Scientific Papers (www.scientificpapers.org)
Journal of Knowledge Management, Economics and Information Technology

Vol. VII, Issue 4
August 2017

Causality Analysis of the Impact of Monetary Policy on Stock Markets: The Case of Turkey

Authors: **Musa ATGUR,** Assistant Professor, Necmettin Erbakan University, matgur@konya.edu.tr**; Fatih YIGIT,** Assistant Professor, Istanbul Medeniyet University, fatih.yigit@medeniyet.edu.tr

In this paper, the effects of monetary policies on the Borsa Istanbul (BIST) stock market have been examined in Turkey for the period 2006-2016. The obtained findings point out some significant effect of the monetary policy on BIST stock market prices and returns in Turkey. In this context Johansen Cointegration and Granger Causality test methods were used. According to the Johansen Cointegration results it proves to be a long-run relationship between the series included. Moreover, the Granger Causality test results suggest an important relationship from the money supply (M2) and deposit interest rate (DIR) variables towards the BIST stock market price index (BIST100F) and return index (BIST100G).

Keywords: Monetary Policy, Stock Market, Turkey.
JEL Classifications: C50, E44, E52, G10.

Introduction

Monetary policies influence financial markets and economic activity in different ways. Therefore, financial markets react differently to expansionary and contractionary monetary policies.

Monetary policy implementations affect balance sheets and total expenditure of companies in different sizes. When an expansionary

monetary policy is applied, stock prices increase thereby causing an increase in firm value. Because adverse selection and moral hazard problems are reduced, credits are increased resulting in an increase in investment expenditures as well as expanding total expenditures [1].

The impacts of monetary policies on commodity and capital markets relate to three major macro variables; interest rates, exchange rates and inflation. The impact on interest rate is explained by the Classical Monetarism and Keynesian IS-LM model. In case of implementing expansionary monetary policy, relaxation in the interest rate increases credit demand meanwhile rising investment demand in capital markets increases aggregate demand. Keynes examines the effects of a decrease in interest rates on aggregate demand. Interest rates fall in the course of time following the adoption of expansionary monetary policy. When interest rates are lower than the marginal efficiency of capital, the marginal productivity of capital expands the investment demand until it equals interest rate. The expansion in investments creates a multiplier effect, causes total demand expansion and is reflected in stock market. Increasing demand for stocks makes pressure on prices. As a result, low interest rates reduce borrowing costs causing stock demand and prices to rise [2].

Keynesian economists argue whether money supply would affect stock market prices if altered expectations about future monetary policy implementation in the wake of changes in money supply. The Keynesians suppose that a positive money supply shock tightens up the future monetary policy and therefore interest rates increases. As interest rates increase, discount rates also increase and the present value of future earnings falls resultantly. According to the Keynesians, economic activity decreases with increases in interest rates, which makes pressure of stock market prices [3].

The effects of monetary policies on financial markets after financial crises are constantly being debated. The functioning of financial markets in a healthy structure is important for the effectiveness of monetary policies. Subsequent to the recent 2007-2008 global financial crisis, monetary policy makers began to go in quest of information about stability of financial markets.

Significant developments in monetary policy have been realized in Turkey since 2001, in this context, the Central Bank of the Republic of Turkey (CBRT) has maintained instrument independence in its monetary policies. Since 2006, the official inflation targeting regime has been adopted

after the implicit regime that was previously employed from 2002 through 2006. After all these developments, some new discussions about financial markets started after the 2007-2008 global financial crisis. In this context, the CBRT has made a significant change in monetary policy by creating a new objective component in 2012 and considering the purpose of financial stability as the main objective of price stability.

This study investigates the effects of monetary policy on the BIST stock market prices and returns in Turkey. In the second part, the relevant theories and studies in the literature are examined. In the third part, the data set is determined and econometric methods are implemented. Eventually, the findings are discussed in the last section.

Literature Review

This section examines the literature on the relationship between monetary policy and stock market performance. Among these studies, Thorbecke [4] examined the effects of monetary policies on stock returns in the US economy for the period 1967-1990, using the vector autoregressive (VAR) model method. The variables included in the econometric model were asset returns, growth, inflation and federal fund interest rate. Its findings show that monetary policies have a significant impact on the stock return index in United States.

