The impact of macroeconomic factors and Covid-19 on the Bucharest Stock Exchange Trading Index

Rareș-Petru MIHALACHE[1]

To cite this article:

Mihalache, R.P. (2024). The impact of macroeconomic factors and COVID-19 on the Bucharest Stock Exchange Trading Index. Romanian Journal of Economics, 58(1), pp. 58 – 74

Abstract*. This paper investigates the impact of macroeconomic factors and COVID-19 on the Romanian Stock Exchange using monthly data spanning from March 2020 to September 2022. This time frame is selected to capture the evolution of the pandemic and to consider all the major waves of infections that Romania faced. We employ the Autoregressive Distributed Lag (ARDL) – Bounds Test technique for estimation. ARDL is chosen as the econometric model due to its suitability for capturing the dynamics of both short-run and long-run relationships. Since the COVID-19 pandemic severely interrupted financial markets and the real economy globally, this analysis also includes COVID-19 related variables to observe the effect of the economic hiatus on the domestic stock market. The originality of this paper lies in its pioneering approach of incorporating both macroeconomic variables and COVID-19-related factors into the same econometric model. At the time of writing, this paper stands out as one of the few studies that comprehensively examine the impact of both macroeconomic conditions and the specific challenges posed by the COVID-19 pandemic on the Romanian Stock Exchange during various waves of infections. Results indicate that macroeconomic and COVID-19 variables have an impact on the Romanian Stock Market. In both the short run and long run, the exchange rate seems to have the most significant influence on the stock market. The research findings bear implications for policymakers, regulators, academia, and investors.*

Keywords*: ARDL, macroeconomic variables, COVID-19, time-series analysis, Bucharest Stock Exchange Trading Index (BET).*

JEL classification*: C13; C22; C87; E52; E58*

1. Introduction

The global financial crisis of 2007-2008 highlighted the weaknesses of the financial markets, causing a significant level of uncertainty and pain, from an economic point of view. The financial turmoil was spread out in the entire economy, acting like a barrier on its normal evolution. In such a turbulent context, central banks had to intervene not only to respond to the financial collapse, but also to re-establish a state of a functional economy. One of the measures implemented was to reduce the level of interest rates and therefore, to promote a restart of the system through which, in consequence, would lead to investments, spending, and loans. As these rates converged to their inferior limits, monetary authorities had to apply less conventional policies to assure the stability of the financial

[1] Romanian Academy, School of Advanced Studies of the Romanian Academy, Doctoral School of Economic Sciences, National Institute for Economic Research "Costin C. Kirițescu", Institute for Economic Forecasting, Bucharest, Romania, rares.mihalache9@gmail.com

system. This set of measures referred to quantitative easing and it was inspired by the experience of Japan in dealing with deflation.

The banking system in Romania, due to a wise policy mechanism of the National Bank, was not directly impacted by the financial crisis. In effect, the governmental support was not needed. However, there were some channels through which the Romanian economy could be influenced: the real economy channel (via the decrease in demand), the credit channel, the exchange rate channel, and the trade channel. The monetary policy measures seemed to follow the suggestions and lessons of other nations, as follows: a decrease in the interest rate, the liquidity supply in the banking system through the drop of the minimum reserve rates for international currency liabilities with a period higher than two years, the relaxation of the banks' access to credit through the instruments that the central bank can use, and the Romanian government request for a foreign credit line (as a preventive measure to assure the trust in the financial system) (Pelinescu, 2012).

Financial markets are sensitive to domestic and international events, and respond immediately after their occurrence. Generally, stock exchanges are called barometers and yardsticks, which react to economic, political, regional, national, as well as international environments. Negative incidents or events which happen internally or externally, such as the 2007-2008 financial crisis, increase fluctuation in the market, which produces a negative impact on its performance (Ali and Afzal, 2012). The crisis has clearly proved the immediate necessity to reorganize financial supervision and regulation in a way that the incentives of market's participants are correlated with the risks that they take. It has also demonstrated that significant work has to be done on the problem of systemic risks at the level of the whole financial system. Also, the financial catastrophe illustrated that price stability is a necessary though incomplete precondition for financial stability (Trichet, 2010).

A decade after the end of the global financial crisis and the great recession, COVID-19 outbreak caught the world in shock. While the financial crisis can be, at least in hindsight, seen as the repercussion of evolutions in the mortgage, housing, and financial markets, which had been building up over a few years, the COVID-19 crisis was truly unanticipated. Many scientists were informed about the possible risks of pandemics, as part of a comprehensive list of potential rare disasters. However, governments, households, and companies seem to have been surprised by the Coronavirus. At its origins, the COVID-19 crisis is not an economic or financial crisis, but a health one, which has negatively affected the lives of millions of individuals worldwide. However, through its influences on demand and supply, and potentially on productivity, the COVID-19 outbreak swiftly switched to a large-scale economic and financial crisis. The recent COVID-19 pandemic has acutely disrupted financial markets and the real economy globally. These exceptional events prompted substantial monetary and fiscal policy interventions. Observing the different nature of this shock, the academic community has produced a significant amount of research during past years. In this regard, macro-finance models have been expanded to assess the impact of the pandemic (Goldstein et al., 2021).

With the expansion of COVID-19 cases globally, financial markets reacted rapidly, recording the biggest declines, comparable to those of other turbulent periods from the past. The Romanian Stock Market began the year 2020 with a higher growth rate than the level observed at the end of 2019. In January 2020, Bucharest Stock Exchange reported the highest value in the last 12 years for the Bucharest Exchange Trading (BET) index, which is the reference index of the local stock market. However, the optimism in Romania started decreasing due to the international circumstances. Until the end of February 2020, the index registered a drop of 8.6% (Vasiu, 2020).

This study seeks to examine the effects of the COVID-19 pandemic and several macroeconomic variables on the Romanian stock market. Assessing the performance of stock indices serves as a means to depict the trajectory of a particular economy, offering insights into its potential and the viability of various economic activities. The primary goal of this paper is to model the interaction between the stock market and macroeconomic and COVID-19 variables in Romania utilizing the ARDL co-integration approach.

The remaining sections of the paper are structured as follows. Section 2 highlights the literature review and the derived hypotheses of the current study. Section 3 presents the empirical analysis. Section 4 provides the results and discussions, while section 5 points to conclusions and recommendations.

2. Literature Review and hypotheses development

This section offers an overview of existing empirical research exploring the association between the financial market, macroeconomic variables, and the Coronavirus pandemic. The findings from this literature review serve as the foundation for the subsequent subsection, 2.2, wherein we formulate hypotheses for our investigation.

2.1. Background

The stock market is one of the most widely followed markets worldwide, with a multitude of transactions facilitated daily. Thus, not surprisingly, plenty of research has been made to understand the nature of these markets and what are the factors that influence their performance and movements in general. It is worth mentioning that most of these studies focused on developed markets and rarely considered developing markets. With this respect, Ullah et al. (2017) analyzed the importance of macroeconomic variables in affecting stock market performance of the South Asian Association for Regional Cooperation (SAARC) countries utilizing the Ordinary Least Squares (OLS) multiple regression model. On one hand, they found that macroeconomic variables, such as foreign currency reserve, interest rate, and exchange rate are statistically significant in influencing stock market performance of SAARC countries. On the other hand, money supply and inflation do not have a substantial relationship in affecting the performance of the stock market.

