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Does Macroeconomic Variables Affect Stock Market?—The Case of Slovak Republic

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Central and Eastern Europe has become an important part of EU and investments into those countries have rapidly grown in the past few decades. Therefore, performance and solidity of stock market is significantly important for both economic and financial environment of a country. Investors are keen in analyzing performance and risks that are associated with shares. Stock market is a major part of the chain where both private and public savings get channelled into capital of a firm where people are employed. Hence stock market is a direct contributor to the economic performance. Economic performance of a nation could be analyzed using key economic indicators. This study focus on how those economic indicators are linked towards performance of the stock market. In recent past Slovak republic has had reputation for a manufacturing-oriented economy with several foreign direct investment inflows. These high capital intense manufacturing entities do rely on performance of stock exchange. Hence, this study aims to partially fulfil research gap in stock market vs. macroeconomic indicators.

Key words: Macroeconomic Variables, Stock Exchange, Share Price Index, Regression Analysis

Introduction

The results of this empirical research help the reader to understand whether the movement of share prices of the Bratislava Stock Exchange (BCPB: Burzycennýchpapierov v Bratislave) is subject to some macroeconomic variable changes. Investors will find this study as a helpful tool for them to identify some basic economic variables that they should focus on while investing in shares and will have an advantage to make their own suitable investment decisions.

The investors pay attention to the performance of stock market so that they are well informed about their investment decisions. Therefore, stable and strong stock market is the key to the development of capital into firms. Historically there have been numerous attempts to mature and stabilize stock markets, certain economies are characterized as the most fluctuating stock markets (Engel & Rangel, 2005). Moreover, the stock markets of East European economies are likely to be sensitive to various such factors as changes in the level of economic activities, political and international economic environment and also related to the changes in key macroeconomic factors.

The study utilizes 120 monthly observations and applies OLS, Dickey Fuller's test and correlation analysis.

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According to study conducted by European Investment Bank (2017) interest in investing in Central and Eastern European markets has grown considerably over the past decade. However, there are only few studies investigating relationship between macroeconomic factors and performance of share markets in this region. A study conducted by Pražák and Stavarek (2017) is focused on Visagrad region share market and its linkage to macroeconomic variable.

Literature Review

Undoubtedly, stock is essentially one of the major assets for the nation's economic conditions. Any adjustment in the share price in the market can have compelling and significant negative ramifications on the economy of any nation which prompts an extremely solid connection between share prices and macroeconomic factors. An exhaustive review of literature on impact of macroeconomic indicators over the stock market behaviour is not the scope of this paper. However, the paper focus on review of literature to follow will mainly concern on some recent findings on the subject under investigation in certain similar economies in other regions.

The stock exchange of any economy has increased a most extreme consideration of analysts and strategy creators as well as money related financial specialists and market analysts are additionally thinking about this phenomenon. Obviously, there are some reasons related to this, in case of financial specialists, if by any chance, they are presented to the connection between share price and their effect on the economy, they may be capable of moderating their presentation to the hazard related. If there should be an occurrence of policy producers, they will have the option to completely estimate or foresee the effect of guidelines and policies. Public can have the option to settle on specific choices on the off chance that they can envision the effect of changes that may occur in the money-related market and the economy (Barakat, Elgazzar, & Hanafy, 2016).

According to the examination led by Barakat et al. (2016), the effect of macroeconomic factors on the stock exchanges in the developing sector has an amazing outcome. The primary factors utilized in the examination incorporate stock market, interest rate, inflation rate, exchange rate, and money supply. Moreover, intermediary factors incorporate Market index, consumer price index, National cash according to USD, interest rates on deposits, and M2. The methods utilized by the specialist are the underlying augmented Dickey-Fuller test (ADF) and the Vector autoregression (VAR) model.

Another investigation was completed by Ogutu (2011) that planned on finding the bond amid industrial growth and share price movements at national stock exchange. The primary factors utilized were industrial growth and share price. Dataset of industrial growth was gathered from Kenyan Central Bank while the share price data were assembled from the stock exchange. The investigation explained that as industrial growth expands the stock market performance improves.

