ANALYSIS OF THE MACROECONOMIC FACTORS INFLUENCE ON THE FINANCIAL MARKETS PERFORMANCE

Andreea Antoneac (Lungu)[1], Octavian Iordan[2]
[1)2)] *Bucharest University of Economic Studies, Bucharest, Romania*

Abstract
This paper represents empirical research of the theory according to which there is an influence between macroeconomic factors and the financial performance of different states, depending on the success of their companies in the stock market. Similar results have been observed in research by various economists over the past decades. The most relevant companies are included in the group stock market indicators that have major effects on national, regional and global economies. Thus, we verified the effects of inflation, unemployment and GDP (Gross Domestic Product) per capita on their value variation by multiple linear regression, by checking the direction of the link between factors and the possibility of its existence. We analysed the evolution of macroeconomic factors over time and how they could influence stock market transactions and the value of their quotations. Considering the differences between the levels of development of the categories of countries according to the human development index, we performed a comparative analysis on developed and emerging states, a total of 6 states equally distributed between the two categories.

Keywords
financial performance of states; the performance of companies in the stock market; the level of development of the states; human development index; stock indices.

JEL Classification
D53; E44; G15; N20; O16.

Introduction

The issue of stock market forecasts has been widely discussed in scientific circles in recent decades. This not only helps to predict investors' profits, but also represents an index of a state's economic health, the stock market being strongly integrated into the economy of contemporary states. The financial performance of the most important companies in a country has an effect on the overall national prosperity that in some cases is direct and in other cases indirect. Thus, in the studied research we noticed that the latter are influenced by macroeconomic indicators, namely the unemployment rate, economic growth, inflation and the real interest rate. Through this paper we will try to

find out which are those factors that influence and contribute to the variation of financial indicators for two groups of states, namely those with developed economies and those with emerging economies. In order to ensure the widest possible distribution and to reduce the mutual influences between states, we have chosen to focus on these six states: Germany, Japan and the USA, as developed countries, and India, the Philippines and Brazil, as emerging countries.
The study of the influence of macroeconomic factors on the financial performance of various states has been constantly performed in literature. These studies help us to find out which indicators have managed to influence the performance of individual companies on the world market and to highlight the effect they have had.

1. Review of the scientific literature

Studies conducted in the past by researchers reflect different conclusions on the given topic. According to Özlen and Ugur (2012), by trying to see the effects of macroeconomic factors on the Bosnian capital market, they demonstrated that for the selected market two key macroeconomic factors can be distinguished, namely the interest rate and the exchange rate. The economic indicators of the most important companies in Bosnia were extremely susceptible to the macroeconomic factors analysed. They also pointed out ways in which they could combat the negative effects of economic crises and recessions. The authors' observation was that economic investors could have used this data for future forecasts of the share price fluctuations of these companies, which could have brought a major benefit, such as maximizing entrepreneurial profit in a market in economic transition to a free market. The researched period was between 2005 and 2012, and the methodology used by the author was the self-regressive distribution. This is preferred for studies with small samples and helps to reflect on the stationarity of the data and the possibility of interpreting the results for a long time.
Macroeconomic factors have shown a major influence in the market forecasts for the Middle East and North Africa. The study on the capital market of Egypt and Tunisia, conducted by Barakat et al. (2016), managed to highlight, by using the autoregressive model, the correlation of such indicators as the exchange rate, inflation rate, interest rate and money supply, and how they influence the main stock market indicators of the respective states. Thus, they managed to point investors' attention to the correlation between data, and to describe the importance of economic policies on market indicators. Moreover, due to the similarities between the MENA states (Middle East and North Africa), the results of this study allowed the application of the same process for other similar states.
Just as stock markets have always been a topic of interest to economists, especially when it comes to emerging markets with enormous potential, such as India, Srivastava (2010) tried to conduct a study on economic indicators in this country. Many of the modern methods of analysis cannot be perfectly folded for developing countries because their economies are imperfect and the contribution of the "shadow economy" is greater. Hence, the problem of correct quantification of macroeconomic indicators, and such methods of analysis as the updated cash flow model, the CAPM (Capital asset pricing

model) or the arbitrage price model are not methods that would perfectly incorporate the multitude of factors or the intensity of interdependence between economic and financial performance. The author, in this study, tried to use the cointegration research method to explain the connection of the dependent factor with the independent ones. The dependent factor of this study was chosen to be the main stock market indicator of India, namely BSE Sensex. The result of this study showed that the volume of industrial production, the wholesale price index and the interest rate influence the process of generating the share prices of the most important Indian companies. This phenomenon reflects the fact that changes in the financial market are largely generated at a national level and not at an international level, and the results given could be useful in the investment decision.