Gan et al. (2006) assessed the relationships between the New Zealand Stock Index and seven macroeconomic variables from January 1990 to January 2003 by deploying cointegration tests. Specifically, they used Granger-causality and Johansen Maximum Likelihood tests to see if the New Zealand Stock Index represents a leading indicator for macroeconomic variables. Generally, the NZSE40 is typically determined by the real GDP, money supply, interest rate and there is no proof that the stock index is a leading indicator for modifications in macroeconomic variables.

In order to examine the effect of macroeconomic variables on stock market development in Botswana, Molefhi (2021) used the Autoregressive Distributed Lag (ARDL)-Bounds Test. The outputs revealed that macroeconomic variables have an impact on Botswana's stock market development. In the short term, inflation, money supply, and real output demonstrate a positive influence on the development of the stock market, while the real exchange rate hinders its development. Additionally, real output supports the stock market development in the long run.

Owusu-Nantwi and Kuwornu (2011) examined the relationship between macroeconomic variables and stock market returns in Ghana using monthly data spanning from January 1992 to December 2008. Empirical findings stressed a significant relationship between inflation and stock market returns. Conversely, crude oil prices, Treasury bill rates, and exchange rates do not appear to have a significant effect on stock returns

Ouma and Muriu (2014) investigated the influence of macroeconomic factors on stock returns in Kenya between 2003 and 2013, utilizing the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) approaches with monthly data. They employed the Ordinary Least Squares (OLS) technique to examine the validity of the model and the significance of various variables that may influence stock returns. The empirical analysis demonstrated that inflation and money supply are significant determinants of returns in the stock exchange. Additionally, exchange rates have a negative effect on stock returns, while interest rates are not significant in predicting long-term returns in the stock exchange.

Barakat et al. (2016) examined the relationship between macroeconomic factors and the stock market in two emerging economies, Egypt and Tunisia, spanning from January 1998 to January 2014. Results highlighted that a causal relationship exists between the market index and exchange rate, money supply, consumer price index (CPI), and interest rate in Egypt. Similarly, the same relationship applies to Tunisia, except for the consumer price index (CPI), which has no causal relationship with the stock market.

Kabeer et al. (2016) studied the impact of three macroeconomic variables (foreign exchange rate, foreign direct investment, and inflation rate) on the Karachi Stock Exchange and used monthly data over a 10-year interval for their analysis. Their results indicated that inflation and the foreign exchange rate have a negative impact on the stock exchange, contrary to foreign direct investment.

Dao et al. (2022) scrutinized the effects of macroeconomic variables on Vietnam's stock market performance over the period 2010 to 2021. Findings revealed that, in the long run, money supply and exchange rate exert discernible influences on the stock market. Particularly, a positive correlation between money supply and the VN-Index is observed, contrasting with the negative effect of exchange rate fluctuations. Conversely, the study failed to establish a significant relationship between world oil prices and interest rates on the VN-Index over the long term. In the short term, interest rates and exchange rate fluctuations are found to adversely affect the VN-Index. Conversely, world oil prices and the preceding one to two months' fluctuations in money supply (M2) exhibit impacts in the same direction on the index.

Lone et al. (2023) explored the influence of chosen macroeconomic factors (index of industrial production, interest rate, consumer price index, exchange rate, oil price index) on the performance of stock markets within the BRICS economies. Their analysis used monthly data spanning from 2011 to 2021 and applied both the ARDL bounds testing and the PMG/ARDL models to examine short and long-term relationships, considering the time dimension and pooled data. Both models yielded consistent findings regarding short and long-term relationships across all BRICS countries, with the exception of South Africa. Additionally, the variables demonstrated casual relationships with each other throughout the sample period. The data analysis suggests that variables possess predictive capabilities for stock returns in BRICS countries.

The research of Khan and Khan (2018) contributes to understanding the impact of diverse macroeconomic factors on stock prices in Pakistan, utilizing monthly data from May 2000 to August 2016. The results indicated that, in the long term, stock prices of the Karachi Stock Exchange are notably influenced by money supply, exchange rate, and interest rate. Conversely, in the short term, all variables exhibit insignificance except for the exchange rate, which demonstrates negative cointegration with stock prices.

In their investigation, Pole and Cavusoglu (2021) explored the influence of macroeconomic factors on stock returns within the Nigerian stock market. They used monthly data covering the period from January 1998 to December 2019. Employing the ARDL bound test, the study analyzed the dynamic relationships among the variables under scrutiny. Results indicated that money supply and aggregate industrial production exert positive and significant impacts on stock returns, while exchange and inflation rates show negative effects on stock returns within the Nigerian stock exchange market. The study's conclusion suggests that macroeconomic factors play a significant role in influencing stock returns within the Nigerian stock market, both in the short and long run.

El Abed and Zardoub (2019) investigated the correlation between macroeconomic variables and stock returns in Germany over the period spanning from 1990: Q1 to 2016: Q1. The study employed the bounds testing procedure proposed by Pesaran et al. (2001), and utilized the Autoregressive Distributed Lag approach. The empirical findings indicated that, in the long run, exchange returns, the M3 aggregate, and oil returns exhibit positive impacts on stock returns, albeit not statistically significant. Conversely, interest rates negatively and significantly influence stock returns, while the Consumer Price Index (CPI) positively and significantly affects stock returns. In the short term, similar patterns are observed, with exchange returns, the M3 aggregate, and oil returns demonstrating positive impacts on stock returns, albeit not statistically significant. Conversely, interest rates exhibit a negative and significant impact on stock returns, while the effect of CPI remains positive and significant.

Khan (2019) conducted a study examining the impact of macroeconomic factors on stock returns within the Shenzhen stock exchange, utilizing monthly data spanning from January 2008 to December 2018. The ARDL model was employed to assess both short and long-term relationships among the variables under investigation. The findings from the estimated short and long-run ARDL model suggested that inflation rate, interest rate, and exchange rate exhibit negative and statistically significant effects on the stock returns of the Shenzhen stock exchange.

Hatmanu and Cautisanu (2021) explored the influence of COVID-19 on the Romanian Stock Market. They considered the impact on the Bucharest Exchange Trading (BET) index of variables such as the number of new cases and new deaths of COVID-19, measures applied by authorities, and the foreign economic context. They deployed the Autoregressive Distributed Lag (ARDL) Bound cointegration test to quantify the effect of COVID-19 on the stock market. The results displayed a substantial long-run negative impact of Coronavirus on the Romanian Stock Market, while the

European economic situation had a positive influence. Gherghina et al. (2021), by using Vector Autoregression (VAR) estimation, discovered no causal linkage among the COVID-19 variables and the Bucharest Stock Exchange Trading index, BET. Herwany et al. (2021) used the Ordinary Least Squares (OLS) regression technique and observed a significant relationship between the COVID-19 outbreak and negative, impactful market returns in the Indonesia stock exchange.

