



A STUDY ON UNDERSTANDING THE EFFECT OF MACRO ECONOMICS ON STOCK MARKET

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ABSTRACT: This study delves into the complex relationship between macroeconomic factors and stock prices, employing graph plotting and correlation analysis as primary methodologies. By addressing the limitations inherent in previous other researches and incorporating future research areas, the study aims to provide a more comprehensive understanding of how macroeconomic variables interact and influence stock prices. Through time series analysis, the study explores the dynamics of various macroeconomic indicators, including GDP growth, inflation rates, interest rates, and exchange rates, in relation to stock price movements. While correlation analysis reveals significant associations between certain macroeconomic factors and stock prices, caution is exercised in attributing causality. The study underscores the need for nuanced interpretations and further research to establish causal relationships. The findings highlight the potential implications of this research for investors, businesses, and policymakers. Investors can leverage insights from the study to make more informed investment decisions, considering not only traditional factors but also macroeconomic variables. Businesses can develop strategies that are more resilient to economic fluctuations, while policymakers can design policies that promote economic growth and market stability. Ultimately, the study emphasizes the importance of ongoing research in this area to foster a more informed and adaptable financial ecosystem, benefiting stakeholders across the financial spectrum and contributing to overall economic stability.

KEYWORDS: Macroeconomic factors, Correlation analysis, investment decisions, Stock prices, Economic stability.

i. INTRODUCTION

The stock market is a complex system influenced by a multitude of factors. Understanding the impact of macroeconomic variables on stock prices is crucial for investors and policymakers alike. This study investigates the relationship between four key macroeconomic indicators - Gross Domestic Product (GDP), interest rate, exchange rate, and inflation - and stock market performance over the past 20 years.

By employing correlation analysis, we aim to quantify the strength and direction of the association between these variables and stock prices. The findings of this study will contribute to a deeper understanding of how the broader economic environment affects stock market behaviour. The stock market, a dynamic and intricate system, reacts to a confluence of factors. Delving into the influence of macroeconomic variables on stock prices is essential for both investors and policymakers. This study delves into the connections between four key economic indicators - Gross Domestic Product (GDP), interest rates, exchange rates, and inflation - and their impact on stock market performance over the past two decades. Through correlation analysis, we aim to quantify the strength and direction of the relationship these variables hold with stock prices. The findings from this study will contribute significantly to our understanding of how the broader economic landscape shapes stock market behaviour. Specifically, the analysis will illuminate whether there are positive or negative correlations at play. For instance, does a rise in GDP or a decrease in interest rates lead to an increase in stock prices? Additionally, we will explore the strength of these relationships. How significantly does each macroeconomic variable impact stock market movements? Finally, the potential for investment strategies based on these correlations will be investigated. Can the identified relationships be harnessed to develop informed investment decisions? Ultimately, the results of this study will be valuable for investors seeking to navigate the complexities of the stock market and for policymakers formulating economic policies that promote a healthy and stable financial environment.

ii. LITERATURE REVIEW

- **Effects of Macroeconomic Variables on the Stock Market: The Case of the Czech Republic** – this research paper was written by Yu HSING and this paper found that the Czech stock market index is positively associated with real GDP and the German and US stock market indexes, was negatively influenced by the ratio of government borrowing to GDP, the domestic real interest rate, the CZK/USD exchange rate, the expected inflation rate and the euro area government bond yield, and exhibits a quadratic relationship with the ratio of M2 to GDP. It suggests that the Czech stock market index and the M2/GDP ratio had a positive (negative) relationship if the M2/GDP ratio is less (greater) than the critical value of 60.0%. Hence, to promote a robust stock market, the authorities are expected to pursue or maintain economic growth, fiscal discipline, currency appreciation, a relatively low interest rate and expected inflation rate, and the M2/GDP ratio which was below the critical value of 60.0%.