In the research of Sharma and Mahendru (2010) we find again the case of India and the BSE Sensex stock market indicator within the Bombay Stock Exchange, as in the previous study. The study revealed that there is a correlation between macroeconomic factors and the financial market, namely an impact on the stock price. They used the multiple regression method in which the exchange rate, interest rate, inflation and gold price are exogenous factors with effects on the stock price of listed companies under the Sensex group indicator. The exchange rate and the price of gold are factors of major importance, the correlation being around 90%, and the other factors showed a less diminished influence, although it is equally important in the volatility of the indicators. Inflation is important only for certain levels of portfolios. Inflation and the price of gold do not play a decisive role in the return-on-return volatility for 2008 and 2009.

The study conducted by Hsing (2011) proposes similar research for the BRICS group countries (member countries Brazil, Russia, India, China and South Africa), with the main focus being the Republic of South Africa. The growth of the real GDP, the monetary reserve and the US stock market index were shown as factors for the South African state's stock market, and the exchange rate, budget deficit and inflation had a negative effect on it. We see a similar thing in the work of Alam and Udin (2009), regarding the interest rate.

From these studies we can create an overview on the effects of macroeconomic factors for countries with emerging economies, where we can observe the verification of the theory by empirical calculation. An important point of interest, although we will not study it in this paper, is the interdependence between the interest rate and the share prices. As a benchmark we can use the research of Alam and Uddin (2009), which investigated the correlation for 15 developed and emerging states. Here we will give special importance to the cases of Japan and Germany, for the study period from 1988 to 2003. The unit root test between the interest rate and the share price had a positive relationship for Japan, but its volatility led to negative changes in follow. The correlation for Germany showed a negative and insignificant link. From this we can deduce a lower importance than in other studies of this factor in the forecasts of financial performance for these states considered. However, in the opinion of Dobrotă et al. (2019), Germany is among the countries with a strong technological development initiative, which determines the impact on the share prices.

Another study by Hsing (2013) focuses on the analysis of the problem that the Japanese stock market has, namely the Nikkei 225 index which was affected by the crisis of 2007

and 2009 and by Japan's stagnant economy. Stock prices had a slower recovery period and by 2011 were 41% lower than before the crisis. Considering the study period, respectively 1975 and 2009, the theory on which the study focuses is the interpretation of the value of the Japanese yen. On one hand, a decrease in its value could stimulate exports and a decrease in the interest rate could positively affect stock prices. On the other hand, an increase in the value of the yen compared to other currencies could stimulate investors. By using the regression method for the data set, it was possible to demonstrate the reverse and negative effect of the budget deficit, the interest rate and the inflation rate for the Nikkei index, and a non-linear relationship with the money supply and the exchange rate. The main outcome of Hsing is to guide a policy based on economic growth and to keep interest rates and inflation relatively low. Too much money could lead to a decline in stock values and detrimental effects on the economy as a whole.

The influence of macroeconomic factors on the stock market is often perceived as a risk, especially for developing countries. Aquino's (2005) research on the Philippine economy aims to study such risks. In this paper, the multifactorial pricing method was used, which resulted in the identification of potential risk factors. Thus, we note that for the Philippines two specific risk factors are the exchange rate and the interest rate, this state being more sensitive to foreign capital inflows. Although the results of the study were sufficient to justify the dependence between economic data and those of stock market performance, we still notice some problems that occur in this market and could jeopardize the results of this study. The main problems highlighted are market inefficiency and incomplete macroeconomic data that create deviations that can lead to vague conclusions.