Abu et al. (2021) examined the impact of COVID-19, represented by the number of confirmed cases and deaths, on Nigeria's stock market from March 23rd to September 11th, 2020, utilizing the autoregressive distributed lag (ARDL) model alongside other econometric techniques. The results from the bounds test to cointegration revealed a long-term relationship between COVID-19, oil prices, exchange rates, and Nigeria's stock market. Specifically, regarding the pandemic, findings suggested that the number of confirmed cases of infection negatively affects stock market performance, while the number of deaths shows a positive relationship with stock market performance in the long term.

Chaouachi and Chaouachi (2020) investigated the influence of the COVID-19 pandemic on the stock market in the Kingdom of Saudi Arabia, employing an Autoregressive Distributed Lag (ARDL) cointegration approach. Specifically, they analyzed the correlation between the natural logarithm of the trading volume of the Tadawull All shares index (TASI) and the natural logarithm of daily COVID-19 confirmed cases in both short and long-term contexts. The bounds test for cointegration is conducted on daily series data spanning from March 2, 2020, to May 20, 2020. Their findings showed that COVID-19 negatively impacts the stock market solely in the long term.

2.2. Hypotheses development

The preceding subsection provides an analysis of recent literature pertaining to the impact of macroeconomic variables and COVID-19 variables on financial markets. This review serves as the groundwork for the main hypotheses presented in this paper:

H_1: "Inflation rate has a significant impact on the BET Index"
H_2: "Exchange rate has a significant impact on the BET Index"
H_3: "Long-term interest rates have a significant impact on the BET Index"
H_4: "COVID-19 deaths have a significant impact on the BET Index"
H_5: "COVID-19 new cases have a significant impact on the BET Index"

3. Empirical Analysis

3.1. Model specification and variable description

To assess the impact of macroeconomic variables and the economic hiatus resulting from the COVID-19 pandemic on the Bucharest Stock Exchange Trading (BET) index, we develop an econometric model comprising one dependent variable and eight independent variables. The selection of these variables is guided by two criteria: maintaining consistent data frequency across all variables and our conviction that these variables may directly influence the Romanian Stock Market. We believe that these selected variables collectively contribute to a comprehensive analysis of the factors influencing the BET index.

The general empirical model deployed in this study is the following:

$$\log(BET) = \alpha_0 + \beta_1 \log(INFL) + \beta_2 \log(\text{ER}) + \beta_3 \log(\text{DIR}) + \beta_4 \log(\text{CRR}) + \beta_5 \log(\text{UNEMPL}) + \beta_6 \log(\text{LTIR}) + \beta_7 \log(\text{COVID19NC}) + \beta_8 \log(\text{COVID19D}) + \varepsilon_t \quad (1)$$

Where BET, the Bucharest Stock Exchange Trading (BET) index, is the dependent variable of the model and is used as a standard measure for the performance of the most traded companies on the local regulated market. The predictors of the model are: INFL, which is the monthly inflation rate, ER represents the monthly EURO to RON exchange rate, DIR is the monthly deposit facility rate implemented by the central bank of Romania, CRR is the monthly cash reserve ratio, UNEMPL defines the monthly unemployment rate, LTIR captures the long-term interest rates, COVID19NC represents the monthly cases caused by the pandemic, and COVID19D includes the monthly deaths; α_0 and ε_t are the constant and the error term, respectively.

In time-series analyses, the optimal model to deploy is influenced by the order of integration. Johansen cointegration test cannot be used directly if variables are of mixed order of integration or if all of them are stationary, since this approach requires all variables of interest to be I(1). An Autoregressive Distributed Lag (ARDL) model represents an Ordinary Least Square (OLS) based model that is applicable for non-stationary time-series data, as well as for time-series with different order of integration. This model considers sufficient numbers of lags to incorporate the Data Generating Process (DGP) in a general-to-specific modeling approach (Shrestha and Bhatta, 2018). Therefore, to assess the impact of macroeconomic and COVID-19 variables on the Romanian Stock Market development, this study employs the Autoregressive Distributed Lag (ARDL) - Bounds Testing approach. This method is applied because the variables defined in the model contain various orders of integration as shown in Table 4 and Table 5. As Molefhi (2021) indicates, the Autoregressive Distributed Lag (ARDL) technique has particular advantages compared to other single equation estimation approaches. It minimizes the endogeneity issues and all the variables are considered to be endogenous. Furthermore, the long-run and short-run estimates are projected simultaneously, removing the problems related to autocorrelation and omitted variables. Sengupta (2020) highlights another important advantage of the ARDL technique to cointegration and that is, the power of this test is not affected in finite samples when unreasonable restrictions are specified. For its finite sample specifications, the ARDL-Bounds Test method performs better even when the samples are smaller. Therefore, when the size of the sample is small, this estimation method is preferred since it is powerful in small samples.

Therefore, the empirical model of the study is defined as follows:

$$\Delta \log(BET) = \alpha_0 + \sum_{i=0}^{n} \beta_{1i} \Delta \log(BET_{t-i}) + \sum_{i=0}^{n} \beta_{2i} \Delta \log(INFL_{t-i}) + \sum_{i=0}^{n} \beta_{3i} \Delta \log(ER_{t-i}) + \sum_{i=0}^{n} \beta_{4i} \Delta \log(DIR_{t-i}) + \sum_{i=0}^{n} \beta_{5i} \Delta \log(CRR_{t-i}) + \sum_{i=0}^{n} \beta_{6i} \Delta \log(UNEMPL_{t-i}) + \sum_{i=0}^{n} \beta_{7i} \Delta \log(LTIR_{t-i}) + \sum_{i=0}^{n} \beta_{8i} \Delta \log(COVID19NC_{t-i}) + \sum_{i=0}^{n} \beta_{9i} \Delta \log(COVID19D_{t-i}) + \lambda_1 \log(BET_{t-i}) + \lambda_2 \log(INFL_{t-i}) + \lambda_3 \log(ER_{t-i}) + \lambda_4 \log(DIR_{t-i}) + \lambda_5 \log(CRR_{t-i}) + \lambda_6 \log(UNEMPL_{t-i}) + \lambda_7 \log(LTIR_{t-i}) + \lambda_8 \log(COVID19NC_{t-i}) + \lambda_9 \log(COVID19D_{t-i}) + u_t, \quad (2)$$

where Δ represents the difference operator, n is the lag length criteria and the other variables of interest are already defined.

To perform the Autoregressive Distributed Lag (ARDL) - Bounds Testing technique, there are two phases. The first one implies testing for cointegration association. This is done to observe if there is a linear combination for nonstationary time-series. Using parameters from equation (2), the null hypothesis examination for no cointegration is defined as follows:

$$H_0: \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = \lambda_8 = \lambda_9 = 0$$
$$H_1: \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq \lambda_7 \neq \lambda_8 \neq \lambda_9 \neq 0$$

The result of the cointegration test is established by the performed F-statistic. The F-statistic is determined by a non-standard distribution regardless of whether the regressors are I (0) or I (1). Also, the F-statistic has two sets of critical bounds. The first one assumes all variables to be I (0), whereas the other one considers that all variables are I (1). If the F-statistic is greater than the I (1) bound, the null hypothesis of no cointegration is rejected. The second phase of the ARDL modelling implies estimating the coefficients for the long-run associations and describing the values of the estimators. Utilizing Akaike Information Criterion (AIC) or Bayesian Information Criterion (BIC), the desirable lag length of the ARDL model is identified.

