Macroeconomic Variables Affecting Bist30 Index Value in Turkey

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Abstract: In finance literature, main financial stock indices are important to determine country’s financial development and it’s behavior against the effect of macro-economic conditions. These conditions can listed as interest rate, inflation rate, money supply, exchange rate, industrial production index, and etc. In changing world economy, macro economic conditions can affect to the financial stability and capital markets. Some economies have a financial vulnerability, and it is important to measure for the affect on the economy. It can be explained that is seems to impossible to determine financial vulnerability with only one variable. It need to support other variable to evaluate how is effect on the economy. In this study we examined impact of macro-economic variables on ISE 30 Index returns in Turkey. We prefer to use ISE 30 Index to represent stock indices in Turkey. We analyzed regression model with ISE 30 Return Index as a depended variable and some macro-economic variables as independent variables between 2005 and 2015. We found two variables are strongly related with BIST 30 Index both exchange rate and inflation rate in negative way.

Keywords: Macro-economic Variables, ISE (BİST) 30 Index, Financial Vulnerability

JEL Classification: E44, G10, G17

Introduction

With regard to literature, it can be said that basic economical variables, other investment tools returns, political and social events and data about companies have effects on share index. Especially, the effect of vulnerability in any country’s economy that is on share

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index return can not be neglected. Also, it is impossible to calculate the vulnerability in economy with only one variable.

As a result, it is thought that the effect of macroeconomic indicators as a whole on the prices of shares should be cared. By seeing this, in this study, it has been wanted to research the effects of macroeconomic variables on share returns.

BIST30 index value has been chosen as share returns in the study and for the period of 2005-2015, BIST30 index value, interest rate, inflation rate, money supply, industrial production index, exchange rate variables were studied. By those variables and regression analyses, the factors that effect BIST30 index value will be revealed.

Literature

In her study, Seviç (2014) studied the relationship between share returns that are in 2003-2013 period and some macroeconomic variables. As a result of the study, the effects of macroeconomic variables on share returns have been seen as meaningful and it is pointed out that this can be done with Arbitrage Pricing Model.

In his study, Albayrak (2012), by using a 370 weeks time series that belongs to 2005-2012 period, analyzed the effect of macroeconomic variables on IMKB (BIST) 100 index. As a result of his study, it has been concluded that USD dollar and golden prices have effect on IMKB 100 index.

In his study between 2002-2012, Kaya (2013) used IMKB 100 index return as dependent variables and he used interest rate, money supply, industrial production index and exchange rate as independent variables. Consequently, it has been detected a positive relationship between share return and M2 money supply and a negative relationship with exchange rate.

In their study in which they studied 1999-2006 period, Sayılgan and Süslü (2011) studied the effects of macroeconomic factors on share returns in terms of Turkey and developing countries. According to the results of the study, it is pointed out that developing countries returns are effected by exchange rate and inflation rate, but they don't effect interest rate, gross domestic product, money supply and petrol prices.

In their studies, Ayaydın and Dağlı (2012) analyzed macroeconomic factors that have effect on share returns in developing markets. This study includes the period between 1994-2009 and 22 developing country markets including Turkey. In the study, it’s detected that share returns are effected by S&P 500 index positively, but it is effected negatively by exchange rate, 1997-1998 East Asia Crisis and 2008 Global Financial Crisis.

In their studies based on Tehran market, Samadi at al. (2012) analyzed the effect of macroeconomic variables on share returns by GARCH model. In the study, exchange rate, inflation rate, oil, golden prices and liquidity degree were used as variables. Consequently, exchange rate, inflation rate and golden prices have effect on share returns, but oil prices and liquidity have no effect.

Osamwenyi and Eubayiro-Osagie (2012) analyzed the period of 1975-2005 and used share index, interest rate, inflation rate, exchange rate, budgetary deficit, GDP and money supply as variables. They tried to reveal the relationship between share index and
macroeconomic variables in a relatively short time by Vector Error Correction Model. As a result, macroeconomic variables effect share market.