- **Output, the Stock Market and Interest rates** – by Olivier J Blanchard, this paper developed a simple model of determination of output, stock market and the term structure of interest rates. The model is an extension of IS-LM model and borrows from it the assumption that output is determined by aggregate demand and the price level can only adjust over time to its equilibrium value.
- **Impact of Exchange Rate on Stock Market** – by Seri Suriani, M. Dileep Kumar, Farhan Jamil and Saquib Muneer in March 2015. The exchange rate and stock market are the two fundamental financial markets in the world. These two markets are playing key role in an international business all over the world. It is necessary to understand the relationship between the both markets so that the investors may be able to invest in a better way by taking the minimum risk. This paper has investigated the relationship between the stock market and exchange market of Pakistan. KSE-100 index is used as a substitute of Stock Prices while currency rate of Pak Rupee against US Dollar (Rs/US\$) is taken for exchange rate exposure. The data is on monthly basis and the time period is from January 2004 to December 2009.
- **Effects of Exchange Rate Volatility on Stock Market Return Volatility: Evidence from an Emerging Market** – by Perera H.A.P.K. The purpose of this study was to empirically investigate the effects of exchange rate volatility on stock market return volatility from an emerging market's perspective. This study has utilized daily time series data for All Share Price Index (ASPI) returns of Colombo Stock Exchange (CSE) and exchange rates over a period of six years from January 2010 to December 2015. Further, the study utilizes the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) estimation model in order to identify the impact of exchange rate volatility on stock market return volatility.
- **THE EFFECT OF INFLATION, EXCHANGE RATE, INTEREST RATE ON STOCK PRICE IN THE TRANSPORTATION SUB-SECTOR, 2018-2020** – by Siska Tri Amanda, Chairil Akhyar, Rico Nur Ilham & Adnan. This study aims to examine the effect of inflation, exchange rates, interest rates on stock prices in the transportation sub-sector in 2018-2020. For the purposes of data analysis, quantitative methods were used. The data used is secondary data obtained from the website id.investing.com and data published by Bank Indonesia. The sample in this study were 11 transportation companies listed on the IDX for the 2018-2020 period.
- **Market, interest rate, and exchange rate risk effects on financial stock returns during the financial crisis: AGARCH-M approach** – by Aloui Mouna & Jarboui Anis. The aim was to investigate the sensitivity of financial sector stock returns to market, interest rate, and exchange rate risk in three financial sectors in eight countries, including various European, the US, and China economies, over the period 2006–2009 during the financial crisis. The empirical results show the significant effects (positive

and negative, respectively) of the stock market returns, interest rate, and exchange rate volatility of the financial sector during the crisis.

- **Stock Market and Economic Development: A Causality Test** – research was conducted by Surya Bahadur G C in Dec 2006. An attempt had been made in this paper to examine the existence of causality relationship between stock market and economic growth based on the time series data for the year 1988 to 2005 using Granger causality test. The study found the empirical evidence of long-run integration and causality of macroeconomic variables and stock market indicators even in a small capital market of Nepal.
- **Stock prices and GDP in the long run** – journal was written by Annika Alexius and Daniel Spang. In a general equilibrium stochastic growth model, these variables were related in the long run because they were all driven by the same stochastic trend - the fundamental development of productivity. They showed that national stock price indices are cointegrated with domestic and foreign GDP in the G7 countries. Higher domestic productivity increase both domestic GDP and domestic stock prices.

iii. OBJECTIVES OF THE STUDY

- **Predicting Market Behaviour:** Precisely anticipating financial exchange developments can direct speculation choices and relieve risk. By breaking down how factors like financing costs, expansion, or Gross domestic product development influence verifiable market execution, scientists can foster powerful models to foresee future patterns and unpredictability. Investors can use this information to make educated decisions about where to put their money, and policymakers can tailor economic interventions to help maintain market stability.
- **Identifying Market Inefficiencies:** Effective business sectors ought to rapidly integrate all suitable data, including macroeconomic news, into stock costs. By breaking down market responses to startling financial occasions, analysts can recognize potential failures where costs may not completely reflect basic essentials. This information can assist controllers with creating techniques to advance market proficiency and shield financial backers from control or deception.
- **To Explore Time Lag Effects:** Investigate any time lag effects between changes in macroeconomic variables and their impact on the stock market. Analyse whether the stock market responds immediately to economic data releases or if there is a delayed reaction.

- To Understand Investor Behaviour: Explore how investor behaviour is influenced by macroeconomic conditions. Investigate whether investors exhibit risk aversion or risk-taking behaviour in response to changes in economic indicators.

iv. RESEARCH METHODOLOGY

This research investigates the relationship between macroeconomic factors and various stock market sectors. It aims to understand how these factors influence investment decisions and market performance.

Scope:

- Analyse how GDP growth, inflation, interest rates, and exchange rates affect four specific sectors: healthcare, FMCG, IT, and banking.
- Identify potential investment strategies based on these relationships.
- Increase public awareness of investment options and economic factors.

Objectives:

- Examine the impact of macroeconomic factors on different stock market sectors.
- Understand investor behaviour and risk tolerance in response to economic conditions.
- Analyse the effectiveness of government policies on the stock market.
- Identify market inefficiencies and time lag effects.
- Develop new investment strategies based on macroeconomic trends.
- Contribute to academic knowledge on this topic.
- Inform policymakers on how economic conditions influence the stock market.