Succeeding cointegration test from equation (2), the error correction model (ECM) is defined in the following way:

$$\Delta \log(BET) = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta \log(BET_{t-i}) + \sum_{i=1}^{n} \alpha_{2i} \Delta \log(INFL_{t-i}) + \sum_{i=1}^{n} \alpha_{3i} \Delta \log(ER_{t-i}) + \sum_{i=1}^{n} \alpha_{4i} \Delta \log(DIR_{t-i}) + \sum_{i=1}^{n} \alpha_{5i} \Delta \log(CRR_{t-i}) +$$

$$\sum_{i=1}^{n} \alpha_{6i} \Delta \log(UNEMPL_{t-i}) + \sum_{i=1}^{n} \alpha_{7i} \Delta \log(LTIR_{t-i}) + \sum_{i=1}^{n} \alpha_{8i} \Delta \log(COVID19NC_{t-i}) + \sum_{i=1}^{n} \alpha_{9i} \Delta \log(COVID19D_{t-i}) + \theta ECT_{t-i} + \mu_t \quad (3)$$

Where α_0 is the constant and $\alpha_1, \dots, \alpha_9$ are the short-run coefficients; θ is the coefficient that captures the long-term dynamics; ECT is the error correction term and the residual error term is represented by μ_t. The error correction mechanism's validity depends on the sign and size of the coefficient displaying the speed of adjustment. θ is expected to be statistically significant and have a negative value (Sengupta, 2020).

3.2. Data

The study consists of time-series analysis with monthly data from March 2020 to September 2022, encompassing the time the pandemic started and the last major wave of infections. The data sources are YCharts, Trading Economics, World Health Organization (WHO), and the National Bank of Romania (NBR). Please refer to **Table 1** for the description of the variables.

Table 1. Variables' descriptions

Variable	Description/Methods for computing the variables	Unit of measurement	Source
BET	Bucharest Exchange Trading index represents the first index considered by the Bucharest Stock Exchange (BSE) and is the reference index for the local capital market. It highlights the performance of the most traded firms on BSE's regulated market, without financial investment companies	Base value of 1000 points as of September 1997; monthly data points	Trading Economics
INFL	Measure of inflation (Consumer Price Index)	Percentage per month	YCharts
ER	Exchange rate	Euro per Romanian Leu (EURRON); monthly data	Trading Economics
DIR	Deposit Facility (Interest) Rate. The interest rates on the National Bank of Romania's (NBR) standing facilities (lending facility and deposit facility) create a symmetrical corridor over the monetary policy rate	Percentage per month	National Bank of Romania and Trading Economics
CRR	Cash Reserve Ratio refers to LEU- and international currency-denominated holdings of credit institutions on accounts opened at the National Bank of Romania (NBR).	Percentage per month	Trading Economics
UNEMPL	The unemployment rate is defined as the level of unemployed individuals in the aggregate work force. Workers are considered jobless in the situation that they currently do not work, even if they are capable and willing to do so. The aggregate work force includes all employed and jobless workers within an economy.	Percentage per month	YCharts
LTIR	The statistics for European Union (EU) Member States refer to interest rates for long-run government bonds denominated in Euro for Member States of the Eurozone and in local currencies for Member States which have not adopted the Euro yet. The harmonised statistics are utilized for convergence analysis purposes.	Percentage per month	YCharts
COVID19NC	Number of new COVID-19 cases; addition of the daily number of new cases for each month	Aggregate monthly cases	World Health Organization (WHO)
COVID19D	Number of new COVID-19 deaths; addition of the daily number of deaths for each month	Aggregate monthly cases	World Health

			Organization (WHO)

Source: Authors'own work.

3.3. Signs of Predictors. Evidence from other studies

Inflation Rate

Macroeconomic stability is essential for stock market movement. The most popular measure of macroeconomic stability utilized in this paper is the inflation rate, quantified by the Consumer Price Index (CPI). Literature indicates that the inflation rate can have either a positive or negative impact on determining stock market performance. The association between inflation rate and stock performance has been assessed broadly in the literature. In his empirical analysis, Fisher (1930) observed a positive relationship between inflation rate and stock returns, and indicated that equity shares might be utilized as a hedge against inflation. In this sense, Bodie (1976) provided evidence to support Fisher's argument. Further, in an empirical analysis, Fama and Schwert (1977) observed an inverse association between expected and unexpected inflation and stock movements. Additionally, Adams et al. (2004) discovered a substantial negative influence of inflation on stock returns.

Exchange Rate

Economic theory indicates that the depreciation of the domestic currency makes exporting goods and services more attractive, thus increasing international demand and consequently, generating higher revenues for local companies. As a result, their values appreciate, leading to an increase in stock prices. Conversely, the appreciation of the domestic currency diminishes profits for exporting companies, negatively impacting the value of stock prices (Jorion, 1991). Abbas et al. (2014), through their empirical investigation, discovered an insignificant positive association between exchange rates and stock market returns. Jamil and Ullah (2013) assessed the impact of exchange rates on stock returns in Pakistan and observed that exchange rates positively influence stock market returns in the short run, while the long-run association is not significant.

Deposit Interest Rate

Haque (2016) explored both the long-term association and short-term dynamics between the Bangladesh stock market index (DSE General Index) and selected macroeconomic variables, including Broad money supply (M2) and Deposit Interest rate (DIR). Analyzing monthly data from January 2009 to June 2015, this research utilized various econometric methodologies. The findings revealed a co-integration between the Bangladesh stock market index (DSE General Index) and the aforementioned macroeconomic variables, suggesting a long-term relationship. Additionally, the study identified that the Deposit Interest Rate exerts a short-term influence on the DSE General Index.

Cash Reserve Ratio

Kumari and Jha (2019) investigated the impact of macroeconomic variables, namely cash reserve ratio and reverse repo rate, on Indian stock market performance using monthly data for the period from April 2016 to March 2018. The results of regression analysis displayed that there is an insignificant relationship between both macroeconomic variables and stock market performance.

Unemployment Rate

The unemployment rate provides information about corporate earnings and expectations regarding fiscal and monetary policies. Firstly, an increase in unemployment rates may indicate reduced future sales and earnings expectations for businesses, leading to decreased stock returns. Secondly, rising unemployment rates may lead to expectations of expansionary fiscal or monetary policies, which can also influence stocks. Boyd et al. (2005) discovered that, on average, an announcement of increasing unemployment rates represents good news for stocks during economic expansion phases and bad news during economic contraction phases.

Long-Term Interest Rate

Understanding the relationship between interest rates and stock market prices is crucial for policymakers, investors, portfolio and corporate managers, as it has substantial implications for various areas of finance, such as portfolio management, asset allocation, risk assessment, and monetary policy transmission. Ferrer et al. (2016) identified the United Kingdom (UK) as the country with the most powerful interconnection between long-run bond yields and stock returns, followed by Germany, France, and the Netherlands. Fausch and Sigonius (2018) observed that in times of negative real interest rates, a surprise monetary contraction leads to a decline in excess stock returns.