Several similar studies were conducted in other regions, which leads this paper's results to be comparable.

Gay (2008) examined the relationship between share prices and macroeconomics variables effects on four emerging economies namely India, Russia, Brazil, and China. The findings were insignificant which prove inefficiency in market. According to study conducted by Suliaman D. (2009) using quarterly data of macroeconomic variables affecting Karachi stock exchange revealed exchange rates fluctuations greatly influence share prices. Further study revealed interest rates and money supply had significant effects on share prices.

Another study is that of Chen, Roll, and Ross (1986) who investigate the impact of macroeconomic variables on stock prices. They employ seven macroeconomic variables to test the multifactor model in the USA. They find that consumption market index and oil prices are not related to financial market while industrial production, change in risk premium, and twist in the yield curve are significantly related to stock returns.

Objectives

The main objective of this study is to test whether the macroeconomic factors of Slovak republic explain the behaviour of the Share Price Index (SPI).

Both past and recent empirical investigations of macroeconomic indicators that influence stock markets have been analyzed. However, most of the studies only focused on individual stocks and disregarded several macroeconomic variables and their effects on economy (Anokye & Siaw, 2010).

The findings of this study would further extend the existing literature on relationship between macroeconomic variables and stock market by providing another latest empirical evidence from Central and Eastern European economy. Additionally, policy makers would be able to forecast and draft regulations and policies according to analysis.

Data and Hypothesis

Data Collection and Sampling

This paper depends on quantitative examination with the assistance of appropriate econometrics model. According to statistical methods, it is a blend of both cross-sectional and time-series data. Panel data are divided into two types, namely: balanced and unbalanced Panel Data. In the words of Gujrati (2003), Balanced Panel Data are where each cross-section is evaluated for the same time periods/series. Unbalanced Panel Data are where each cross-section is evaluated for different time periods.

The study covers the periods from 2012 to 2019 and employs time series data. 96 monthly observations were gathered from the Slovak Stock Market (SAX) reports. Further GDP data, government issued securities, and Price index data were gathered from Slovak Statistical Office Database.

Data analysis was performed with aid of Excel, and Minitab statistical software.

Hypothesis of the study: Based on the previous studies, this study has formulated the following hypotheses**:**

H1: Stock market performance is linked with Macroeconomic variables.

Methodology

To examine the impact of macro-economic factors on stock market performance, panel data analysis was utilized in this study and the model equation is formulated as follows:

$$SPI = \beta_1 i,t + \beta_2 GDPi,t + \beta_3 GSIi,t + \beta_4 CPIi,t + \varepsilon t$$

where,

SPI: share price index

GDP: gross domestic product

GSI: government securities issued

CPI: consumer price index

ε: error term

it = i represents countries; t represents time series

Analysis of the Study: Descriptive Analysis

Descriptive statistics are further useful to make general observations about the data collected. General description of these variables appears in Table 1 below.

Table 1

Descriptive Statistics

Variables	Observations	Mean	Median	Min	Max	SD
SPI	120	278.67	289.33	214.97	365.42	52.66
GDP	120	1468.78	1398.28	1230.30	1616.39	372.64
GSI	120	1.21	1.28	0.89	2.21	0.92
CPI	120	146.67	152.77	126.98	188.90	24.35

Above table represents the descriptive statistics of both independent and dependent variables in which 120 monthly observations have been included in the study. The mean of SPI, gross domestic product, government securities, and consumer price index are 278.67, 1468.78, 1.21, and 146.67 respectively, while the standard deviation of SPI, gross domestic product, government securities, and consumer price index are 52.66, 372.64, 0.92 and 24.35 respectively.

Multi-collinearity Test

Multi-colinearity can be measured using Variance Inflation Factor or Tolerance test. In this study, VIF was used. According to Table 2, the centred Variance Inflation Factors are showing the value which is less than 10. Therefore, the finding of this analysis has proved that that there is no multi-collinearity, as the VIF is less than 10.