Ali (2011) analyzed the relationship between Daka market index return and some macroeconomic variables and with the aim of revealing the relationship among variables, he used Vector Error Correction Model and Cointegration test. As a result, it is detected that there is a non-direct relationship from causality analyze, consumer price index and foreign transfer to share share price, but there is a reciprocal relationship between importation payoff and share prices. Also, no causality has been found between GDP and share price.

**Data Set and Method**

Because the variables that will be used in the study are monthly, variables about Moving Average Methods are purified from seasonality. The variables that will be used in study are summarized in the table below.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Explain</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIST30</td>
<td>Borsa Istanbul 30 Index</td>
</tr>
<tr>
<td>DOVIZ</td>
<td>Dolar/TL Exchange Value</td>
</tr>
<tr>
<td>FAIZ</td>
<td>Interest Rate</td>
</tr>
<tr>
<td>LNM2</td>
<td>M2 Nature Log of Money Supply</td>
</tr>
<tr>
<td>SUE</td>
<td>Industrial Production Index</td>
</tr>
<tr>
<td>ENF</td>
<td>First Lag of Nature Log of Inflation</td>
</tr>
</tbody>
</table>

Zivot and Andrews (1992) analyzed the results of unit root test developed by Perron (1989) and they criticized its exclusively detecting breakage date in Perron test. In Zivot-Andrews test, it is supposed that the time is not clearly known when the breakage occurs under the control of alternative hypothesis. Zivot and Andrews (1992) developed the procedure by which Perron used to detect breakage points and they transformed Perron test to unconditional unit root test. In Zivot-Andrews test, breakage dates aren’t known in advance and these dates are detected internally.

Zero hypothesis for trend and both trend and fixed models are like below.

\[ y_t = \mu + y_{t-1} + e_t \]  

(1)

It it supposed that zero hypothesis series integrate without any internally structural breakage. It is conditioned that alternative hypothesis emerges in a trend that is in a unknown point in the series and it should be showed with one break trend-fixed process. In this process, the main aim is to predict the breakage point that mostly concentrate on alternative hypothesis that says trend-fixed.

Breakage point is chosen by minimizing one-sided t statistic for \( \lambda, \alpha^i = 1 \) \( i = A, B, C \). Because, much smaller values of statistic cause the rejection of zero hypothesis. For \( \hat{\lambda}_{inf}^i \) model, it shows minimized value. In this situation,

\[ t_{\tilde{\alpha}^i} = \inf_{\alpha \in \Lambda} t_{\tilde{\alpha}^i}(\lambda), \quad i = A, B, C \]  

(2)
by watching Perron’s ADF test strategy, the regression balances which are used to test unit root are like below:

\[ y_t = \hat{\mu}^A + \hat{\beta}^A D_t(\hat{\lambda}) + \hat{\beta}^A y_{t-1} + \sum_{j=1}^k \hat{\alpha}^A_j \Delta y_{t-j} + \hat{\epsilon}_t \] (3)

\[ y_t = \hat{\mu}^B + \hat{\beta}^B D_t^*(\hat{\lambda}) + \hat{\beta}^B y_{t-1} + \sum_{j=1}^k \hat{\alpha}^B_j \Delta y_{t-j} + \hat{\epsilon}_t \] (4)

\[ y_t = \hat{\mu}^C + \hat{\beta}^C D_t(\hat{\lambda}) + \hat{\beta}^C y_{t-1} + \sum_{j=1}^k \hat{\alpha}^C_j \Delta y_{t-j} + \hat{\epsilon}_t \] (5)

Here, if it is \( t > T\lambda \), \( D_t(\hat{\lambda}) = 1 \) otherwise, it is 0; if it’s \( t > T\lambda \), \( D_t^*(\hat{\lambda}) = t - T\lambda \), otherwise, it’s 0.