Continuing the study of the financial market in the Philippines we can take into account the work of Murcia (2014), who tried to formulate the macroeconomic factors that influence the financial sector, the holding sector, and the Philippine composite stock market index (PSEi). Thus, for the study period 2006 - 2012, the author managed to demonstrate a strong link between these indicators and the US peso-dollar exchange rate, the gold reserve and the Consumer Price Index. It also succeeded in demonstrating the positive influence of foreign direct investment on the operating sector. The importance of this study, for us, emerges from the demonstration of the correlation between financial indicators and inflation, but also the verification of the methodology, more explicitly of the multiple regression equation.

Eid and Matsuo (2009) studied the influences of macroeconomic factors on the stock market in Brazil, a state with an emerging economy, but with resources and rich potential for the world economy. This state had significant economic growth in the 1990s and 2000s, which was largely due to the stability of economic policies. In this regard, the authors set out to analyze the above-mentioned theme for 1994 and 2003. Economic growth was closely linked to the scarcity of resources, and entrepreneurial profit was linked to the proper functioning of financial systems. Therefore, the Bovespa indicator, which sums up the stock market performance of Brazilian companies, was conditioned by the public debt figure as a percentage of GDP, the interest rate and direct investment. However, the Brazilian market appears to be divided in this study, in the equity and debt market, with the public and private sectors of Brazil being involved in

competition for funds and investments, which resulted in different factors of influence. We observe this through the opinions of the authors, who concluded that the debt market had a direct and significant link with the change in GDP, which can be explained by the inflows of funds through investments. However, the same could not be observed for the stock market, where by regression, less statistically significant links were noticed. The relationship that stocks have with the stock market can be explained by the entrepreneurial culture of private sector companies, which act to maximize profits and actions that would bring advantage, as opposed to public sector companies.

A broader vision is expressed in the study of Garcia and Liu (1999) who managed to formulate a paper on 15 emerging and developed states in South America, North America and Asia. The selected period was 1980 and 1995, and the selected countries are: Argentina, Brazil, Chile, Colombia, Indonesia, Japan, South Korea, Malaysia, Mexico, Peru, Philippines, Taiwan, Thailand, United States and Venezuela. Thus, the level of income and the rate of savings have been shown to be statistically significant factors to influence market capitalization, which is more pronounced for East Asian markets, this being largely due to higher liquidity, higher savings rates, and a more developed banking sector. One thing mentioned in this paper is the importance of financial liberalization, which would play a key role in stimulating economic growth and which, in turn, would lead to a positive upward trend in stock price indicators. The problem that the author points out in the case of Latin America is the insufficiency of liquidity and a low saving rate, which could be combated by encouraging the population to make investments or savings in the bank. Likewise, a measure in this regard would be the promotion of national stock markets.

By analysing these studies, in which you can see the influence of macroeconomic factors on the performance of the financial market at large and on the performance of the stock market indicators, we managed to outline an overview of the issues we want to study.

2. Research methodology

Using the methods previously referred to, we will perform a multifactorial linear regression to analyse the effects of macroeconomic factors on the stock market. Thus, the stock market indicator will be the dependent variable, and the macroeconomic factors will represent the independent regression variables. The equation will take the form:

$$IND = bo + PIB * b1 + INF * b2 + UNE * b3 + e; \quad (1)$$

in which,

bo - represents the intercept;

b1, b2, b3 - represent the coefficients of the independent variables;

IND - represents the stock market indicator (the six stock market indicators - Dow Jones (DJI), Bovespa, DAX Performance, BSE Sensex, Nikkei 225 and PSEi);

GDP - represents the Gross Domestic Product;

INF - represents the inflation rate;

UNE - represents the unemployment rate;
e - represents the statistical error coefficient, which we will observe from the residues.
To solve this regression model, we will use the Data Analysis set from Excel which will help us to formulate conclusions regarding the data of interest such as the square of R:

$$R^2 = 1 - \frac{SSres}{SStot} = 1 - \frac{\sum_i (yi - \hat{yi})^2}{\sum_i (yi - \overline{yi})^2}$$

(2)
This indicator will make it easier for us to determine the correlation between time series, as well as the power correlation between data. The accuracy of the data and results adjustment will depend on this indicator. In order to verify our theory, we are interested in this indicator being as close as possible to 1. We will find both data in the Regression Statistics table. As we will see in the following in the next chapter, both indicators are quite close to 1, for all 6 equations, which encouraged us to go further.
The next step was to test the hypothesis of the truthfulness of the given system. We will do this by calculating the Significance F. For this we will need the data from the ANOVA tables, which have been calculated below. In the beginning we will prove the formulas for calculating the sum of the squares of the regression, the residue and the total

$$SP_{tot} = \sum_i (yi - \overline{y})^2, \; SP_{reg} = \sum_i (\hat{yi} - \overline{y})^2, \; SP_{rez} = \sum_i (yi - \hat{yi})^2.$$

(3)
Based on this indicator we will build two econometric theories:
H0: Significance F> 0.05;
H1: Significance F <0.05.

