SECTION:
FINANCE

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MACROECONOMIC IMPACT ON STOCK INDICES: TURKEY & RUSSIA

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Abstract
Since stock market is a high volatility market, they are affected by various variables. In this study, we aimed to investigate the relationship between the stock price index and consumer price index, interest rate and industrial production index for the stock markets of Russia and Turkey for the quarter period of 2000Q1-2021Q4. In this direction, ARDL model is used and the results of the paper show that there is a long-run relationship between stock markets and macroeconomic variables for both Russia and Turkey. When the long-run coefficients are analyzed, it is found that there is a long-run relationship between the Russian stock price index and the interest rate and the industrial production index, while there is no relationship with the consumer price index. In the short-run relationships, statistically significant results are produced since the error correction coefficient (-0.7900) is negative. According to the results of Turkey's long-run coefficients, there is a long-run relationship between the stock price index and the consumer price index, while there is no relationship between the interest rate and the industrial production index. As for the short-run relationship, the coefficient of ECM (-1.1669) is negative and statistically significant and there is a short-run relationship between Turkey's stock price index and interest rates. The findings show that the stock price index for both Russia and Turkey is affected by macroeconomic variables in the short and long run. In other words, macroeconomic variables should not be ignored while making long-term forecasts for stock markets.

Keywords: ARDL, stock markets, macroeconomics, short and long term.

Introduction

As one of the most active financial markets, the stock market is subject to major fluctuations as it is affected by numerous factors that have been researched in various studies. The effects of macroeconomic variables on stock price indices have been of primary concern in both domestic and foreign literature.

Literature review shows that interest rates, consumer price index, the narrow or broad money supply, industrial production index, and oil prices are the macroeconomic factors that affect stock prices. The common econometric methods used to analyze the relationships among these variables are ARCH/GARCH modeling, VAR modeling, and ARDL modeling.The relationship between stock prices and various macroeconomic variables is one of the pioneering studies on the US by Chen, Roll, Ross (1986) for the period 1953:1-1983:11. The second objective of this paper is to investigate the validity of asset pricing model and efficient market theory in stock markets by using VAR modeling method. The findings show that industrial production index, risk premium returns and inflation are important variables in determining stock markets. In the second objective of the study, which is to determine the valid theory, the validity of the asset pricing model in the stock market has been proven. Similarly, Chen (2009), another study for the US stock market, examined the impact of macroeconomic variables on the stock market with the monthly data of 1957:2-2007:12. Among the macroeconomic variables included in the study, inflation contributed positively to the stock market, while the power of the industrial production index to affect the market was found to be ineffective. Humpe and Hamilton (2009) argue that stock prices depend on dividend payout flows and the market discount rate and macroeconomic variables believed to affect these two variables will directly affect stock markets. Accordingly, the co-integration relationship between the US and Japanese stock markets is investigated for the period 1965:1-2005:6 using inflation, interest rate and M1 money supply variables. The findings indicate that there is a positive relationship between the US stock market index S&P500 and the industrial production index, while there is a negative relationship between inflation and the long-term interest rate. Similarly, Nikkei 225, the Japanese stock market index, has a positive relationship with the industrial production index, but due to the negative relationship between the industrial production index and the long-term interest rate and inflation, it is concluded that these variables do not affect the stock market. Wong, Khan and Du (2006) investigated the relationship between the US and Singapore stock markets and macroeconomic variables. For the period 1982:1-2002:12, according to the results of the analysis, there is a long-run relationship between the Singapore stock market index and interest rate and M1 money supply, while there is no relationship with the US stock market. Mansor (1999) investigated the Malaysian stock market for the period 1977:1-1996:6. Both bivariate and multivariate analyses were conducted to determine the relationship between the stock market index and various macroeconomic variables. According to the results of the bivariate analysis, although there is a co-integrated relationship between the stock price index and inflation, credit aggregates and official reserves, the reliability of the result is not clear because it is not informationally efficient. The results of the multivariate analysis indicate that the exchange rate has a strong effect on stock markets. The relationship between stock market index and macroeconomic variables accepted in the national literature has been the subject of many studies in different periods. In fact, a statistically significant relationship was found between the stock price index and the consumer price index (Omağ, 2009; Sancar, Uğur, & Akbaş, 2017; Karaca, Çütcü, & Özkök, 2022; Durgut & Arıcı, 2022; Özer, Kaya, & Özer, 2011) and a negative relationship was found between the variables in the studies (Koyuncu, 2018; Poyraz , 2014). Likewise, when the relationship between the stock price index and the interest rate is analyzed, a statistically significant relationship was found in (Karaca, Çütcü, & Özkök, 2022; Durgut & Arıcı, 2022; Özer, Kaya, & Özer, 2011; Yılmaz, Güngör, & Kaya , 2006; Süslü & Altın, 2022), while a statistically insignificant relationship was found in (Omağ, 2009; Koyuncu, 2018; Kaya, Çömlekçi, & Kara, 2013). While there is a significant relationship between the stock price index and the industrial production index in (Sancar, Uğur, & Akbaş, 2017; Özer, Kaya, & Özer, 2011; Koyuncu, 2018; Poyraz , 2014), (Kaya, Çömlekçi, & Kara, 2013) found a statistically insignificant relationship. When the findings of the studies are analyzed, it is seen that the consumer price index, interest rate and industrial production index variables produce more results when statistically significant relationships with stock prices are evaluated. As a result of the extensive literature review, it is deemed more appropriate to use these three macroeconomic variables as independent variables in the upcoming study in order to observe which variables will affect stocks more.