Bredin, et al. [5] investigated the impact of changes in monetary policy on stock returns in the UK economy during the period 1993-2004. A VAR model was constructed in the study in which stock index and policy interest rate variables were taken as the model variables. The results proved a negative effect of monetary policy shocks on the expected returns of stocks.

Ioannidis and Kontonikas [6] examined the effects of monetary policy on stock returns in thirteen OECD countries during the period 1972-2002. The results of their study in which the Ordinary Least Squares (OLS) estimation method was undertaken show that monetary policies in these countries have impact on stock returns.

Laopodis [7] argued a dynamic relationship between monetary policies and stock markets in the US economy during the period 1970-2003. In this context, the relationship between the federal fund interest rate and the S&P 500 Index was examined. For the econometric modelling in the

study where the VAR Model method is used as the econometric method, industrial production, inflation rate, federal fund interest rate, total reserve, money supply and unsecured reserves variables were taken as the model variables. The findings showed no consistent relationships between monetary policy variables and stock market returns.

Alatiqi and Fazel [8] examined the impact of money supply on stock prices during the period 1965-2005 in the United States. In the study, Engle-Granger Cointegration and Granger Causality test methods were applied. For the econometric model, M1 money supply, S&P 500 index, treasury bond interest rate and treasury bond interest rate variables were employed. The results provided some evidence suggesting important effects of money supply changes on stock prices.

Rahman and Mustafa [9] explored the effects of money supply and oil prices on stock markets for short-run and long-run for the period 1974-2006 in the US. The Vector Error Correction Model (VECM) method was applied considering M2 money supply, oil prices and S&P 500 index returns to be the variables of interest. The results of the study showed that negative currency and oil shocks affected the stock market in the covered period

Gençtürk [10] examined the effect of macroeconomic factors on stock prices during the financial crises in Turkey for the period 1992-2006 by dividing the entire period to the sub-periods according to availability of a crisis. For the econometric model of the study in which the multiple regression analysis method was applied, the variables such as BIST100 index, treasury bill interest rate, consumer price index, money supply, industrial production index, dollar exchange rate and gold prices were engaged. According to the results of this study, it has been determined that the consumer price index and money supply variables affect the BIST return index during the crisis periods in Turkey. In the period when there was no crisis, it was determined that all the macroeconomic factors included affected the BIST index.

Raymond [11] challenged the interaction of monetary variables and stock prices in the Jamaican economy during the period between 1990 and 2009. The cointegration and VECM methods were undertaken using JSE index, interest rate, exchange rate, M2 and M3 money supply as the model variables. The findings of the study suggest that monetary variables have important effects on stock prices.

Okpara [12] searched for the effects of monetary policies on stock market returns in the Nigerian economy for the period 1985-2006. The VECM method was used in the study with such variables as nominal interest rate, treasury bill interest rate, stock return index, real interest rate, inflation rate and minimum discount rate The findings point out that monetary policies must be effective on the stock market in the long run.

Fernandez-Amador, et al. [13] examined the effects of monetary policy on the stock market liquidity in the German, French and Italian economies for the period 1999-2009. The results of the study in which the VAR Model method is applied show that monetary policy has significant effects on the stock market liquidity in these countries.

Özer, et al. [14] researched the interaction between macroeconomic variables and stock prices in Turkey for the period 1996-2009 using the least squares, Johansen cointegration, Granger causality and error correction modeling methods. The results of the study revealed some significant equilibrium relationships between stock prices and certain macroeconomic variables in Turkey during the period of interest.

Aklan and Nargeleçekenler [15] analyzed the relationship between monetary policy and stock market in Turkey in the period of 1996-2012 in terms of sectors and sub-sectors. In the study conducted using the VAR Model method, interest rate, U100, financial and industrial index variables were used. The results of the study showed that the stock market responded to monetary policy shocks in Turkey during the period 1996-2012.

Galebotswe and Tlhalefang [16] examined the impact of monetary policy shocks on stock returns in the Botswana economy for the period 1993-2010. The VAR Model method was employed in the study. Oil prices, real GDP, inflation, nominal exchange rate, Central Bank borrowing interest rates and domestic firm index were determined as the variables. The results indicated that monetary policy shocks in the Botswana economy partially affected stock returns.