Table no 1 The calculation method of the indicator Significance F

Indicator	Sum of squares	Degrees of freedom	Square average	Significance F
Regression	*SPreg*	*p-1 =vreg*	*SPreg/vreg=s2reg*	*F=s2reg/s2*
Residues	*SPrez*	*n-p=vrez*	*SPrez/vrez=s2*	
Total	*SPtot*	*n-1=vtot*	*SPtot/vtot*	

Source: authors' conception

Once we finished the ANOVA analysis and our results being positive for Significance F, we continued with the analysis of the factors influencing the stock market indicators. This was done by P-value analysis. In our paper we set the confidence level to 95%,

which means that to consider a significant indicator for the variation of dependent values, its P-value should be less than or equal to 0.05.

In order to verify if our data have a long-term relevance, we decided to verify the equation by the co-integration method. For this we used the EViews application and tried the methods of the first and second difference, as well as the logarithm of the equation data. The data managed to be cointegrated for all 4 data series in the case of the second difference, both for the Johansen and for Eigenvalue test. For this paper we paid special attention to the Johansen cointegration test:

$$y_t - y_{t-1} = \varepsilon_t;$$

$$y_{t-1} - y_{t-2} = \varepsilon_t .$$

(4)

Once co-integrity is achieved, we can be sure that we are reaching a long-term state of equilibrium. This allows us to analyze the data from the point of view of future forecasting, this being the fact that changes the state of our work from a simple remark of historical facts to a system of economic forecasting on the future evolution of stock market data. This would be of particular interest to investors and holders of equity portfolios in the studied countries, as well as to companies included in group stock market indicators.

And in order to complete our study and to create an overall conclusion, we will perform an analysis of the normality of the waste distribution. For this purpose we will use both the graphical method and the empirical method of analysis. For the empirical method we will calculate the Jarque-Bera test for residues:

$$JB = \frac{n}{6} * (S^2 + \frac{1}{4} * (K-3)^2)$$

(5)

where, S reflects the level of Skewness and K means the level of Kurtosis. These in turn were calculated with the formulas:

$$S = \frac{\frac{1}{n} * \sum_{i=1}^{n} (yi - \bar{y})^3}{(\frac{1}{n} * \sum_{i=1}^{n} (yi - \bar{y})^2)^{\frac{3}{2}}};$$

$$K = \frac{\frac{1}{n} * \sum_{i=1}^{n} (yi - \bar{y})^4}{(\frac{1}{n} * \sum_{i=1}^{n} (yi - \bar{y})^2)^2} .$$

(6),

(7)

In order to reach the conclusion of normality of the residues, the result of the Jarque-Bera test should be as close as possible to 0, which would mean a balanced distribution on the histogram of the residues. It would have the shape of a bell (figure no. 2).

Macroeconomic factors and stock market indicators used

Next, we will mention the macroeconomic factors and stock market indicators used in our research. We will also choose the data source that we will use in our application.

Regarding the macroeconomic factors that we will analyze, we mention the following: GDP per capita, unemployment rate and inflation. The main purpose of this paper is an equal and as accurate an analysis as possible of all six states.

We believe that the financial and entrepreneurial performance of companies is of major importance for national economies and reflects the economic situation from a statistical point of view more precisely than just abstract figures. From this perspective, we chose the stock market indicators with a major importance for the economies of the states concerned, which generally represent group stock market indicators of the top of the best performing companies.

Thus, we will consider the Dow Jones Industrial Average indicator for the USA, the Bovespa indicator for Brazil, the DAX Performance indicator for Germany, the BSE Sensex indicator or Bombay Stock Exchange Sensitive Index for India, the Nihon Keizai Shimbun indicator, also known as Nikkei 225 for For Japan and for the Philippines we chose the PSE Composite Index indicator.