COVID-19 cases and deaths

Major events might substantially influence stock market returns. The Covid-19 pandemic has influenced the investment and business environment worldwide. The results of Al-Awadhi et al. (2020) indicate a substantial negative effect of both daily rise in total confirmed cases and the daily rise in total deaths caused by COVID-19 on stock returns of all companies listed in the Shanghai Stock Exchange Composite Index and Hang Seng Index.

3.4. Descriptive Statistics

Table 2 and Table 3 display the descriptive statistics of the macroeconomic and COVID-19 related variables used in this paper. Descriptive statistics assist in describing and understanding the features of a particular dataset by offering short summaries of the sample, along with measures of the data. Standard deviations show that the number of cases and deaths of COVID-19 cases are more volatile than the macroeconomic variables on the stock market. Moreover, standard deviations display that the exchange rate level is the least volatile.

Table 2. Descriptive Statistics of the macroeconomic variables

	BET	INFL	ER	DIR	CRR	UNEMPL	LTRIR
Mean	10939.67	5.554839	4.898554	1.475806	5.258065	5.751613	4.765484
Median	11431.12	3.500000	4.917620	1.000000	5.000000	5.600000	4.000000
Maximum	13190.07	13.40000	4.946530	4.500000	6.000000	6.700000	9.260000
Minimum	7625.380	1.700000	4.828900	0.750000	5.000000	5.100000	2.650000
Std. Dev.	1759.723	4.154101	0.044753	1.063318	0.444803	0.415428	1.937280
Skewness	-0.45743	0.873049	-0.41746	1.885975	1.105815	0.480215	0.946205
Observations	31	31	31	31	31	31	31

Source: Author's Computations (2023).

Table 3. Descriptive Statistics of the Covid-19 variables

	COVID19NC	COVID19D
Mean	105425.1	2161.968
Median	49208.00	1278.000
Maximum	516959.0	10710.00
Minimum	2142.000	55.00000
Std. Dev.	129809.6	2457.642
Skewness	1.833755	2.005652
Observations	31	31

Source: Author's Computations (2023).

The investigation of skewness proves that the distributions for inflation rate, deposit interest rate, cash reserve ratio, unemployment rate, long-term interest rate, as well as the number of of new COVID-19 cases and deaths are positively skewed, whereas the distribution for exchange rate is negatively skewed in the stock market.

3.4. Unit Root Tests

Many of the time-series empirical analyses consider that series are nonstationary. This is in concordance with the usual behaviour of macroeconomic variables. Since time-series analysis starts with testing the stationarity/non-stationarity of the variables, it is crucial to perform unit root tests before running the econometric model, in order to ensure suitable model specifications. With this regard,

Augmented-Dickey Fuller (ADF) and Phillips-Perron (PP) tests were performed to test for the unit root. These tests are used to determine if the variables are stationary or nonstationary. A stochastic process is considered to be stationary if the mean and variance do not vary with time and the auto-covariance does not rely on time, but on the time lag between the variables. The opposite is true for non-stationary time-series data. Most importantly, using a model with nonstationary data is likely to yield to spurious relationships.

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

Variable	Without Trend		Trend and Intercept		Conclusion
	Level	First Difference	Level	First Difference	
LBET	-2.306580	-4.209528***	2.213174	-5.247970***	I(1)
LINFL	-0.218650	-3.635130**	-2.540843	-3.562673*	I(1)
LER	-1.704715	-7.320112***	-3.055880	-7.591776***	I(1)
LDIR	1.207521	-4.441969***	-0.408038	-7.210807***	I(1)
LCRR	-	-5.385165***	-1.581642	-5.468670***	I(1)
LUNEMPL	-0.924207	-5.025612***	-3.520889*	-4.787613***	I(1)
LLTIR	-0.368561	-3.265889**	-1.728931	-3.986412**	I(1)
LCOVID19NC	-3.553406**	-	-4.858892***	-	I(0)
LCOVID19D	-2.766783*	-5.387702***	-2.597886	-5.744427***	I(1)

Note: *, **, *** denote statistical significance at 10%, 5%, and 1% levels
Source: Author's Computations (2023).

Table 5. Phillips-Perron (PP) Unit Root Test

Variable	Without Trend		Trend and Intercept		Conclusion
	Level	First Difference	Level	First Difference	
LBET	-2.339154	-4.179054***	0.371306	-5.271213***	I(1)
LINFL	0.493536	-3.499222**	-3.174321	-3.282852*	I(1)
LER	-1.809073	-7.407469***	-2.998434	-8.447643***	I(1)
LDIR	0.585955	-4.684807***	-0.065361	-7.619347***	I(1)
LCRR	-1.703385	-5.385880***	-1.581642	-5.541942***	I(1)
LUNEMPL	-1.094533	-5.157853***	-3.614353*	-4.841297***	I(1)
LLTIR	-0.112899	-3.289925**	-1.710218	-3.986412***	I(1)
LCOVID19NC	-3.201257**	-	-2.591182	-6.110019***	I(0)
LCOVID19D	-2.807882*	-7.211897***	-2.849481	-8.914889***	I(1)

Note: *, **, *** denote statistical significance at 10%, 5%, and 1% levels
Source: Author's Computations (2023).

Table 4 and Table 5 display that all variables are integrated of order one [I(1)], except for the monthly number of COVID-19 cases (LCOVID19NC), which is stationary at levels [I(0)]. Therefore, the Autoregressive Distributed Lag (ARDL) approach is appropriate in analyzing the impact of macroeconomic and COVID-19 variables on the movement of BET, since some variables are stationary at first difference, whereas one is stationary at levels.

4. Results and Discussion

4.1. The Influence of Macroeconomic Variables and COVID-19 on Romanian Stock Exchange

After identifying the order of the integration of the variables (Table 4 and Table 5), the ARDL-Bounds Test was deployed to observe if there exists a long-run relationship between the variables.

Table 6. Null hypothesis: No long-term relationships exist

Test Statistic	Value	k
F-statistic	12.29324****	8

Note: *, **, ***, **** denote statistical significance at 10%, 5%, 2.5%, 1% benchmarks.
Source: Author's Computations (2023).

Table 7. Critical Value Bounds

Significance	I(0) Bound	I(1) Bound
10%	1.66	2.79
5%	1.91	3.11
2.5%	2.15	3.4
1%	2.45	3.79

Note: *, **, ***, **** denote statistical significance at 10%, 5%, 2.5%, 1% benchmarks.
Source: Author's Computations (2023).

The results in Table 6 and Table 7 show that the F-statistic is greater than the critical value bounds at all significance thresholds. Consequently, we reject the null hypothesis of no cointegration and conclude that there is long-run relationship among the variables.

Table 8. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	194.0019	NA	2.33e-17	-12.75875	-12.33442	-12.62586
1	428.9533	307.8673	7.43e-22	-23.37609	-19.13276	-22.04713
2	676.9783	171.0517*	5.79e-26*	-34.89505*	-26.83272*	-32.37003

Note: * indicates lag order selected by the criterion
Source: Author's Computations (2023).