Seong [17] researched the impact of monetary policies on the stock market in Singapore for the period 1991-2013 using the Engle-Granger cointegration, Engle-Granger Two-Stage Error Correction Model and Granger Causality test methods. Amon the model variables included are time index, M1, M2 and M3 money supply variables, deposit interest rate and borrowing interest rate. The results of this study show that the impact of

monetary policies upon the stock market is remarkable in both short-run and long-run in Singapore.

Sirucek [18] examined the effects of changes in money supply on the stock market during the period 1967-2011 in the US economy. Cointegration and Granger Causality test methods were used in the study and the findings showed that the money supply was effective on the stock market.

Yoshino, et al. [2] surveyed the reaction of the stock market to monetary policy shocks in Iranian economy for the period 1998-2013. In the study, error correction model method was applied, Tehran Stock Exchange Price Index (TEPIX), real GDP, money base, exchange rate and consumer price index are among the variables included. The findings indicate that monetary policy shocks are effective on the stock market.

Choi and Yoon [19] checked the effects of money supply changes on the volatility of the Korean Stock Exchange Market using the GARCH, GJR-GARCH and EGARCH methods. The study covers the 1980-2013 period and for the econometric model the stock market price index, M1 and M2 money supply, US money supply (M1, M2, M3) variables were considered to be the variables. The findings indicate that the money supply has no significant impact on the volatility of the Korean stock market.

In the study prepared by Çetin and Bıtırak [20], the effect of macroeconomic variables on stock returns was examined in Turkey during the period between 2000 and 2009. The findings obtained in the study using the least squares econometric estimation method show that gold prices and deposit interest rate in Turkey have a negative effect on stock returns while the broad money supply and the rate of capacity utilization in the manufacturing industry are positively affected.

Haitsma, et al. [21] conducted an examination study on the reactions of the stock market to monetary policy in the European Union during the period 1999-2013. Generalized Least Squares Method was used in the study with the stock return index, interest rate and dummy as the variables. According to the results of the study, non-traditional monetary policies in the EU have been found to be very effective on stock market.

Yıldırım and Mirasedoğlu [22] examined the effectiveness of monetary policy mechanism on stock prices in Turkey during 2002-2014. The variables used in the econometric model of the study, were overnight interest rates between banks, BIST 100 Index, fixed capital formation rate, domestic consumption of domestic and foreigners and industrial production

index. The findings of the study in which the VAR model method was applied revealed that the stock market price channel in the Turkish economy did not work effectively in the relevant period.

Zare, et al. [23] argued the response of stock prices to the monetary policy shocks in the Malaysian economy during the period of 1990-2011 via the structural vector autoregressive (SVAR) model. In the implementation of SVAR Model; oil price index, US federal fund interest rate, domestic output, industrial production index, consumer price index, monetary base, short term interest rate, nominal exchange rate index, Kuala Lumpur Composite Index were used as the variables of interest. The findings prove that monetary policy shocks in Malaysia have significant impact on stock prices.
Ekene [24] examined the effects of monetary policy on stock returns in Nigeria for the period 2003-2014 using the standard VAR method. For the VAR model of the study using monthly data; consumer price index, interbank interest rate, treasury bills interest rate, exchange rate and stock index variables were included. The results obtained from the VAR estimation show that monetary policy variables have no significant effect on stock prices.

Table 1: Literature Review-1

Author	Country and Period	Method	Result
Thorbecke [4]	US (1967-1990)	VAR	Monetary policies are influential on the stock return index.
Bredin, et al. [5]	UK (1993-2004)	VAR	The monetary policy shocks have affected the expected returns of stocks in negative direction.
Ioannidis and Kontonikas [6]	13 OECD Countries (1972-2002)	Ordinary Least Squares	Monetary policies are influential on stock returns.
Laopodis [7]	US (1970-2003)	VAR	There is no consistent relationship between monetary policy and