The data for the stock market indicators were taken from Yahoo Finance, specifying the data between 1991 and 2019, for December 31 of each year. Here we can find historical data of stock indicators from almost all stock markets in the world. Although the data differ by year, we still find the statistical values of interest for most indicators. Data for macroeconomic factors were taken from the World Bank report.

3. Results and discussions

Table no. 2. Interest indicators of Regression Statistics and ANOVA

Indicator	DAX Performance Index	Nikkei	Dow Jones	iBovespa	Sensex	PSEi
R square	0,86799	0,675525	0,861617	0,81376	0,955692	0,852012
Adjusted R	0,852148	0,636588	0,844319	0,788363	0,948697	0,834254
Significance F	0,000001	0,000001	0,000001	0,000001	0,000001	0,000001

Source: Yahoo Finance, authors' calculations

Table no. 3: Statistical significance of the P value for the 5% confidence level

Indicator/P-value	DAX	Nikkei	Dow Jones	iBovespa	Sensex	PSEi
Intercept	0,040566	0,004007	0,000739	1,04E-07	0,27693	0,246996
PIB per capita	0,000001	0,534173	0,000001	0,000001	0,000001	0,000001
Inflația	0,026238	0,206643	0,061497	0,311443	0,475656	0,987823
Șomajul	0,121581	0,000001	0,004715	0,000236	0,115729	0,955417

Source: Yahoo Finance, authors' calculations

Table no. 4. Regression coefficients

Indicator/P-value	DAX	Nikkei	Dow Jones	iBovespa	Sensex	PSEi
Intercept	-11563,8	27813,36	-22344,5	-213455	37045,01	-4817,55
PIB per capita	0,525694	0,111931	0,916607	19,230705	22,88901	4,008716
Inflation	-684,663	-918,466	-1085,91	7,60017	137,3946	0,959557
Unemployment	-273,313	-4363,88	-965,418	6752,224	-9179,8	42,94943

Source: Yahoo Finance, authors' calculations

Table no. 5. Results of the Jarque-Bera test to verify the normality of the regression residue distribution

Indicator	DAX	Nikkei	Dow Jones	iBovespa	Sensex	PSEi
Jarque-Bera	0,815865	0,103070	0,346707	5,054742	2,210132	0,576701
Probabilitatea	0,665024	0,949771	0,840840	0,079869	0,331189	0,749499

Source: Yahoo Finance, authors' calculations

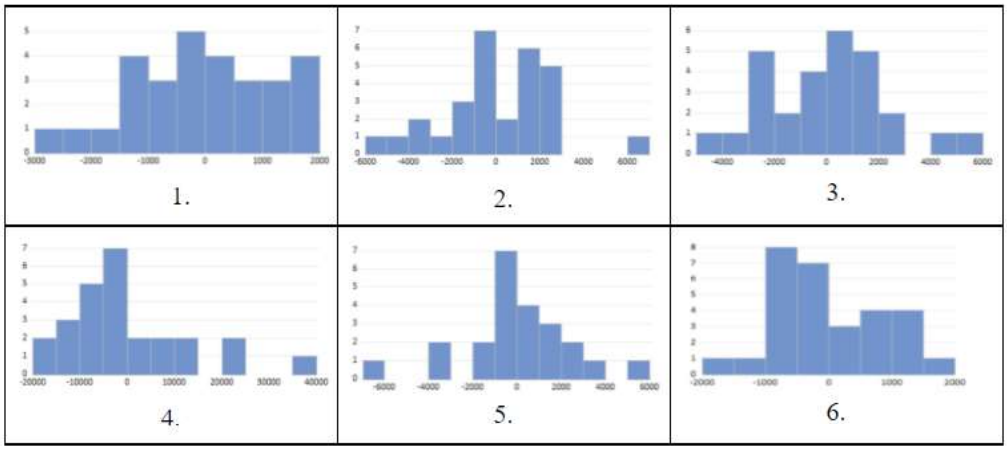

Figure no. 1. Histograms of residue distribution. (1. DAX Performance Indicator, Germany; 2. Nikkei 225 Indicator, Japan; 3. Dow Jones Indicator, USA; 4. iBovespa Indicator, Brazil; 5. S&P Sensex Indicator, India; 6. PSEi Indicator, Philippines)