Further, the estimation of long-term and short-term coefficients for the defined model is carried out. The optimal lag length is selected using Akaike Information Criterion (AIC), and it selected ARDL (2, 2, 2, 2, 2, 2, 2, 2, 2) for the model. The results are reported in Table 8 and Table 9.

Table 9. Long-run and short-run estimations of the ARDL model

Long-run Estimates; Dependent Variable: LBET		
Regressor	**Coefficient**	**p-value**
LINFL	-0.091883	0.3283
LER	7.295228	0.0001***
LDIR	-0.298207	0.0112**
LCRR	-0.988725	0.0060***
LUNEMPL	-0.595537	0.0578*
LLT_IR	0.519477	0.0520*
LCOVID_19_NC	-0.001153	0.6985
LCOVID_19_D	-0.028378	0.0448**
Short-run Estimates; Dependent Variable: LBET		
Regressor	**Coefficient**	**p-value**
ΔLBET(-1)	0.446391	0.2578
Δ*LINFL*	0.144608	0.2573
Δ*LINFL(-1)*	1.296023	0.1045
ΔLER	32.471838	0.0493**
ΔLER(-1)	12.641021	0.2747
ΔLDIR	-0.005984	0.9296
ΔLDIR(-1)	1.275804	0.0425**
ΔLCRR	-0.810098	0.1416
ΔLCRR(-1)	0.781216	0.0320**
ΔLUNEMPL	-0.836800	0.1622
ΔLUNEMPL(-1)	-2.315812	0.0506**
ΔLLT_IR	-2.716341	0.0382**
ΔLLT_IR(-1)	-1.632367	0.0612*
ΔLCOVID_19_NC	0.003569	0.5896
ΔLCOVID_19_NC(-1)	0.020007	0.1808
ΔLCOVID_19_D	-0.101513	0.0799*
ΔLCOVID_19_D(-1)	-0.009445	0.5321
ECT(-1)	-4.692955	0.0104***

Note: *, **, *** denote statistical significance at 10%, 5%, and 1% levels.
Source: Author's Computations (2023).

The results of the Error Correction Model (ECM) indicate that some of the coefficients are positive and statistically significant (ΔLER, ΔLDIR(-1), ΔLCRR(-1)) to the Romanian Stock Market movement (LBET), while others are negative and statistically significant (ΔLUNEMPL(-1), ΔLLT_IR and ΔLLT_IR(-1), ΔLCOVID_19_D). The remaining variables are not statistically significant in the short-run. Also, it is worth mentioning how profound the influence of the exchange rate on the domestic capital market is in the short-run. Therefore, if the exchange rate increases by one unit, the stock market will go up by approximately 32 points. The ECT(-1), which designates a one-time lagged residual saved from the approximated dynamic long-run association is negative and significant at the conventional 5% significance level, ensuring that convergence to long-term equilibrium might be attained. The significance of these short-run associations is supported by findings from previous studies such as Haque (2016), Jamil and Ullah (2013), Ullah et al. (2017), Al-Awadhi et al. (2020), Lone et al. (2023), and Herwany et al. (2021).

The long-run elasticity results confirm that deposit facility rate (LDIR), cash reserve ratio (LCRR), unemployment rate (LUNEMPL), and COVID-19 deaths (LCOVID_19_D) are statistically significant and negatively affecting the stock market (LBET). However, the exchange rate (LER) and the long-term interest rates (LLT_IR) have a positive and statistically significant influence on the stock market. These findings align with previous studies by Khan and Khan (2018), Chaouachi and Chaouachi (2020), Lone et al. (2023), and Haque (2016). The remaining variables, inflation rate (LINFL) and COVID-19 cases (LCOVID_19_NC) have a negative and statistically insignificant effect on the BET index.

4.2. Diagnostic tests

To assure that the estimated model is unbiased and robust, we need to verify the fitness of the model through analyzing goodness of fit statistics and deploying diagnostic tests.

4.2.1. Goodness of fit

A rough perception of the robustness of predicted regression coefficients can be made by assessing how the regression line explains data, if residuals are serial correlated, and if the model is significant, among other aspects.

Typical tests for goodness of fit encompass R^2, which highlights a correlation in bivariate case and therefore, the value closer to 1 is thought to be better. In multivariate regression, as it is the case for this paper, adjusted R^2 is preferred. R^2 increases with the grow in the number of variables, whereas adjusted R^2 increases only when the additional variable enhances the prediction power. In our case, adjusted R^2 displays a value of 0.991616, which indicates that approximately 99% of the fluctuations in the BET index are explained jointly by the predictors.

4.2.2. Residual Diagnostics

Diagnostic tests indicate the robustness of estimated coefficients. They are used to spot model misspecification and advise on model improvements. Observing the results of the following diagnostic tests, we conclude that the model of this study is correctly specified.

4.2.2.1. Normality

Normality represents the assumption where residuals of the regression are normally distributed with zero mean. Jarque-Bera test has been deployed to check for normality. The hypotheses are the following:

H_0: the error terms are normally distributed; $E[\varepsilon_t] = 0$

H_1: the error terms not normally distributed; $E[\varepsilon_t] \neq 0$

If the p-value of the Jarque-Bera test is less than the 5% significance level, then H_0 is rejected. We notice that the p-value is $0.778877 > 0.05$ and therefore, we fail to reject H_0, meaning that the assumption of normality is satisfied.

4.2.2.2. Heteroskedasticity

Heteroskedasticity refers to the situation when the variance of the error term, or residual term, in a regression model varies significantly. If this is true, it might fluctuate in a systematic way and there might be some factor which can explain this. If this is the case, then the model might be incorrectly defined and should be changed so that the systematic variance is caught by one or more additional predictors. Heteroskedasticity is a breach of one of the Gauss-Markov assumptions. Breusch-Pagan-Godfrey test is employed for analyzing the presence of heteroskedasticity in this paper. The following hypotheses are considered:

H_0: residuals have constant variance – homoskedasticity; $Var\ [\varepsilon_t] = \sigma^2$, for all t

H_1: residuals do not have constant variance – heteroskedasticity; $Var\ [\varepsilon_t] \neq \sigma^2$, for all t

If the p-value of the Breusch-Pagan-Godfrey test is less than the 5% significance level, then H_0 is rejected. We find that the p-value is $0.0907 > 0.05$. Therefore, we fail to reject the null hypothesis, implying that residuals are not heteroskedastic.

4.2.2.3. Serial correlation

Serial correlation, or correlation over time, refers to the situation when residuals in one period (ε_t) are associated with residuals in previous periods ($\varepsilon_{t-1}, \varepsilon_{t-2}, \varepsilon_{t-3}, \ldots$). Even if serial correlation might not influence the consistency or unbiasedness of the coefficient estimates, it does affect their efficiency. Therefore, serial correlation is not desired in the linear regression model. Breusch-Godfrey LM test is used to check if the error terms are serially correlated. Consider the following hypotheses:

H_0: residuals are not serially correlated; $Cov\ [\varepsilon_t, \varepsilon_{t-s}] = 0$

H_1: residuals are serially correlated; $Cov\ [\varepsilon_t, \varepsilon_{t-s}] \neq 0$

If the p-value of the Breusch-Godfrey LM test is less than the 5% significance level, then H_0 is rejected. The resulting p-value is $0.7606 > 0.05$. Therefore, we fail to reject the null hypothesis and the assumption of no serial correlation is satisfied.