In Zivot-Andrews test, breakage points are determined by minimizing \( \hat{\lambda}^i_{inf} \) and \( t_{di} \) values with \( \hat{T}_B = T\hat{\lambda} \). (Zivot-Andrews, 1992: 253-254)

**Findings**

In the study, it is wanted to decide whether series include unit root or not and it was researched whether level values are stable or not. In the study, Zivot – Andrews unit root test that cares constructive breakages was used and results that were handed have been given in the Table 2 below.

**Table 2: Zivot – Andrews Unit Root Test Results**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Constant Test Statistical</th>
<th>Break Date</th>
<th>Trend Test Statistical</th>
<th>Break Date</th>
<th>Constant and Trend Test Statistical</th>
<th>Break Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIST30</td>
<td>-3.6629 (0)</td>
<td>2007:12</td>
<td>-3.0614(0)</td>
<td>2008:11</td>
<td>-3.7215 (0)</td>
<td>2007:12</td>
</tr>
<tr>
<td>DOVIZ</td>
<td>-3.2371 (0)</td>
<td>2014:11</td>
<td>-3.1283 (0)</td>
<td>2012:11</td>
<td>-3.6577 (1)</td>
<td>2011:11</td>
</tr>
<tr>
<td>FAIZ</td>
<td>-3.4679 (1)</td>
<td>2008:12</td>
<td>-3.0543 (1)</td>
<td>2010:08</td>
<td>-3.7029 (1)</td>
<td>2009:06</td>
</tr>
<tr>
<td>LNM2</td>
<td>-3.7239 (0)</td>
<td>2015:10</td>
<td>-6.8733(0)</td>
<td>2006:05</td>
<td>-5.6836 (0)</td>
<td>2006:07</td>
</tr>
<tr>
<td>SUE</td>
<td>-4.6876 (1)</td>
<td>2008:08</td>
<td>-3.3100 (1)</td>
<td>2009:03</td>
<td>-4.5694 (1)</td>
<td>2008:08</td>
</tr>
<tr>
<td>ENF</td>
<td>-10.6449 (0)</td>
<td>2011:05</td>
<td>-10.4432(0)</td>
<td>2016:02</td>
<td>-10.6212 (1)</td>
<td>2011:05</td>
</tr>
</tbody>
</table>

Lag lengths has been determined by Schwarz (SIC) Information Criteria. Maximum lag length setted 12. In the table parenthesis are represent optimum lag length. * , ** and *** represents respectively at 0.10, 0.05 and 0.01 level statistically significant.

When we analyze in Table 2, it has been observed that the series whose level value are stable are only LNM2, SUE and ENF. For industrial production index value, while it has been decided as stable, it has been concluded that it is not stable according to the results of trendy unit root balance, trendy and fixed terms. Therefore, the graphic of series has been analyzed and according to this, it has been decided to care fixed terms and unit root test.

Similarly, for M2 money supply variable, while it has been encountered to the finding that series is not stable according to the results of fixed term unit root test. It has been observed that according to the results of fixed term, fixed term and trendy unit root test results, the series is stable. As a result, the graphic series has been analyzed and it has been seen that it is necessary to care the results of fixed term, trendy and fixed term unit root test. Consequently, in the study, it has been decided that except for SUE, LNM2 and ENF variables, the other variables that were handed are not stable according to their level values. For mentioned variables’ first period differences unit root analyze results that were handed are showed in Table 3 below.
Table 3: I(1) Zivot – Andrews Unit Root Test Results

When we analyze in Table 3, it has been concluded that the series that isn’t stable at its level value are stable in their first period differences. After this step, in the study, the process will be continued with the analyze of level/differences of series’ stable positions.

Firstly, correlation matrix has been wanted to use to detect relationship among variables and the results that belong to Pearson Correlation Matrix are showed in Table 4 below.