The goal of this study is to econometrically test the existence of a short and long-run relationship between the stock price index in Turkey and Russia. The selected macroeconomic variables are (consumer price index, interest rate and industrial production index) for the 2000Q1-2021Q4 quarter period. The explanatory variables used in the study and the direction of the relationship between the dependent variable stock price index and the explanatory variables used in the study are preferred variables used in most studies in the existing literature in order to provide clearer results and to make comparisons. The ARDL bounds test method was preferred as the research method and the analysis was carried out with the Eviews 13 package program.

Research Questions:

l How do macroeconomic variables such as consumer price index, interest rate, and industrial production index influence the stock price index in Turkey and Russia over the period 2000Q1–2021Q4?

l Is there a significant long-run and short-run relationship between stock indices and macroeconomic indicators in Turkey and Russia?

l Which macroeconomic factors play a key role in shaping stock market movements in Turkey and Russia, and how do their effects differ between the two economies?

The rest of this study is structured as follows: First, we present the methodology, which includes a detailed description of the data, sources, and key macroeconomic variables. As a next step, modeling approach was described which is explaining the logic behind ARDL model selection and its application. This is followed by the presentation of empirical findings, where both long-run and short-run relationships between stock indices and macroeconomic variables are analyzed for Turkey and Russia. Finally, the study concludes with a discussion of the results, their implications for policymakers and investors, and potential directions for future research.

METHODOLOGY AND DATASET

In this section, we described the collected data , applied model, and obtained results from analysis. Data belongs to Turkey and Russia where our primary objective is to observe how macroeconomic indicators influence stock markets on both Turkey and Russia.

Dataset

In the study, Turkey and Russia stock price indices are selected as the dependent variable and consumer price index, interest rate and industrial production index as the macroeconomic variables of both countries are selected as independent variables. The variables selected for both countries are obtained from the OECD database and cover the period 2000Q1-2021Q4. In addition, the natural logarithms of all series are taken.

Variables	Description	Data Source
LNRSSH	Russia stock price index (Index value)	OECD
LNRSCPI	Russian consumer price index (Index value)	OECD
LNRSI	Russia Interest Rate (% change)	OECD
LNRSIP	Russia industrial production index (Index value)	OECD
LNTRSH	Turkey stock price index (Index value)	OECD
LNTRCPI	Turkey consumer price index (Index value)	OECD
LNTRI	Turkey Interest Rate (% change)	OECD
LNTRIP	Turkey industrial production index (Index value)	OECD

Figure 1. Time series plots for Turkey

Source: own elaboration.

The reason for including the series in the model in logarithmic form is both to reduce the correlation between variables and to tolerate the problem of changing variance. Details about the data are presented in Table 1 where we can see features with their descriptions and sources.