The results of the tests are briefly presented in Table 10.

Table 10. Results of the diagnostic tests

Test	P-value	Decision
Jarque-Berra	0.778877	fail to reject H_0
Breusch-Pagan-Godfrey	0.0907	fail to reject H_0
Breusch-Godfrey LM	0.7606	fail to reject H_0

Source: Author's computation (2023).

4.2.3 Stability Diagnostics

To investigate for parameter stability, Cumulative Sum (CUSUM) test, as well as Cumulative Sum of Square (CUSUMSQ) test are utilized. CUSUM test proves whether coefficients of regression are modifying systematically, while CUSUMSQ test shows whether coefficients of regression are modifying suddenly. Consider the following hypotheses:

H_0: parameters are stable

H_1: parameters are not stable

The null is rejected if the blue line, which represents the CUSUM or CUSUMSQ, crosses any of the two red lines (5% significance level). As results indicate, the blue line falls in the boundary of the red lines, suggesting that the parameters are stable.

4.2.4. Ramsey RESET Test

The intuition of this test is that if non-linear combinations of the predictors exhibit any power in explaining the target variable, the model is misspecified, meaning that the data generating process can be better estimated by a polynomial function or other non-linear functional form. We have the following hypotheses:

H_0: the model is well specified

H_1: the model is not well specified.

If the probability value of the F-statistic is greater than the 5% significance value, then one might fail to reject the Null. In our analysis, the p-value of the F-statistic is $0.2416 > 0.05$ and hence, we can conclude that the model is correctly specified.

5. Conclusion and Recommendation

This paper assessed the influence of macroeconomic and COVID-19 variables on the Romanian Stock Market movement using monthly data for the period March 2020 – September 2022. The main goal was to determine the influence of the macroeconomic and COVID-19 variables on the stock market performance measured by the Bucharest Stock Exchange Trading (BET) index by using the Autoregressive Distributed Lag (ARDL) – Bounds Test approach. The Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test have been applied to check the stationarity of the data and to ensure that none of the variables is integrated of order 2.

The results of the study indicate a positive and significant relationship between the exchange rate, the lagged deposit facility rate, and the lagged cash reserve ratio on short-term stock market development. In contrast, a negative significant relationship exists between the lagged unemployment rate, long-term interest rates, and COVID-19 deaths in the short run. In the long run, the exchange rate and long-term interest rates exhibit a positive and significant relationship with stock market movement, while the deposit facility rate, cash reserve ratio, unemployment rate, and COVID-19 deaths demonstrate a negative and significant long-run effect on the BET index. Among the five hypotheses formulated at the beginning, the results indicate that we can reject H_1 (i.e., "Inflation rate has a significant impact on the BET Index") and H_5 (i.e., "COVID-19 new cases have a significant impact on the BET Index"), since their corresponding p-values are not significant in either the short-term or the long-term. Additionally, our study incorporated several macroeconomic variables—deposit facility rate, cash reserve ratio, and unemployment rate—that were not commonly used in previous research papers. The results show that they have an impact on the BET Index".

Policy makers should consider uncertain events like the COVID-19 pandemic when implementing the policies in the future. The effects of the COVID-19 crisis on households and firms, and the related uncertainty, implied disruptions in many financial markets worldwide. It impacted the sustainability and resilience of businesses, with many of them being closed. Therefore, it would be beneficial for policy makers to be more prudent in the future and to update the models according to the social and economic conditions. This paper holds significance for academia, policymakers, regulators, and investors at large from both macroeconomic and health perspectives. The implications are delineated as follows:

i. The research is anticipated to aid academia in reaching more substantive conclusions and to further advance the current study by employing advanced and comprehensive econometric models.
ii. The identification of a cointegrating relationship between macroeconomic variables and stock market prices suggest an efficient price discovery mechanism within the Romanian stock market. This implies that the information in macroeconomic variables is successfully captured by the respective stock market of the Romanian economy. Consequently, investors gain a significant advantage in formulating investment strategies based on the macroeconomic variables.
iii. The distributive lag structure observed within the ARDL framework underscores that macroeconomic variables influence the stock market with specific time lags, a phenomenon attributed to the transmission mechanism through which policies influence asset prices. In light of this, the study is poised to assist policymakers and regulators in formulating economic policies and implementing effective regulatory measures.
iv. Ensuring stability in macroeconomic policies is crucial for facilitating comprehensive planning among diverse stakeholders. It promotes efficient resource allocation, fosters a predictable business climate, enhances industrial production effectiveness and efficiency, attracts foreign investment inflows, boosts performance indices in the stock market, and fuels overall economic growth.
v. Given the potential for future pandemics, it is imperative for the government to recognize the lessons learned from the COVID-19 crisis and allocate increased resources to the healthcare sector. Enhancing healthcare facilities through upgrades will enable faster and more effective treatment of patients, thereby alleviating widespread panic and anxiety across the nation.

The present study holds potential for yielding more comprehensive results, as several new avenues for research could be derived from its findings. Firstly, while this study incorporates a rich set of macroeconomic variables, the employed set is not exhaustive. Including additional macroeconomic variables, such as the industrial production index and oil prices, commonly used in research to explain changes in stock prices, could provide further insight into the relationship between stock market returns and economic activity. The incorporation of these variables into the model offers opportunities for future research.

Secondly, numerous studies in the finance literature have explored the impact of macroeconomic variables on stock returns by assuming symmetric adjustments between variables. In future research, it would be beneficial to analyze the potential asymmetric behavior of the stock market in response to macroeconomic variables. Few studies on Romania's financial market have accounted for asymmetry in the relationship between series. In essence, it would be worthwhile to investigate whether there are asymmetric responses to positive and negative changes in these variables. Most prior studies have overlooked asymmetry and relied on traditional linear time series approaches, potentially leading to biased output estimations. Addressing this gap empirically could involve exploring the effects of shocks in macroeconomic variables on stock returns through a multivariate nonlinear ARDL model.

Thirdly, one could extend the ARDL framework by incorporating quadratic terms into the model, thereby enabling the capture of non-linear relationships. In this regard, a Quadratic Autoregressive Distributed Lag (QARDL) model could be employed to compare results with those of the ARDL model.

Lastly, a larger sample size facilitates better generalization of findings from the econometric model to the population or broader economic context. With more observations, the model becomes more adept at capturing underlying patterns and dynamics, thereby enhancing its applicability beyond the specific dataset used for estimation.

References

Abbas, A., Tahir, S. H., and Raza, S. (2014) Impact of Macroeconomic Variables on Stock Returns: Evidence from KSE-100 Index of Pakistan. *Research Journal of Economics & Business Studies*, 3(7), 70-77.

Abu, N., Gamal, A. A. M., Sakanko, M. A., Mateen, A., Joseph, D., and Amaechi B. O. O. (2021) How have COVID-19 confirmed cases and deaths affected stock markets? Evidence from Nigeria. *Contemporary Economics*, 76-99.