When we analyze in Table 4, it has been observed that there is negative relationship between all variables. Similarly, there is also positive relationship between exchange rate and interest rate, but only interest rate has statistically significantly. Interest rate has statistically significant with M2 and ENF variables. By seeing those results, it can be said that all variables can be handed in detecting factors that effect BIST30 index value. Because, as it is seen, it’s been detected that there aren’t strong relationship among independent variables and that’s why, it’s been decided that all independent variables can be included in the same balance in the same time.

In the study, some issues like whether faulty terms range normally or not, auto-correlation and the existence of different variance problems are researched and according to the

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4 In the model, faulty terms that show normal range have been researched by Jarque –Bera test and JB test has found statistic value as 6.7255 and for its %1 importance level, it has found critic value as 9.21 As a result, it has been pointed out that faulty terms range normally for its importance value. By using Breusch-Pagan-Godfrey test, whether there is different variance problem or not has been researched and its statistic has been found as 22.5360 and critic value has been found as 15.08 for its importance value. By seeing those results, it can be said that there is different variance problem in the model. Lastly, in the model, the
diagnostic test results, the model has been predicted with the aim of having trustworthy results by using resistant standard predictor. According to the aim, findings were handed are showed in Table 5 below.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>Robust Standard Error</th>
<th>t-statistical value</th>
<th>Probability value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-7702.09</td>
<td>11619.32</td>
<td>-0.66</td>
<td>0.509</td>
</tr>
<tr>
<td>DDOVIZ</td>
<td>-42732.85</td>
<td>6196.452</td>
<td>-6.90</td>
<td>0.000***</td>
</tr>
<tr>
<td>DFAIZ</td>
<td>-31600.82</td>
<td>26346.4</td>
<td>-1.20</td>
<td>0.233</td>
</tr>
<tr>
<td>LNM2</td>
<td>475.2987</td>
<td>578.5505</td>
<td>0.82</td>
<td>0.413</td>
</tr>
<tr>
<td>DSUE</td>
<td>-96.2144</td>
<td>68.1598</td>
<td>-1.41</td>
<td>0.160</td>
</tr>
<tr>
<td>ENF</td>
<td>-128025.9</td>
<td>70713.04</td>
<td>-1.81</td>
<td>0.073*</td>
</tr>
</tbody>
</table>

\[ R^2 = 0.34666 = 13.68 \text{ (0.0000***)} \]

\*, **, and *** represents respectively at 0.10, 0.05 ve 0.01 level statistically significant. Starting with “D” variables mean first difference form of the variable.

When we analyze in Table 5, it has been concluded that there are only 2 variables that effect BIST30 index value. As a result, it can be said that an increase in exchange rate can reduce BIST30 index value as much as 42732.85 and an increase in inflation rate can decrease BIST30 index value as much as 128025.9 as well.

**Conclusion**

In this study, share returns and interest rate, inflation rate, money supply, industrial production and exchange rate were analyzed. It was tried to reveal macroeconomic variables that effect regression analyzes and share returns (BIST30 Index value).

Consequently, it has been seen that some of the used macroeconomic variables, exchange rate and inflation rate, effect BIST30 index value negatively and significantly. Also, the effect of interest rate, industrial production index and Money supply has been seen on BIST30 index value.

According to results, we found two variables are strongly related with BIST 30 Index both exchange rate and inflation rate in negative way. It means the two variables are significantly effected to BIST 30 index. But their effect is negative ways. In other words, it can be said that an increase in exchange rate can reduce BIST30 index value and an increase in inflation rate can decrease BIST30 index value.

Investors who want to invest to capital market are effected by macroeconomic indicators. As we mention in our study, potential investors of capital market may prefer the low rate of variables like exchange rate and inflation. In such situation, the hope of decrease in existence of problem of autocorrelation has been researched with the help of LM test. The statistic for LM test has been found as 133.27 and for the % 1 importance level, critic value has been found as 3.84. By this view, it has been decided that there is also autocorrelation problem in the model.
exchange and inflation may direct investors to capital market. In other words, the decrease tendency of those two variables directs investors’ expectations to capital market.

References