Source: authors' conception

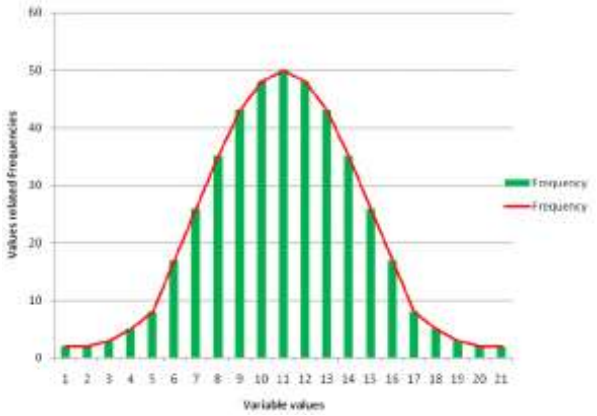

Figure no. 2. Histogram of the residues in the "ideal" bell shape

Source: authors' conception

3.1. Developed countries

Next, we will interpret the data obtained by the methodology discussed in the previous chapter.

We start with the developed countries, to see the results obtained in contrast to emerging economies. We will focus on the first indicator, the DAX Performance Index

(table no. 6). The square of R for DAX was set at 0.86799, which means that almost 87% of the DAX variation is explained by the variation of the three macroeconomic factors taken into account for Germany. This is encouraging because it is a fairly high value. And if we take into account the adjusted R value, we also notice a high value of 0.852148. This means that approximately 85% of the variation of the DAX stock indicator would be explained by the given equation. This reflects a beneficial situation for the further analysis of our results. The next step would be to check the econometric theory of matching the given equation for the research performed, and just as Significance F is less than 0.05, which reflects that the given equation fits (Table 2). Next, we checked the statistical significance of macroeconomic factors, or which of the three factors have a statistically significant effect on the variation of the dependent variable. In our case we notice that GDP per capita and the inflation rate have values of P-value lower than 0.05, with 0,000001 and 0.026 respectively. The unemployment rate is not statistically significant with a value of over 0.05, more exactly 0.121. From this we conclude that the DAX is influenced by the variation of the Gross Domestic Product and the inflation rate of Germany (table no. 4). From here, we can see that the GDP per capita has a direct and positive correlation with the stock market indicator, which indicates that the increase of the macroeconomic factor will result in the increase of the DAX value. Inflation is in an inverse and negative relationship, so a decrease in this factor will lead to an increase in quotation. The Jarque-Bera test gives a value of 0.815 (Table 5), which means a distribution of residues with a low degree of normality. The same can be seen on the residue distribution histogram (figure no. 1, image 1). The histogram shows the shape of a bell only at the beginning, and is altered for larger data. This could mean the lack of a normal distribution, and the fact that the equation used could give true data only for certain periods of time. It should also be taken into account that during the analyzed period, Germany went through the change of currency in 2000, from German marks to the single European currency (Euro), and in 2009 the financial crisis took place, periods for which the data could oscillate differently. However, the value is not exaggerated and in this study it is appropriate.

The next developed state for which we will analyse the stock market indicator is Japan with Nikkei 225 (table no. 7). We will use the same macroeconomic factors, as well as the study period, to create a level playing field for all studied states. The square of R resulting from our regression showed not very encouraging data in the specific case of Japan, which is only 0.675525. From where we can conclude that only 67% of Nikkei's variation is explained by the evolution of macroeconomic factors of this state during these 27 years. Regarding the direction of the connection with the statistically significant macroeconomic factor, we notice that it is of a negative nature (table no. 4). The increase in unemployment will inevitably lead to a decrease in the value of the stock market indicator. The result is quite pessimistic but we will consider it as such and we will check the possibility of the existence of the given regression equation. Significance F has a value of 0,000001, which has a value sufficient to reject the null theory and to lead us to the conclusion that the chosen macroeconomic factors fit this equation and manage to explain the variation of the dependent variable. The data provided highlight the indices of interest in the regression statistics and the ANOVA table (table no. 2). From what we observe only the Intercept and the unemployment rate