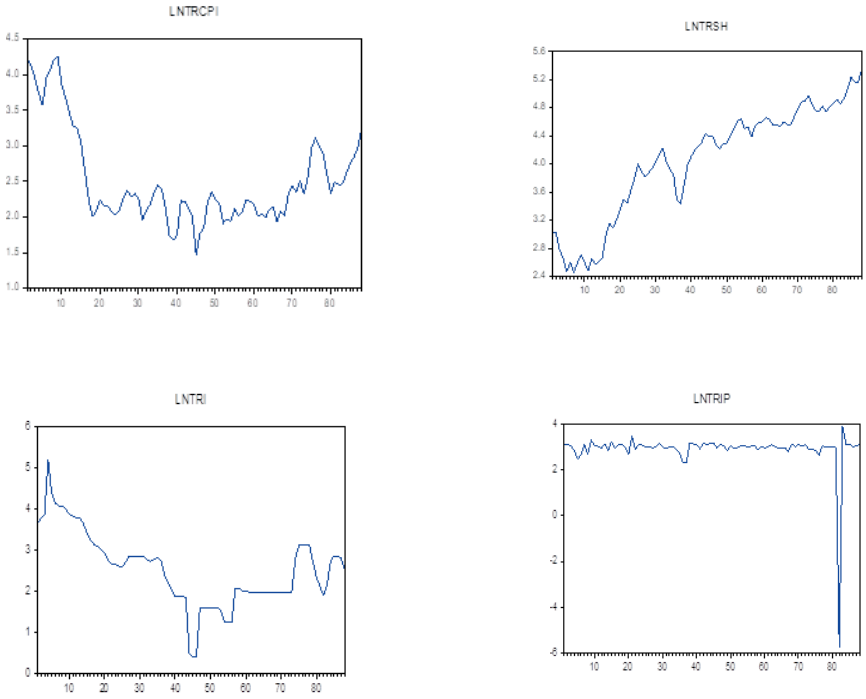

Figure 1. Time series plots for Turkey
Source: own elaboration.

In Figure 1, we observe 4 time-series plots for Turkey. In first row, 2 plots shows movements in Turkey's consumer price index (Index value), and Turkey's stock price index (Index value). In second row, 2 illustrations describe trends in Turkey's Interest Rate (% change), and Turkey's industrial production index (Index value). For Turkey, the stock price index (LNTRSH) shows an upward trend, reflecting growth in the financial market, while the consumer price index (LNTRCPI) exhibits fluctuations indicative of inflationary pressures. The interest rate (LNTRI) demonstrates significant volatility which is potentially driven by monetary policy adjustments, whereas the industrial production index (LNTRIP) remains relatively stable with occasional sharp declines.

The ARDL bounds test procedure was proposed by Perasan, Shin and Smith (2001). This test estimates the model using the ordinary ECM method after selecting the lag order of the model. While the ARDL bounds test method can provide both short-run and long-run cointegrated relationships between variables, the main reason why it is preferred in stock markets is that it ignores the requirement that variables have the same degree of integration. Variables can be integrated at degree I(0) or I(1), but I(2) and higher degree of integration is not accepted according to this test procedure (Chia & Lim, 2015; Ünal, Nas, & Heybeli, 2022). Since the research topic of the study is based on two different countries, two different models are presented.

In Equation 1, dependent variable is Russian stock price index, and in Equation 2, target variable is Turkey stock price index. These two formulas are applied to implement two separate modeling.

EMPRICAL RESULTS

The first step for determining the co-integrated relationship between variables is to determine the degree of stationarization with unit root tests. For this purpose, Philips-Perron and ADF conventional unit root tests were preferred. The results are detailed in Table 2.

When the unit root test results are analyzed, it is seen in Table 2 that the industrial production index has I(0) degree of integration, while the consumer price index, interest rate and stock price index have I(1) degree of integration according to both Russia and Turkey data. Since the degrees of integration are I(0) and I(1), the first condition of the ARDL bounds test approach is fulfilled and the analysis can be performed. Once it is concluded that the variables are stationary, the second step of the ARDL bounds test approach is to determine the appropriate model. Akaike Information Criterion was used to determine this model. In the model identification analysis, Figure 3 and Figure 4 show that the best model for Russia is ARDL (1,0,0,0,3) and for Turkey is ARDL (5, 7, 1, 5).