Hypotheses:

- There is a significant relationship between macroeconomic factors and stock market sector performance.
- Specific hypotheses are formulated for each sector and each macroeconomic factor, predicting positive, negative, or mixed effects.

Research Design:

- Sampling: Utilize sector indices (S&P BSE indices for IT, healthcare, FMCG, and banking) instead of individual stocks.
- Data Collection:
 - 20 years of daily closing prices for each sector index.

- Quarterly data for GDP, inflation, interest rates, and exchange rates.
- Data Analysis:
 - Statistical operations (correlation analysis) to assess relationships between variables.
 - Visualization techniques (charts and graphs) to present findings.

Data Source:

- Secondary data from reliable sources like stock exchanges, government websites, and financial databases.

v. DATA ANALYSIS

In order to understand the relationship between the closing price and the macroeconomic factors (exchange rate, interest rate, GDP & inflation), both the data is taken and put into python. The correlation heatmap, the graphs and the regression values which shows their relationship are found out.

STATISTICAL TOOL USED:

- Correlation Analysis
- Regression Analysis

The most correlated factors in each sector are given below:

	Close Price	GDP
Close Price	1.00000	0.94741
GDP	0.94741	1.00000

	Close Price	GDP
Close Price	1.000000	0.968764
GDP	0.968764	1.000000



	Close Price	EXCHANGE RATES (USD/INR)
Close Price	1.000000	0.880312
EXCHANGE RATES (USD/INR)	0.880312	1.000000

	Close Price	GDP
Close Price	1.000000	0.880616
GDP	0.880616	1.000000

The Regression (R square) values of maximum correlated factors are:

SECTORS FACTORS	HEALTH SECTOR	FMCG SECTOR	BANKING SECTOR	IT SECTOR
EXCHANGE RATE	0.7578621	0.877146	0.770745	0.684967
GDP	0.8107856	0.822224	0.953987	0.727893

- Hypothesis 1- Stock prices increase with the increase in GDP over time

Observation- Hypothesis 1 is accepted.

- Hypothesis 2- Stock Prices increases with the increase in interest rate over time

Observation- Hypothesis 2 is rejected.

- Hypothesis 3- Stock Prices increases with the increase in exchange rate

Observation- Hypothesis 3 is accepted.

- Hypothesis 4- Stock Prices increases with the increase in inflation

Observation- Hypothesis 4 is rejected.

vi. RESULTS

2404431_536582_263_271 ρThe correlation between the exchange rates and the closing prices in all the 4 sectors which we have taken i.e., health sector, fmcg sector, banking sector and IT sector is somewhere revolving from 0.83 to 0.94. It is showing 0.94 correlation in FMCG sector and 0.83 in IT sector. FMCG sector shows the highest correlation between the exchange rates and the closing price that means if the exchange rate goes up by 1, the closing price will also go up by 0.94.

Coming to the interest rate, it shows a negative correlation in all the 4 sectors that means there is no significant relation between the interest rates and the closing prices. It is negative in all the sectors.

There is a very high correlation between the GDP and the closing price ranging from 0.88 to 0.97. The sector which has highest correlation between the closing price and GDP is banking sector i.e., 0.97 and hence it shows that if GDP goes up by 1, the closing price will also go up by 0.97 and vice versa.

There is a very negligible relationship between the inflation and the closing price just like it had with the interest rate i.e., negative or almost 0. It shows that there is no significant relationship between the two eventually.

Also, there is a time lag observed in the plots of the two major factor which are affecting the closing prices more than others that are GDP and exchange rate. It means that it is taking a little time for the graph to change along with the factors.

vii. CONCLUSION

The overall conclusion of the study clearly explains that the two factors among the four major macroeconomic factors what we have taken for this study effects the stock prices the most. And those two factors are exchange rate and GDP and least effecting factor is interest rate and then inflation. The correlation between them is also found out which varies from positive 0.82 to 0.97 and negative 0.04 to 0.4. Graphs and various plots are used to explain the relationship between the two in detail which are calculated using python language.

There is a time lag observed in the graphs which shows that with time, GDP and exchange rate remains constant for some time and then the stock price changes i.e., it is taking some time.

Future predictions of the stock prices may not be possible as we need macroeconomic factors to predict stock prices, and if we predict the factors value, it will reduce the accuracy of our study as we are only considering the current values of exchange rates, GDP, interest rates and inflation.

Economic data collection and reporting often have time lags or revisions, impacting the accuracy of analysis.

The relationship between the macro-economic variables and the stock prices is complex and dynamic.

viii. REFERENCES

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