have a statistical significance for the Japanese stock market indicator (table no. 3), the P-value of unemployment being below 0.05, so this conclusion can be drawn. As for GDP per capita and the Japanese interest rate, they have values above 0.05, namely 0.53 and 0.2, which are well above the significance threshold. We notice a situation opposite to that which occurred for the DAX Performance Index, where the unemployment rate was not statistically significant, while GDP values and interest rates entered the required range. An interesting fact is that GDP per capita is so far from the threshold. As we will see below, in all the states studied only for Japan we notice the insignificance of GDP per capita. Another fact that we could highlight here, is the normal distribution of the residues of this regression for Nikkei 225, the value of the Jarque-Bera test being only 0.103070, and the histogram having the shape of a bell (figure no. 1, image 2), fact which reflects that the given analysis can be applied in the long run and also the fact that the model is correct. In reality, the level of normality is higher than the other states studied, which we cannot help but enjoy. Japan is known for its economic stability over the past 30 years, which is more stagnant than slow-growing. Japanese companies and respectively the evolution of their securities is quite severely affected by the given conditions. The slow growth of GDP and the insignificant level of inflation, and even deflation were probably the reasons for the lack of significance in our regression. Japan is facing a difficult economic and social situation, caused by a complicated demographic situation, the state's population being one of the oldest in the world. The state has also been affected by natural phenomena such as the earthquakes of 1995 and 2011, and the crisis of 2009, as well as the general recession of the economy, the Japanese referring to the period of 1990s and 2000s under the term "lost generation". This is visible in the unemployment statistics, which had the largest variations between the three macroeconomic factors, hence its statistical significance.

For the USA, we analyse the regression regarding the Dow Jones stock market indicator, for which we observe some similarities with the developed states analysed previously (table no. 8). Thus, the value of R Square is 0.861617, which is extremely similar to the case of Germany, where the equation explains 86% of the regression results. And here we can talk about a stimulating value to continue the study. Significance F has a value of 0,000001, which indicates an extremely low error level of the equation. Macroeconomic factors manage to explain the variation of the stock market indicator in an acceptable form for the given application. The P values obtained during the year showed that the stock market indicator is largely affected by GDP and the unemployment rate. In the first case, as we will see for the other states, the USA maintains the trend of Germany, and with Japan it has a common macroeconomic factor of influence, namely unemployment. The P-value of these factors is lower than the figure of 0.05 for both, but the inflation rate also has a fairly significant influence, although we cannot include it due to the significance threshold, which is 0.061497, which leads us to at the thought that in the case of a different coordination we could observe an influence of all the studied macroeconomic factors and characteristics of the USA, on the Dow Jones. As in the case of Germany and Japan, for the USA, namely for its stock market indicator, we notice a positive correlation between it and GDP and a negative correlation with inflation and unemployment. The level of normality is acceptable, standing at 0.34. By excluding a deviation, the shape is approximately

suitable for qualifying the residue distribution as corresponding to the normality requirements (figure no. 1, image 3). The US economic indicators during the analysed period were extremely generous: the general decrease of the unemployment level, the level of the inflation rate which was at comfortable levels between 1% and 3% per year and a substantial increase of the GDP determined a beneficial evolution of the indicator. American stockbroker. The latter had a 9-fold increase in the Dow Jones stock market, ignoring periods of crisis. Overall, we note that the evolution of macroeconomic factors has led to an increase in the quotations on the New York stock market of the 30 US economic giants.

3.2. Emerging countries

Next, we will perform the regression analysis for emerging economies such as Brazil, India and finally the Philippines.