Adams, G., McQueen, G., and Wood, R. (2004) The Effects of Inflation News on High Frequency Stock Returns. *The Journal of Business,* 77(3), 547-574.

Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., and Alhammadi, S. (2020) Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of Behavioral and Experimental Finance,* Volume 27, 1-5.

Ali, R., and Afzal, M. (2012) Impact of global financial crisis on stock markets: Evidence from Pakistan and India. *Journal of Business Management and Economics,* 3(7), 275-282.

Barakat, M. R., Elgazzar, S. H., and Hanafy, K. M. (2016) Impact of macroeconomic variables on stock markets: Evidence from emerging markets. *International Journal of Economics and Finance,* 8(1), 195-207.

Bodie, Z. (1976) Common Stocks as a Hedge against Inflation. *Journal of Finance*, Volume 31, 459-470.

Boyd, J. H., Jagannathan, R., and Hu, J. (2005) The stock market's reaction to unemployment news: Why bad news is usually good for stocks. *The Journal of Finance,* 60(2), 649-672.

Chaouachi, M., Chaouachi, S. (2020) Current COVID-19 impact on Saudi Stock Market: Evidence from an ARDL model. *International Journal of Accounting, Finance, Auditing, Management & Economics*, 1, 1-13.

Dao, H. T., Vu, L. H., Pham, T. L., and Nguyen, K. T. (2022) Macro-economic factors affecting the Vietnam stock price index: an application of the ARDL model. *The Journal of Asian Finance, Economics and Business*, 9(5), 285-294.

El Abed, R., Zardoub, A. (2019) Exploring the nexus between macroeconomic variables and stock market returns in Germany: An ARDL Co-integration approach. *Theoretical and Applied Economics*, 2(619), 139-148.

Fama, F., Schwert, G. (1977) Assets returns and inflation. *Journal of Financial Economics*, Volume 5, 115-146.

Fausch, J., and Sigonius, M. (2018) The impact of ECB monetary policy surprises on the German stock market. *Journal of Macroeconomics,* Volume 55, 46-63.

Ferrer, R., Bolós, V. J., and Benítez, R. (2016) Interest rate changes and stock returns: A European multi-country study with wavelets. *International Review of Economics & Finance ,* Volume 44, 1-12.

Fisher, I. (1930). The Theory of Interest. *New York: MacMillan.*

Gan, C., Lee, M., Yong, H. H. A., and Zhang, J. (2006) Macroeconomic variables and stock market interactions: New Zealand evidence. *Investment management and financial innovations,* 3(4), 89-101.

Gherghina, S., Armeanu, D., and Joldes, C. (2021) COVID-19 Pandemic and Romanian Stock Market Volatility: A GARCH Approach. *Risk and Financial Management,* 14(8), 1-29.

Goldstein, I., Koijen, R., and Mueller, H. (2021) COVID-19 and Its Impact on Financial Markets and the Real Economy. *The Review of Financial Studies,* 34(11), 5135-5148.

Haque, M. N. (2016) Impact of some selected macroeconomic variables (money supply and deposit interest rate) on Share Prices: A Study of Dhaka Stock Exchange (DKE). *International Journal of Business and Economics Research*, 5(6), 202-209.

Hatmanu, M., and Cautisanu, C. (2021) The Impact of COVID-19 Pandemic on Stock Market: Evidence from Romania. *International Journal of Environmental Research and Public Health,* 18(17), 1-22.

Herwany, A., Febrian, E., Anwar, M., and Gunardi, A. (2021) The Influence of the COVID-19 Pandemic on Stock Market Returns in Indonesia Stock Exchange. *Journal of Asian Finance, Economics and Business,* 8(3), 39-47.

Jamil, M., and Ullah, N. (2013) Impact of Foreign Exchange Rates on Stock Prices. *IOSR Journal of Business and Management*, 7(3), 45-51.

Jorion, P. (1991) The Pricing of Exchange Rate Risk in the Stock Market. *Journal of Financial and Quantitative Analysis*, 26(3), 363-376.

Kabeer, M. A., Iqbal, A., Najaf, K., and Najaf, R. (2016) The Influences of Macro-Economic Factors on Capital Market Performance in Pakistan. *International Journal of Research - Granthaalayah,* 4(2), 139-150.

Khan, J., and Khan, I. (2018) The impact of macroeconomic variables on stock prices: a case study of Karachi Stock Exchange. *Journal of Economics and Sustainable Development*, 9(13), 15-25.

Khan, M.K. (2019) Impact of exchange rate on stock returns in Shenzhen stock exchange: Analysis through ARDL approach. *International Journal of Economics and Management*, 1(2), 15-26.

Kumari, L., and Jha, N. K. (2019) The effect of cash reserve ratio and reverse repo rate on stock market performance - Empirical evidence from India. *IOSR Journal of Economics and Finance*, 10(1), 47-51.

Lone, U. M., Darzi, M. A., Islam, K. U. (2023) Macroeconomic variables and stock market performance: a PMG/ARDL approach for BRICS economies. *Macroeconomics and Finance in Emerging Market Economies*, 16(2), 300-325.

Molefhi, K. (2021) The Impact of Macroeconomic Variables on Capital Market Development in Botswana's Economy. *African Journal of Economic Review,* 9(2), 204-222.

Ouma, W., and Muriu, P. (2014) The impact of macroeconomic variables on stock market returns in Kenya. *International Journal of Business and Commerce,* 3(11), 1-31.

Owusu-Nantwi, V., and Kuwornu, J. (2011) Analyzing the effect of macroeconomic variables on stock market returns: Evidence from Ghana. *Journal of Economics and International Finance,* 3(11), 605-615.

Pelinescu, E. (2012) Transmission mechanism of monetary policy in Romania. Insights into the economic crisis. *Romanian Journal of Economic Forecasting,* 3(1), 5-21.

Pesaran, M. H., Shin, Y., and Smith, R. J. (2001) Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics,* 16(3), 289-326.

Pole, H., and Cavusoglu, B. (2021) The effect of macroeconomic variables on stock return volatility in the Nigerian stock exchange market. *Asian Journal of Economics, Finance and Management*, 3(3), 32-43.

Sengupta, S. (2020) How trade openness influenced economic growth in India: An empirical investigation. *Indian Journal of Economics and Development,* 8(3), 1-14.

Shrestha, M. B., and Bhatta, G. R. (2018) Selecting appropriate methodological framework for time series data analysis. *The Journal of Finance and Data Science,* 4, 71-89.

Trichet, J. (2010) State of the Union: The Financial Crisis and the ECB's Response between 2007 and 2009. *Journal of Common Market Studies,* 48, 7-19.

Ullah, G. M. W., Islam, A., Alam, M. S., and Khan, M. K. (2017) Effect of macroeconomic variables on stock market performance of SAARC countries. *Asian Economic and Financial Review,* 7(8), 770-779.

Vasiu, D. (2020) The Covid-19 impact on Bucharest Stock Exchange. The first six months. *Studies in Business and Economics,* 15(2), 256-269.