			the stock market.
Alatiqi and Fazel [8]	US (1965-2005)	Engle-Granger Cointegration, Granger Causality	Money supply changes are effective on the stock market.
Rahman and Mustafa [9]	US (1974-2006)	VECM	Negative money and oil shocks have affected the stock market.
Gençtürk [10]	Turkey (1992-2006)	Multiple Linear Regression	Macroeconomic factors have affected the BIST index.
Raymond [11]	Jamaica (1990-2009)	VECM	Monetary variables are influential on stock prices.
Okpara [12]	Nigeria (1985-2006)	VECM	Monetary policy is influential on the stock market returns in long-run.
Fernandez-Amador, et al. [13]	Germany France Italy (1999-2009)	VAR	In all three countries, monetary policies have impact on the stock market liquidity.
Özer, et al. [14]	Turkey (1996-2009)	Johansen Cointegration VECM Granger	The relationship between stock prices and macroeconomic variables has been established in long-run.
Aklan and Nargeleçekenler [15]	Turkey (1996-2012)	VAR	The stock market has reacted to monetary policy shocks.
Galebotswe and Tlhalefang [16]	Botswana (1993-2010)	VAR	The monetary policy shocks are partially affecting the stock market.

Table 2: Literature Review -2

Author	Country and Period	Method	Result
Seong [17]	Singapore (1991-2013)	Engle Granger Granger Causality	The monetary policies are influential on the stock market transmission for short-run and long-run.
Sirucek [18]	US (1967-2011)	Granger Causality	Money supply is effective on the stock market.
Yoshino, et al. [2]	Iran (1998-2013)	VECM	The monetary policy shocks are affecting the stock market.
Choi and Yoon [19]	Korea (1980-2013)	GARCH	Money supply changes are not effective on the stock market volatility.
Çetin and Bıtırak [20]	Turkey (2000-2009)	Ordinary Least Squares	Gold prices and deposit interest rates affected the stock returns negatively, but money supply and manufacturing industry capacity utilization positively.
Haitsma, et al. [21]	European Union (1999-2013)	Ordinary Least Squares	The non-traditional monetary policies are effective on stock market.
Yıldırım and Mirasedoğlu [22]	Turkey (2002-2014)	VAR	Stock prices channel did not work efficiently.
Zare, et al. [23]	Malaysia (1990-2011)	SVAR	Monetary policy shocks are affecting stock prices.
Ekene [24]	Nigeria (2003-2014)	VAR	Monetary policy is not influential on stock prices.

Data Set and Econometric Method

The data used are monthly and cover the period between 2006 and 2016. In the study, the reason for choosing this period is that there have been significant developments in the monetary policies adopted in Turkey after

the financial crisis and the official inflation targeting regime has been introduced in 2006.

Our econometric study is based on the approaches followed by both Alatiqi and Fazel [8], the model used in the study of the effect of money supply on stock prices in US during the period 1965-2005, and Zare, et al. [23], the model used in the study of effects of monetary policy shocks on stock prices in Malaysia. Our final econometric model can be summarized in equations (1) and (2).

$$BIST100R = f(M2, DIR, CPI, IPI) \quad (1)$$

$$BIST100P = f(M2, DIR, CPI, IPI) \quad (2)$$

The variables of the econometric model shown in Eq. (1) and Eq. (2) are; BIST100 Return Index (BIST100R), BIST100 Price Index (BIST100P), Broad Money Supply (M2), Deposit Interest Rate (DIR), Consumer Price Index (CPI) and Industrial Production Index (IPI - Adjusted for calendar and seasonal effects, 2010 = 100).

Firstly, the logarithmic transformations of the series belonging to all the variables except the DIR were performed in the study. The variables and data set information used for the econometric model of the study are summarized in Table 3.

Table 3: Variables and Data Set Used for Econometric Analysis

Variable	Period	Definition
BIST100R	2006:01-2016:12	BIST100 Return Index
BIST100P	2006:01-2016:12	BIST100 Price Index
M2	2006:01-2016:12	Broad Money Supply
DIR	2006:01-2016:12	Deposit Interest Rate
CPI	2006:01-2016:12	Consumer Price Index

IPI	2006:01-2016:12	Industrial Production Index (Adjusted for calendar and seasonal effects, 2010 = 100)

Unit root (stationarity) analysis

For econometric time series analysis, firstly unit root test is performed for the series to test whether the series exhibit a distribution around a certain average or not. The mean and variance of the series that have unit root vary depending on the time.

