Matrix in Chart 1, positive correlations between variables are displayed in blue and negative correlations are displayed in red. The dominance of the colors of the shapes and the size of the shapes show the strength and direction of the correlation between the variables. Accordingly, it is seen that the correlation between the BIST-100 Index Return and volatility is negative and quite high compared to the correlation between other variables. In this context, the BIST-100 Index Return is strongly affected by the volatility in the market. The negative value of the correlation between the BIST-100 index and volatility indicates that uncertainty in the market has a negative effect on returns. In this context, our study reached similar results to Dimitriou and Simos (2011), Chandra and Thenmozhi (2015), Jin (2017), Carr and Wu (2017), Just and Echaust (2020), and Dahmene et al. (2021). However, unlike the findings we obtained in our study, Li et al. (2005) and Tan et al. (2021) found a positive relationship in their studies examining the relationship between volatility and returns. This is due to the fact that researchers use different econometric models and examine markets with different characteristics.

It is seen that the value of the correlation between the BIST-100 Index Return and exchange rate return is negative. Accordingly, it has been determined that as the BIST-100 Index Return increases, the exchange rate returns decrease. This negative relationship between BIST-100 Index Return and exchange rate returns is consistent with the studies of Berke (2012), Chkili and Nguyen (2014), and Xie et al. (2020). However, in the study of Acar Boyacıoğlu and Çürük (2016), a positive relationship was found between the BIST-100 Index Return and exchange rate returns. In addition, in the studies of Erdoğan et al. (2020), a partial positive relationship was found. The reason why these studies differ from the findings of our study is that the characteristics of the examined sectors, stock markets, and indices are different.

When the correlation between the BIST-100 Index Return and liquidity is analyzed, it is seen that the relationship between these two variables is positive and less than 1%. Accordingly, it has been determined that the effect of liquidity on the BIST-100 Index Return is quite low compared to the effect of other variables on the BIST-100 Index Return. This result shows that market liquidity does not significantly affect the BIST-100 Index Return. These results are similar to the results obtained by Marshall and Young' (2003), Martinez et al. (2005), Chiang and Zheng (2015), Hartian and Sitorus (2015), Jun et al. (2003), Narayan and Zheng (2011), Batten and Vo (2014), Assefa and Mollick (2014), Dinh (2017), Leirvik et al. (2017), Bhattacharya et al. (2019) and Boloupremo (2020). Unlike the findings we obtained in our study, Chang et al. (2010) showed a negative relationship between stock returns and liquidity; Brana and Prat (2016), on the other hand, found different directional relationships between stock returns and liquidity in different periods. The reason why these studies differ from the findings of our study is that the period and stock markets are different.

According to the findings of our study, it is seen that two different return regimes are statistically significant in the BIST-100 in the period under consideration. Of these two different regimes, Regime 1 represents the low-yielding period. Regime 2 illustrates the high return period.

Table 5: The Markov Regime Switching Probabilities Matrix

Variables		Regime 1	Regime 2
BIST-100 Return	**Regime 1**	0.8136	0.0344
	Regime 2	0.1863	0.9655
Liquidity	**Regime 1**	0.5128	0.5089
	Regime 2	0.4871	0.4910
Volatility	**Regime 1**	0.8105	0.0250
	Regime 2	0.1894	0.9749
Exchange Return	**Regime 1**	0.7238	0.0491
	Regime 2	0.2761	0.9508

According to the switching probabilities matrix in Table 5, the probability that the BIST-100 Index Return will remain in Regime 1 while in Regime 1 is 81.36%; 3.45% probability of switching to Regime 2 while in Regime 1; 96.55% probability of remaining in Regime 2 while in Regiment 2; It is seen that the probability of switching to Regime 1 while in Regime 2 is 18.63%. According to these results, it has been determined that the probability of staying in the same regime is high while being in both regimes, and the probability of switching from one regime to the other is relatively low.

51.28% probability of liquidity staying in the same regime while in Regime 1; 50.89% probability of switching to Regime 2 while in Regime 1; 49.1% probability of staying in the same regime while in Regime 2; and the probability of switching to Regime 1 while in Regime 2 is 48.71%. According to these results, it is seen that both the probability of staying in the same

regime and the probability of switching to another regime are close to each other for liquidity. This showed that market liquidity has similar characteristics in different regimes.