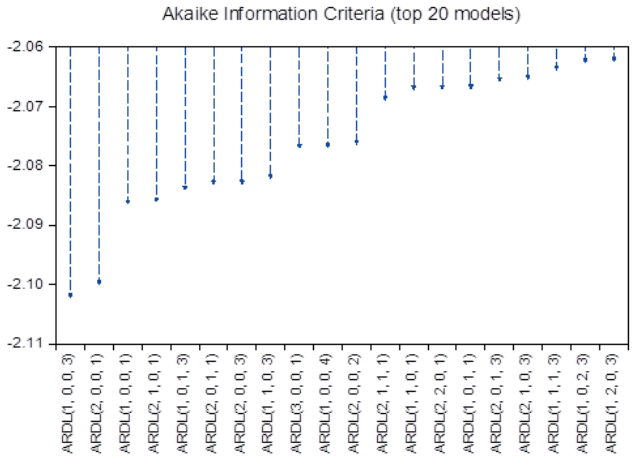

Figure 3. Top 20 models for ARDL bounds test (Russia)

Source: own elaboration.

Figure 3 demonstrates Akaike Information Criteria (AIC) values which are ranging from roughly -2.06 to -2.11 throughout the top 20 models for an ARDL bounds test concerning Russia. Each model, labeled from ARDL(1,0;0,3) to ARDL(1,2;0,3). This shows its corresponding AIC value, indicating how each model's specification slightly influences its fit or performance with the dataset.

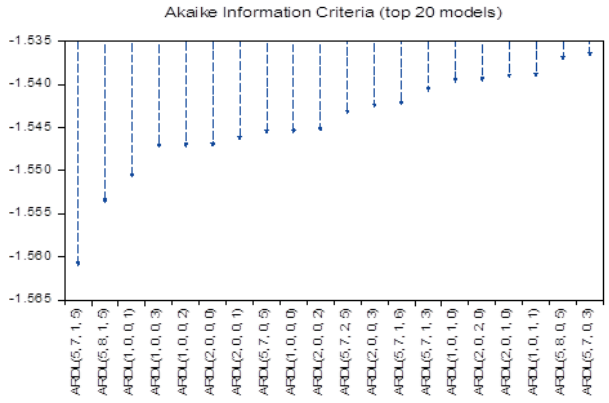

Figure 4. Top 20 models for ARDL bounds test (Turkey)

Source: own elaboration.

In addition, Figure 4 illustrates Akaike Information Criteria (AIC) values for the top 20 models from an ARDL bounds test on Turkey with AIC values spread roughly from -1.535 to -1.565. Each model is labeled from ARDL(1,7;1,5) to ARDL(1,7;0,3), which are showing their respective AIC values, and indicates the model fit or performance with the dataset. The final step to examine the short and long term relationship between the selected variables is to determine whether the variables have autocorrelation problem (Breusch-Godfrey LM test), changing variance problem (Breusch-Pagan-Godfrey Changing variance test) and model fitting error (Ramsey-Reset test). When Table 3, which presents the results of the tests applied for the detection of problems, is analyzed, it is seen that both Russia and Turkey data do not have the aforementioned problems.

Diagnostic Tests	Russia	Turkey
R2	0.4708	0.5939
Adjusted R2	0.2792	0.5565
F statistic	2.4572 (prob: 0.0036)	15.881 (prob: 0.0000)
Breusch-Godfrey LM test	0.3290 (prob: 0.7210)	0.0921 (prob: 0.9121)
Breusch-Pagan-Godfrey Variance test	0.8898 (prob: 0.6034)	0.5375 (prob: 0.8034)
Ramsey Reset test	0.5286 (Prob: 0.4702)	0.6356 (prob: 0.4278)

Table 3. Diagnostic Test Results for Russia and Turkey
Source: own elaboration.

In order for the data to be used in the study to provide meaningful results in the method to be applied, the prerequisites were realized and it was concluded that all data were suitable for the application of the ARDL bounds test. Table 4 shows the results of Model 1 (dependent variable Russia stock price index) in the first panel and Model 2 (dependent variable Turkey stock price index) in the second panel.