The concept of stationarity refers to a probable process in which the mean and variance do not change over time and that the covariance between the two periods depends on the distance between the two periods [25].

A total of three different unit root test methods were used in the unit root analysis of the series used in the study, namely ADF (Augmented Dickey-Fuller), PP (Phillips Perron) without structural break and Zivot-Andrews structural break Unit Root Test methods. Firstly, ADF unit root test applied and the results obtained are given in Table 4. ADF unit root test method is based on the Schwarz information criterion in the determination of the lag lengths. According to the results in Table 4 all series tested by the ADF unit root test and they were found to have unit root which means non-stationary. Then the first difference values were taken to make them stationary (I (1)).

Table 4: ADF (Augmented Dickey-Fuller) Unit Root Test Results

Variable	Level		First Difference		Result
	Constant Without Trend	Constant With Trend	Constant Without Trend	Constant With Trend	
BIST100R	-1.1080(0)	-2.5185(0)	-11.1370(0)**	-11.0951(0)**	I(1)
BIST100P	-1.3325(0)	-2.5253(0)	-11.2263(0)**	-11.1847(0)**	I(1)
M2	-1.3211(0)	-3.7697(0)*	-11.0600(0)**	-11.1058(0)**	I(1)

DIR	-1.6465(1)	-1.9008(1)	-8.4615(0)**	-8.1001(1)**	I(1)
CPI	-0.4487(4)	-5.1287(1)	-8.5092(3)**	-8.4675(3)**	I(1)
IPI	-0.8381(1)	-2.5287(3)	-15.1167(0)**	-15.0579(0)**	I(1)

*: %5 Significant at significance level. **: %1 Significant at significance level.
Values in parentheses are lag lengths.

PP (Phillips Perron) unit root test results, which is the second unit root test method used in the study, are given in Table 5. The lag length for the implementation of the PP unit root test were determined according to the "Andrews Bandtwith" method. According to the results in Table 5, in general, the series belonging to all variables are not stationary according to the level values, but contain unit root. When the first difference of the series was taken and the PP unit root test method was reapplied, all the series were made stationary.

Table 5: PP (Phillips Perron) Unit Root Test Results

Variable	**Level**		**First Difference**		**Result**
	Constant Without Trend	**Constant With Trend**	**Constant Without Trend**	**Constant With Trend**	
BIST100R	-1.11(0,81)	-2.59(1.37)**	-11.14(0.27)**	-11.10(0.28)**	I(1)
BIST100P	-1.33(0.73)	-2.59(1.24)	-11.23(0.29)**	-11.18(0.30)**	I(1)
M2	-1.32(0,37)	-3.80(1.13)*	-11.06(0.13)**	-11.11(0.09)**	I(1)
DIR	-1.44(4.26)	-1.61(4.31)	-8.54(1.29)**	-8.52(1,30)**	I(1)
CPI	-0.44(2.52)	-4.28(3.38)**	-9.77(0.83)**	-9.74(0.82)**	I(1)

IPI	-1.08(4.06)	-2.32(3.60)	-15.02(1.18)**	-14.96(1.18)**	I(1)

*: %5 At the level of significance of 5%, the null hypothesis (Ho) is rejected.
**: %1 At the level of significance of 5%, the null hypothesis (Ho) is rejected.
Values in parentheses are lag lengths.

Perron [26] proposed a unit root test that is based on a single structural break in series. The test is based on the assumption that the structural break is external and its period is known.

Zivot and Andrews [27] proposed as an alternative to Perron [26], a unit root test that allows one structural break and in which structural break is internally identified. The Zivot and Andrews [27] structural break unit root test is based on three different models. According to model A, the structural break only occurs in the mean (constant) state. According to model B, the structural break is only in slope (trend). According to model C, the structural break takes place in both forms, both in the mean and in the slope. Models are given in equations (3), (4) and (5) [27].