The first indicator analyzed by us will be iBovespa (table no. 9). The square of R is 0.81376, slightly smaller than for Germany and the USA, but superior to Japan. This value folds very well in our regression. The percentage of confidence in the equation given for the Brazilian indicator is 81%. Significance F has a suitable value, of only 0,000001, so we notice that here too the data fits for the script of our application. In the context of the 95% confidence level, we continue with the P-value analysis for Brazil, which reveals the significance of GDP per capita and unemployment in the evolution of the stock market indicator change. The inflation rate proved insignificant in the given year, taking into account its value of 0.311443, or over 0.05. However, the regression coefficients gave surprising results. Although Bovespa agrees with the regressions of the previously analyzed states regarding the positive relationship between GDP and the stock market indicator, we still observe a unique case in terms of the correlation with the unemployment rate. The relationship is also positive, which is bizarre, because in practice it would mean that if the percentage of able-bodied and unemployed people increases, the value of stock quotes of Brazilian companies also increases, given that unemployment in Brazil is higher than other states in our analysis, exceeding the value of 12% in 2019, the lowest rate being, at the same time, 6.24% in 1991. From this increase we can conclude the ascending evolution of the stock market indicator, which increased 3 times during the studied period. GDP also had an upward trend, its value increasing over the years by 40%, excluding some fluctuations from the many periods of crisis. Inflation, which did not prove to be significant, had a strange evolution. Its levels fluctuated a lot and were well above the comfortable limit of economic development of 1% -3%, and even in 1994 it reached levels of over 2000%. All of the above can also be reflected in the results of the Jarque-Bera normality test, which has a value of over 5, by far a normal distribution of residues on the histogram (figure no. 1, image 4). From the analysis of the evolution of GDP per capita we observe several periods of recession such as those between 1998 and 1999, 2009, 2015 and 2016. We also observe periods with high inflation, of over 10%, in 1994 and 1996, 2003 and 9 % in 2015. There were also significant increases in unemployment, of over 10%, in 1999, 2016 and 2019. These numerous periods of recession and instability evoke problems in the correct analysis of the influence of these macroeconomic factors on the stock market

indicator. The high level of the Jarque-Bera test may be due to these factors exposed by us, and probably in the particular case of Brazil, the stock market should be investigated in the short term, as well as the consideration of short-term investments to the detriment of long-term ones.

The Sensex indicator for India reflects the highest value of the R square of 0.955692, which indicates a very good concordance between macroeconomic factors and the stock market indicator (Table no. 10). Significance F is one of the lowest, which indicates the highest level of confidence in the regression equation so far. The Significance F value for Sensex is only 0,000001. However, only the value of GDP per capita has been shown to be statistically significant for this indicator, which reveals that for India, economic growth and stock market growth is in an extremely close correlation. On one hand, this is not surprising to us, as the official Indian unemployment rate has had stable values over the past 27 years, and although inflation initially had a fluctuating trend it has nevertheless recovered and returned to its original value in 2019. On the other hand, share of GDP per capita expanded 3 times during this period, compared to an impressive 11 times increase in the value of stock quotes of major Indian companies. As in the case of the other stock market indicators, its correlation with economic growth is a positive one, which can also be observed from the graphs of the trends of macroeconomic factors and stock market indicators for the states concerned. The unstable variation of inflation and the unusual stability of unemployment probably had an effect on the normal distribution of residues, the Jarque-Bera test showed the problems and the need to analyze the Indian stock market with greater caution regarding the data used (Figure no. 1, image 5). As in the case of Brazil, it would be advisable to consider shorter periods of time.

Finally, we will analyze the PSEi indicator of the Philippines (Table no. 11), which has the value of 0.852012 for the square of R. The percentage of 85% is around the observed average and the rest of the indicators analyzed, being similar to the value for Dow Jones. Regarding Significance F we do not notice any deviation, the given coefficient being as suitable as for the rest of the indicators. The value of the latter being 0,000001. The data for the Philippines is similar to the data for India, which probably stems from their geographical, cultural and economic proximity. This state managed to increase its GDP per capita almost 2 times in the studied period and its stock quotes about 7 times, hence the statistical significance of this macroeconomic factor in our regression, from the P-value analysis. The rest of the macroeconomic factors were strongly insignificant, with values of 0.98 for inflation and 0.95 for unemployment. This fact can be explained by the fact that the value of both factors was reduced in the time period studied, but which have a particularly strange fluctuation and which would not be subject to a particular trend or law. The value of the normality test denotes an acceptable value, although it does not imply the existence of a normality in itself, standing at the level of 0.57 (figure no. 1, image 6). From this we deduce the positive correlation between the economic growth of the Philippine state and the stock quotes.

Conclusions

In conclusion, there is an influence between macroeconomic factors and the financial performance of different states depending on the stock market success of their companies. The economic stability of emerging countries is a problem, however, and the results of this study cannot be recommended for use by investors for long-term projects. In this regard, it is recommended to invest in short projects with maximized profit.

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