For the ARDL model results to be significant, the F statistic value should be greater than I(1) values. When the results for Russia in the first panel are analyzed, it is seen that statistically significant long-run results are produced between stocks and macroeconomic variables since the F statistic value (14.689) is greater than I(1) values. When the results for Turkey are analyzed, the F statistic value (6.8420) is greater than the I(1) values and statistically significant long-run relationships are produced.According to the ARDL bounds test results, the long-run coefficients are presented in Table 5 in order to examine the degree of impact of macroeconomic variables on the stock price index.

When Table 5 is analyzed, the results for Russia show that there is no statistical relationship between the consumer price index and the stock price index in the long run, while there is a long run relationship between the interest rate and the stock price index with a statistical significance level of 5%. Finally, when the long-run relationship between the industrial production index and the stock price index was analyzed, a statistically significant relationship was found at the 1% significance level. When the direction of the long-run relationship between the variables is analyzed for Turkey, no long-run relationship was found between the interest rate and industrial production index and the stock price index, but a statistically long-run relationship was found between the consumer price index and the stock price index at the 5% significance level.

The ARDL bounds test approach is a test that determines the long-run relationship between variables while at the same time emphasizing the importance of producing accurate results. The correctness of the variable relationships is determined by CUSUM graphs. The CUSUM plots of the variables within the scope of the study are shown in Figure 5 for Russia and Turkey, respectively.

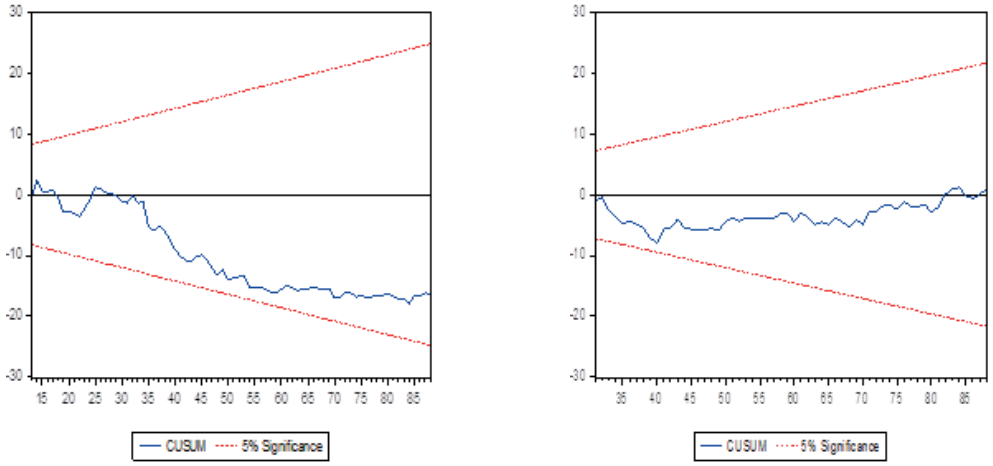

Figure 5. CUSUM Charts for Russia and Turkey (respectively)
Source: own elaboration.

According to the CUSUM graphs (Figure 5), if the variables follow a course within the 5% significance limits, it is understood that the long-run relationships are correct. When Figure 3 is analyzed, it is concluded that the long-run relationships are correct since the CUSUM graphs show a course at the 5% significance level for both countries.

The short-run relationship between the last stage variables analyzed for the ARDL bounds test is shown in Table 6. In Table 6, we observe the short-run relationship which is obtained from the Error Correction Model. For this reason, the error correction coefficient (ECM) takes precedence in the test interpretation. Accordingly, a negative error correction coefficient means that statistically significant results are produced. In this paper, the ECM coefficient for Russia is (-0.7900) and for Turkey is (-1.1669), which means that statistically significant results are produced. When the short-run relationship between the variables by country is analyzed, a short-run relationship was found between the stock price index and industrial production index at 1% significance level for Russia, while a statistically significant relationship was found between the stock price index and interest rates at 1% significance level for Turkey.

Conclusion

The aim of this study is to analyze the short and long-run relationship between Russian and Turkish stock markets and macroeconomic variables for the period 2000Q1-2021Q4. The dependent variable is the stock price index and the independent variables are consumer price index, interest rate and industrial production index. The variables used in the study were obtained through the OECD database. In order to determine the econometric relationship between the variables in the study, the ARDL bounds test method was preferred and the short and long term relationship was investigated.