Model A;

$$Y_t = \hat{\mu}^A + \hat{\theta}^A DU_t(\hat{\lambda}) + \hat{\beta}^A t + \hat{a}^A y_{t-1} + \sum_{j=1}^{k} \hat{C}_j^A \Delta y_{t-j} + \hat{e}_t \quad (3)$$

Model B;

$$Y_t = \hat{\mu}^B + \hat{\beta}^B t + \hat{\gamma}^B DT_t^*(\hat{\lambda}) + \hat{a}^B y_{t-1} + \sum_{j=1}^{k} \hat{C}_j^B \Delta y_{t-j} + \hat{e}_t \quad (4)$$

Model C;

$$Y_t = \hat{\mu}^C + \hat{\theta}^C DU_t(\hat{\lambda}) + \hat{\beta}^C t + \hat{\gamma}^C DT_t^*(\hat{\lambda}) + \hat{a}^C y_{t-1} + \sum_{j=1}^{k} \hat{C}_j^C \Delta y_{t-j} + \hat{e}_t \quad (5)$$

The results of the Zivot-Andrews structural break unit root test method, which is the third unit root test method used in the study, and the minimum T statistic values are given in Table 6.

Table 6: Zivot-Andrews Structural Break Unit Root Test Results

Variable	Model	Break Period	Minimum T Statistics Values
BIST100R	A	2009:07	-3.3513(0)
	B	2014:08	-2.7428(0)
	C	2009:04	-4.1026(0)
BIST100P	A	2009:07	-3.3414(0)
	B	2014:11	-2.7490(0)
	C	2009:04	-4.0450(0)
M2	A	2012:01	-3.7305(4)
	B	2008:02	-3.6827(4)
	C	2012:01	-4.4199(4)
DIR	A	2009:01	-7.3698(4)
	B	2010:04	-4.3788(4)
	C	2009:01	-7.2770(4)
CPI	A	2008:01	-3.9751(4)
	B	2008:04	-3.8355(4)
	C	2009:04	-4.4853(4)
IPI	A	2008:08	-3.8850(3)
	B	2009:01	-3.2341(3)
	C	2010:02	-3.8986(3)

Critical values for model A; % 1: -5.34, 5%: -4.93. Critical values for model A; %1: -4.80, %5: -4.42. Critical values for model A; %1: -5.57, %5: -5.08

According to the minimum T statistic values given in Table 6, structural break was observed in the A and C model for the DIR variable during the period 2009:01. When the results obtained are evaluated in terms of other variables except the DIR, the null hypothesis claiming that structural break unit root exists cannot be rejected.

Cointegration analysis

Johansen [28] cointegration method is one of the methods used to study the long-term relations of the stationary series of the same order in the time series analysis.

Johansen cointegration is made by means of the equation system given in equations, (6) and (7). According to this:

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \ldots + \Gamma_{k-1} \Delta X_{t-k+1} + \Gamma_k X_{t-k} + \varepsilon_t \quad (6)$$

$$\Gamma_i = -I + \Pi_1 + \ldots + \Pi_i, i = 1, \ldots, k \quad (7)$$

Π_i; indicates coefficient matrix and expresses the number of co-integrated vectors in the system of equations. In this study, Johansen cointegration test was used to examine the long-run relationships of the series.

Johansen cointegration test results are given in Table 7. According to the Maximum Eigenvalue and Trace Test results in Table 7, the r = 0 null hypothesis (H_0) is rejected and the r = 1 and r> 0 alternative hypotheses (H_1) are accepted because the maximum eigenvalue and trace test statistics value in the first row exceeds the critical values of 5% at the 5% significance level. According to Johansen cointegration test results, there is at least one cointegrated vector. Therefore, there was a long run cointegration relation between the series.

Table 7: Johansen Cointegration Test Results

Maximum Eigenvalue Test			
Null Hypothesis (H_0)	**Alternative Hypothesis(H_1)**	**Test Statistics**	**%5 Critical Value**
r=0	r=1	59.91	40.08
r=1	r=2	20.71	33.88
r=2	r=3	18.29	27.58
Trace Test			
Null Hypothesis (H_0)	**Alternative Hypothesis(H_1)**	**Test Statistics**	**%5 Critical Value**
r=0	r>0	115.27	95.75
r≤1	r>1	55.36	69.82
r≤2	r>2	34.64	47.86

Causality analysis

The existence and direction of causality relations between variables in econometric analyzes are examined by causality tests. One of these methods is the Granger causality test method. In the Granger causality test; for

estimating Y variable, if the causality test using the past values of variable X are more successful than the test in which past values of X are not used then it results in X is Granger cause of Y [25].