Table 2

Multi-collinearity Test

Variable	Coefficient	Centred variance inflation factors (VIF)
SPI	0.630	-
GDP	0.007	2.273
GSI	0.005	1.300
CPI	0.015	2.143

Unit Root Test

In order to find out the times series variables are stationary or non-stationary, the ADF's unit root test was performed. Results of unit root tests indicate that two out of the four variables are non-stationary (Table 3). The results of the ADF test indicate that all the integrated variables are stationary at the first difference with varying level of significance. Hence, the present study employs with the first difference for the GDP and CPI meanwhile the SPI and GSI are with level form.

Table 3

Augmented Dickey Fuller (ADF) Test

Variables	Level		First difference	
	t-statistic	Probability value	*t*-statistic	Probability value
SPI	-4.512	0.002	-8.178	0.000
GDP	-1.968	0.328	-15.985	0.000
GSI	-3.010	0.087	-8.745	0.000
CPI	-2.268	0.398	-8.738	0.000

Table 4

Summary of Covariance Analysis

Variables	SPI	GDP	GSI	CPI
SPI	1.000	-	-	-
GDP	0.218***	1.000	-	-
GSI	0.679***	-0.235	1.000	-
CPI	0.656***	-0.745	-0.278	1.000

Notes. SPI = Share Price Index, GDP = Gross Domestic Product, GSI = Government Securities Issued, CPI = Consumer Price Index.

*** $p < 0.01$ significance level.

Deriving from results, the study concludes that there is a high correlation between the independent variables (GDP, GSI, CPI) and dependent variable (SPI). Further, GDP and GSI show a negative relationship with SPI and CPI shows a positive relationship with SPI.

Regression Analysis

Table 5 elucidates the linkage/relationship among the variables employed specifically in this research. The work carried out regression analysis in order to examine whether macroeconomic variables significantly have impact on stock market performance by employing ordinary least square method. This method was utilized in similar studies conducted by Ihsan, Mehboob & Raja (2015) and Shiba (2019).

Table 5

Ordinary Least Square Regression Analysis (OLS)

Variables	Coefficient	Std. error	*t*-ratio	*p*-value
SPI	-0.759	0.787	-0.863	0.318
GDP	0.138	0.087	1.384	0.169
GSI	-0.784	0.075	-7.928	0.000***
CPI	1.486	0.143	7.512	0.000***
R-squared	0.760	Durbin-Watson stat 0.152		
Adjusted *R*-squared	0.752	*F*-Statistic 0.000		

Note. *** $p < 0.01$ significance level.

Table 5 illustrates the *R*-squared is 0.76. This replicates that the macroeconomic variables account for 76% variation in the share price index (SPI). Further it endorses that 76% of the difference in share price index is explained by the three macroeconomic variables: GDP, GSI, and CPI. The research further illustrates, GDP and CPI are directing towards positive effects and GSI is commanding negative effect on share price index.

Conclusions & Recommendations

This research has analyzed the relationship between macroeconomic variables and stock market performance. It therefore seemed appropriate and challenging to test this relationship using panel data. Correlations and regression analyses were utilized. According to our findings, correlation analysis indicated that there is a high correlation between the independent variables (GDP, GSI, CPI) and dependent variable (SPI).

Data from regression analysis illustrate, 76% of the variation in share price index is explained by the three macroeconomic variables: GDP, GSI, and CPI. Furthermore, this study sheds light on the fact that in order to

take full advantage of the stock markets practical implementation of economic policies should take place. Therefore, in general, research findings indicate that macroeconomic factors have an significant impact on the movement of SPI. Bratislava Stock Exchange share prices are highly dependable on macroeconomic variables. This study will help the investors and public to take better decisions by keeping in view the macroeconomic factors which lead to effective decision making for the maximization of their profit.

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