The results of the study show that there is a long-run relationship between stock markets and macroeconomic variables for both Russia and Turkey. When the long-run coefficients are analyzed, it is found that there is a long-run relationship between the Russian stock price index and the interest rate and industrial production index, while there is no relationship with the consumer price index. In the short-run relationships, statistically significant results are produced since the error correction coefficient (-0.7900) is negative. According to the results of Turkey's long-run coefficients, there is a long-run relationship between the stock price index and the consumer price index, while there is no relationship between the interest rate and the industrial production index. As for the short-run relationship, the ECM coefficient (-1.1669) is negative and statistically significant and there is a short-run relationship between the Turkish stock price index and interest rates. The findings of this study suggest that macroeconomic variables are essential factors that should not be ignored for both Russian and Turkish stock markets and should be taken into account when forecasting the market, especially due to the strong long-run relationship.

References

Chen, N. F., Roll, R., & Ross, S. A. (1986). Economic forces and the stock market. Journal of Business, 59(3), 383–403.
Chen, S. S. (2009). Predicting the bear stock market: Macroeconomic variables as leading indicators. Journal of Banking & Finance, 33(2), 211–223.
Chia, R. C. J., & Lim, S. Y. (2015). Malaysian stock price and macroeconomic variables: Autoregressive distributed lag (ARDL) bounds test. Kajian Malaysia: Journal of Malaysian Studies, 33, 1–15.
Durgut, E., & Arıcı, N. D. (2022). The effect of selected macroeconomic indicators on stock markets: The case of Turkey. Journal of Finance, Economics, and Social Research, 7(3), 552–564.
Humpe, A., & Macmillan, P. (2009). Can macroeconomic variables explain long-term stock market movements? A comparison of the US and Japan. Applied Financial Economics, 19(2), 111–119.
Karaca, S. V., Çütcü, İ., & Özkök, Y. (2022). The relationship between selected macroeconomic variables and the Borsa Istanbul index: The case of Turkey. Alanya Academic Review, 6(3), 2913–2927.
Kaya, V., Çömlekçi, İ., & Kara, O. (2013). Macroeconomic variables affecting stock returns: The case of Turkey (2002–2012). Dumlupinar University Journal of Social Sciences, (35), 1–18.
Koyuncu, T. (2018). The relationship between the BIST-100 index and macroeconomic variables: An empirical study. Journal of Finance, Economics, and Social Research, 3(3), 615–624.
Ibrahim, M. (1999). Macroeconomic variables and stock prices in Malaysia: An empirical analysis. Asian Economic Journal, 13(2), 219–231.
Omağ, A. (2009). The effect of macroeconomic variables on stock prices in Turkey during the period 1991–2006. Öneri Journal, 8(32), 283–288.
Özer, A., Kaya, A., & Özer, N. (2011). The interaction between stock prices and macroeconomic variables. Dokuz Eylul University Journal of Faculty of Economics and Administrative Sciences, 26(1), 163–182.
Poyraz, E. (2014). Analysis of the impact of selected macroeconomic indicators on the Borsa Istanbul XU100 index. Paradoks Journal of Economics, Sociology, and Politics, 11(2), 102–128.
Sancar, C., Uğur, A., & Akbaş, Y. E. (2017). Analysis of the relationship between stock price indices and macroeconomic variables: The case of Turkey. International Journal of Social Sciences and Education Research, 3(5), 1774–1786.

Süslü, C., & Altın, H. (2022). An examination of macroeconomic factors affecting the Borsa Istanbul 100 Index. Turkish Studies - Economics, Finance, Politics, 17(1), 1–20.
Ünal, A. E., Nas, S., & Heybeli, M. (2022). The impact of selected macroeconomic variables and expectation indices on the BIST 100 index. Sosyoekonomi, 30(54), 443–466.
Wong, W.-K., Habibullah, K., & Du, J. (2006). Do money and interest rates matter for stock prices? An econometric study of Singapore and the USA. The Singapore Economic Review, 51(1), 31–51.
Yilmaz, Ö., Güngör, B., & Kaya, V. (2006). Cointegration and causality between stock prices and macroeconomic variables. Journal of Finance and Economic Studies, 4(2), 75–89.