Granger causality test is applied according to the equations (8) and (9). These equations are:

$$Y_t = \sum_{t=1}^{m} \alpha Y_{t-i} + \sum_{j=1}^{m} \beta_j X_{t-j} + u_{1t} \quad (8)$$

$$X_t = \sum_{i=1}^{m} \theta_i X_{t-i} + \sum_{i=1}^{m} \gamma_j Y_{t-j} + u_{2t} \quad (9)$$

According to Eqs. (8) and (9), m is the lag length, and the error terms u_{1t} and u_{2t} are assumed to be independent of each other (white noise). In the Granger causality test, the null hypothesis (H_0) of "X is not Granger cause of Y" is tested.

Granger causality test results are given in Table 8. Some of the F-Statistic values in Table 8 are significant at the 5% significance level. According to this, the null hypotheses (H_0) which denote the absence of the causality relation from the monetary variable M2 to the BIST100R and BIST100P variables are rejected. According to Granger causality test results, it is found that there is a causality relation from the M2 variable to the variables BIST100R and BIST100P.

Table 8: Granger Causality Test Results

Null Hypothesis (H_0)	Observation	F-Statistics	Probability
M2 does not Granger Cause BIST100R. BIST100R does not Granger Cause M2.	127	2.5310 3.4241	0.0440 0.0110
DIR does not Granger Cause BIST100R. BIST100R does not Granger Cause DIR.	127	1.8523 3.2544	0.1234 0.0143

M2 does not Granger Cause BIST100P. BIST100P does not Granger Cause M2.	127	2.6116 3.4301	0.0389 0.0109
DIR does not Granger Cause BIST100P. BIST100P does not Granger Cause DIR.	127	1.6587 3.4159	0.1642 0.0111

Conclusions

Financial markets are responding differently to monetary policy shocks. Monetary policymakers' ability to predict the reaction of financial markets plays an important role in the behavior of economic agents.

Along with the recent 2007-2008 global financial crisis, which has had a negative impact on all global economies, new quests for financial market stability have come to the fore. In this context, central banks adopted financial stability as a main objective as well as price stability.

There have been significant developments in Turkey in terms of monetary policy implementations after November 2000 and February 2001 financial crisis. In this context, the official inflation targeting regime was applied in 2006. With the 2007-2008 global financial crisis, measures were taken to ensure the stable functioning of the financial markets. Within the scope of the mentioned measures, the CBRT has established a new objective component since 2012 and adopted financial stability as its main objective in addition to price stability objective.

The Johansen Cointegration and Granger Causality test methods were used to study the effects of monetary policies on the BIST stock market in Turkey during 2006-2016. The findings of the study show that monetary policies have a significant impact on the BIST stock market prices and returns.

It is important that the CBRT should take into account this proved relationship between the monetary policies and the BIST stock market when it makes its monetary policy in the coming periods.

The results obtained in this study and the studies that were examined in the literature part; Gençtürk [10], Özer, et al. [14], Aklan and Nargeleçekenler [15] in Turkey, Alatiqi and Fazel [8] in US, Zare, et al. [23] in

Malaysia on monetary policy shocks and stock market relations, support each other.

References

[1]. F. S. Mishkin, Monetary Policy Strategy: MIT Press, 2007.
[2]. N. Yoshino, F. Taghizadeh Hesary, A. Hassanzadeh, and A. D. Prasetyo, "Response of stock markets to monetary policy: An Asian stock market perspective," Asian Development Bank Institute2014.
[3]. E. H. Thabet, "Examining the Long Run Relationship between the US Money Supply (M2) and the Canadian Stock Market," International Journal of Economics and Finance, vol. 6, pp. 180-190, 2014.
[4]. W. Thorbecke, "On stock market returns and monetary policy," The Journal of Finance, vol. 52, pp. 635-654, 1997.
[5]. D. Bredin, S. Hyde, and G. O'Reilly, "UK stock returns & the impact of domestic monetary policy shocks," 2005.
[6]. C. Ioannidis and A. Kontonikas, "Title," unpublished|.
[7]. N. T. Laopodis, "Dynamic linkages between monetary policy and the stock market," Review of Quantitative Finance and Accounting, vol. 35, pp. 271-293, 2010.
[8]. S. Alatiqi and S. Fazel, "Can money supply predict stock prices," Journal for Economic Educators, vol. 8, pp. 54-59, 2008.
[9]. M. Rahman and M. Mustafa, "Influences of money supply and oil price on US stock market," North American Journal of Finance and Banking Research, vol. 2, pp. 1-12, 2008.
[10]. M. Gençtürk, "The effect of macroeconomic factors on stock prices in financial cirises period," Suleyman Demirel University Journal of Faculty of Economics & Administrative Sciences, vol. 14, pp. 127-136, 2009.
[11]. K. Raymond, "Is there a long run relationship between stock prices and monetary variables? Evidence from Jamaica," Bank of Jamaika2009.
[12]. G. C. Okpara, "Monetary policy and stock market returns: Evidence from Nigeria," Journal of Economics, vol. 1, pp. 13-21, 2010.