81.05% probability of volatility staying in Regime 1; 2.5% probability of switching to Regime 2 from Regime 1; 97.49% probability of staying in Regime 2; and the probability of switching to Regime 1 from Regime 2 is 18.94%. According to these results for volatility, the determination to stay in the same regime is high, and the probability of switching from one regime to the other is relatively low.

72.38% probability of the exchange rate return will remain in Regime 1; 4.91% probability of switching to Regime 2 from Regime 1; 95.08% probability of remaining in Regime 2. It is seen that the probability of switching to Regime 1 from Regime 2 is 27.61%. According to these results, it has been determined that the probability of staying in the same regime is high while being in both regimes, and the probability of switching from one regime to the other is relatively low.

5. EVALUATION AND CONCLUSION

According to classical finance literature, stock returns depend on micro and macro variables and internal factors that differ according to these variables. In addition, there are assumptions that investor behavior is rational, there is fair competition among investors, and investors cannot direct the market alone or with the help of a group. However, studies have revealed that the factors affecting stock returns are higher in number. In addition, it has been observed that the effects of these factors on stock returns are not linear, unlike the classical finance literature, but have nonlinear features.

In our study, the liquidity of stocks, which is known to be related to stock returns, the volatility of stock returns and the variables, including exchange rate returns (Dollar/TL), have been examined with the Markov Switching Method, which is one of the non-linear econometric methods. Furthermore, in our study the relationship of the returns of the BIST-100 Index with the liquidity of the stocks, the volatility of the stock returns, and the exchange rate returns were examined within the scope of the COVID-19 Pandemic. Our research used data between March 11, 2020, when the first Covid-19 case was recorded in Turkey, and May 23, 2022, when the mask ban was largely lifted.

According to the findings obtained in our study, it was observed that the highest standard deviation was in liquidity. It has been determined that the standard deviations of the BIST-100 Index Return, exchange rate returns, and volatility are quite low compared to the standard deviation of liquidity. It has been observed that the BIST-100 Index Return and the exchange rate returns have similar returns and risks. It has been observed that the negative value data in the BIST-100 Index Return series is more than the positive value data. On the other hand, it has been observed that the positive value data in the exchange rate return series is more than the negative value data. The kurtosis coefficients of the variables were greater than 3, so extreme positive kurtosis was detected in all series. Therefore, there is volatility clustering in the variables.

It has been observed that there is a negative correlation between the BIST-100 Index Return and volatility, and it is quite high compared to the correlation between other variables and BIST-100. In this context, it is seen that volatility strongly affects the BIST-100 Index Return. Therefore, the negative correlation between the BIST-100 and volatility indicates that market uncertainties have a negative impact on returns. Accordingly, as the uncertainty in the

market increases, it can be thought that investors turn to investment instruments that they see as safer instead of the stock market.

It is seen that there is a negative correlation between BIST-100 Index Return and Exchange rate returns. Accordingly, it has been determined that as the exchange rate returns increase, the BIST-100 Index Return decreases. The increase in uncertainties in the market and the tendency of investors towards foreign currency in order to prevent the depreciation of their savings due to inflation can be seen as the reason for this correlation.

According to the results we obtained in our study, it was observed that the increase in liquidity increased the BIST-100 Index Return, in line with previous studies. However, since the correlation between the BIST-100 Index Return and the liquidity is less than 1%, it is seen that the market liquidity does not significantly affect the BIST-100 Index Return.

It has been determined that the data movements in the examined period occurred within the framework of two different regimes. It has been observed that the probability of the BIST-100 Index Return, volatility, and exchange rate returns to remain in the same regime is high, and the probability of switching from one regime to another is relatively low. For market liquidity, it has been determined that both the probability of staying in the same regime and the switching to another regime are close.

The correlation of the expected returns of stocks with other factors in the market has a crucial place in the finance literature. Correct modeling of stock returns will guide the investor in creating expected return estimates for assets. Our study will contribute to the literature in terms of examining the relationship between stock returns and market factors during the COVID-19 Pandemic, which has caused unprecedented changes in the world of economy and finance.

Ethics Statement: The authors declare that ethical rules are followed in all preparation processes of this study. In case of detection of a contrary situation, BİİBFAD Journal does not have any responsibility and all responsibility belongs to the authors of the study
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