[13]. O. Fernandez-Amador, M. L. Gächter, M. Larch, and G. Peter, "Monetary policy and its impact on stock market liquidity: Evidence from the euro zone," University of Innsbruck2011.

[14]. A. Özer, A. Kaya, and N. Özer, "Hisse senedi fiyatları ile makroekonomik değişkenlerin etkileşimi," Dokuz Eylül Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, vol. 26, pp. 163-182, 2013.

[15]. N. A. Aklan and M. Nargeleçekenler, "Hisse senedi piyasasında para politikalarının rolü: Türkiye örneği," İktisadi ve İdari Bilimler Dergisi, vol. 33, pp. 103-128, 2012.

[16]. O. Galebotswe and J. B. Tlhalefang, "Monetary policy shocks and stock returns reactions: Evidence from Botswana," Botswana Journal of Economics, vol. 10, pp. 79-108, 2012.

[17]. L. Seong, "Transmission of monetary policy to the stock exchange: Further evidence from Singapore," Interdisciplinary Journal of Contemporary Research in Business, vol. 5, pp. 384-392, 2013.

[18]. M. Sirucek, "Impact of money supply on stock bubbles," Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, vol. 61, pp. 2835-2842, 2013.

[19]. K.-H. Choi and S.-M. Yoon, "The effect of money supply on the volatility of Korean stock market," Modern Economy, vol. 6, pp. 535-543, 2015.

[20]. A. C. Çetin and İ. A. Bıtırak, "The impacts of macro economical variables on stock returns in Turkey's economy: An analysis on the axis of arbitrage pricing model," Visionary E-Journal, vol. 6, pp. 1-19, 2015.

[21]. R. Haitsma, D. Unalmis, and J. de Haan, "The impact of the ECB's conventional and unconventional monetary policies on stock markets," Journal of Macroeconomics, vol. 48, pp. 101-116, 2016.

[22]. D. Ç. Yıldırım and M. U. Mirasedoğlu, "Aktarim Mekanizmasinin Hisse Senedi Fiyatlari Kanalinin Etkinligine Iliskin Bir Analiz," Eskisehir Osmangazi Universitesi Sosyal Bilimler Dergisi, vol. 16, pp. 105-125, 2015.

[23]. R. Zare, M. Azali, and M. Habibullah, "The reaction of stock prices to monetary policy shocks in Malaysia: A structural vector autoregressive model," in International Organization for Research and Development, Istanbul-Turkey, 2015.

[24]. O. C. Ekene, "Impact of monetary policy on stock returns in Nigeria," Middle-East Journal of Scientific Research, vol. 24, pp. 1778-1787, 2016.

[25]. D. N. Gujarati, Basic Econometrics: Tata McGraw-Hill Education, 2009.

[26]. P. Perron, "The great crash, the oil price shock, and the unit root hypothesis," Econometrica, vol. 57, pp. 1361-1401, 1989.

[27]. E. Zivot and D. W. K. Andrews, "Further evidence on the great crash, the oil-price shock, and the unit-root hypothesis," Journal of Business & Economic Statistics, vol. 20, pp. 25-44, 2002.

[28]. S. Johansen, "Statistical analysis of cointegration vectors," Journal of Economic Dynamics and Control, vol. 12, pp. 231-254, 1988.