Evaluating the Impact of Macroeconomic Variable on Indian Stock Market

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Abstract: The prices of shares and other financial assets have constantly had a significant influence in the improvement and advancement of financial activities, and this has turned out to be clear ever. Macroeconomic factors show the prosperity of any economic system and determine the investment future. Macroeconomic factors influence pricing in any economy. Macroeconomic vulnerability influences stock and commodity market, which altogether decides price instability. The securities exchange is a basic stage in the money related arrangement of our nation as it assumes a major role in directing shortage area investment funds to the surplus part. The research examined the impact of certain macroeconomic factors (disposable revenues, interest rates, govt. policies, inflation and exchange rates) on the results of securities market performance in the National and Bombay stock exchanges. Thusly, the causal connection between the securities exchanges returns and chose macroeconomic factors in the NSE and BSE has been resolved in the investigation. The examination utilized the ADF, correlation, multiple regression and granger causality test for analyzing the association between the chose factors. The study period was assessed by monthly data for 2006-2016. The findings showed that in the first difference the variables are stationary. There is a strong relationship exists between disposable income, government policies, the exchange rate and share price. This means that if these variables change, the stock prices of NSE and BSE will be affected. Furthermore, there is an unfavorable connection in the NSE and BSE between interest rate and inflation rate and share price, which means a shift in inflation and interest rate that will not have a strong impact on stock prices and will be in an adverse direction. In addition, a multiple regression that showed these variables was used to check the effect of selected macroeconomic factors on Indian stock prices. They have an influence on the NSE and BSE share prices.

Keywords: Macro-Economics, Stock Market, GDP, Investor, Inflation and Economic Growth

I. INTRODUCTION

In the advancement of economic activity, share prices and other financial assets have always been of excellent importance and have also played a crucial part in nations’ economies, and this is seen in history. Many scientists have also shown that stock markets have always played a major part in the prosperity of the nation, creating capital formation and promoting the economy’s financial development (Essaied, Hamrita et al., 2009; Charles and Adjasi, 2008; Pilinkus, 2015). The stock market has helped businesses organize assets from shareholders to investors in exchange for ownership shares as one of the most important components of a free-market economy. Prices of stock are considered an indicator of the country’s economic state. Share prices also influence much more, including wealth, savings and decision making in households. It will not be wrong to say that stock market are a vital part of every nation’s financial system because they have an important part to play in shifting funds and in bringing together investors and savers to boost economic growth. By examining the market output and market index, investors monitor their investments. The market index is used to evaluate each portfolio’s function and also provides an overview of future market trends. Elementary changes to the macroeconomic structure and policies that play a significant role in achieving financial stability can be tactful to the stock markets of the new growing countries. Because the stock market is an important pillar of the economy of the nation, government bodies, companies and investors are also observing it closely (Nazir and others, 2010). Because stock markets are vital to economic and financial stability, economic policymakers and scientists are trying to provide it with smooth and risk-free activities by taking stock market conduct into account. Economic experts, business analysts, investors, practitioners and policymakers have been weakened by the continued link between macroeconomic factors and stock prices (Kwon and Shin, 1999). However the relationship between the two variables has been deep rooted since two decades and is an area of interest among the academicians and researchers. The initial attempts were made by Fama in 1981, thereafter there has been increasing efforts to evaluate the relationship between the two variables with the help of empirical studies among one country or a group of country. Macro economic variables are responsible for the expansion of an economy and they are responsible for the amount of investments. The pricing method is governed by these factors. Changes in the macroeconomic variables contribute to price changes through their share and commodity impact. The stock market is one of the major industries that contribute to turning deficit sector savings into surpluses. Article AL-Sharkas, Adel (2004), "examines the long-term equilibrium, using macroeconomic variables to be specific, mechanical creation files, customer value files, cash supply (M2) and treasury charge rates, between collections of macroeconomic factors, and the Amman Stock Exchange (Jordan). In addition, quarterly data were used from the 1980:Q1 to 2003:Q3 surveys in relation to the Vector error correction..."
model (VECM) technique. The study's implications showed that these macroeconomic factors are co-integrated. In creating Sri Lankan securities exchange (Colombo Stock Exchange), Menike (2006) studied "the impact of macroeconomic variables on stock costs" utilizing multivariate relapse. Month to month time arrangement information from September 1991 to December 2002 was considered for the examination. Various factors were used for the analysis such as cash supply, conversion standard, expansion rate and loan cost. The research further outlined that the reverse connection between inflation expenditures and conversion expenditures with respect to the Colombo Stock Exchange's (CSE) stock costs and the adverse effect of the treasury securities tax rate explains that stock costs decrease with the increase in the debt charge of treasury securities. Chuang et al. (2007) examined that "Stock prices in Taiwan, Hong Kong, Singapore and South Korea" influenced the economic supply and budget deficit. He used the same four-monthly information. It showed a long-standing connection among the nations taken into account between monetary supply, budget deficits and stock prices. In addition in the short-term stock prices the changes in currency and fiscal policy take time to adjust fully. Sohail and Hussain (2009) inspected "the long-run and short-run links between Lahore Stock Exchange and macroeconomic factors," such as mechanical creation file, money supply (M1), CPI and loan price in Pakistan. The examination was based on quarterly information from 1973 to 2004. In order to evaluate the effects of the examination, cointegration tests and VECM tests were employed. The results show that the stock record of customer valuation has a negative effect, while the contemporary generating file, which is a real effective exchange rate, has a significant positive long-term effect on stock returns. Sajjad, Shafi et al. (2012) examined the connection between macroeconomic factors, i.e. growth rate, conversion standard, treasury bills and credit costs and stock trading in Karachi, using monthly information from January 2005 to December 2010. The test of cointegration and the causality of the granger were linked to the short and long-term review. The findings showed that KSE and KSE are bi-directional inductors from loans to swap scales and unidirectional inducements of grangers. Ozlen & Ergun (2012) used Gregorian calendar month 2005-2012 in its evaluation inquiry and rate of return, rate, present businessmen inadequate and proportion as independent variables and stock returns as variable balance due to misuse. The autoregressive lag method distributed completes the variables required by the exchange rate and rate area. Rafy (2014) discovered one hundred index and shopper indicator, import and export, and exchange rate causative connection between KSE. They use nineteen-year data from 1992 to 2012 to understand the connection of these factors with the securities industry. In order to examine the association, enforced multivariate analysis and farmer relationship look at. Their unquestionable bi-directional connection between interest and KSE is one hundred index, whereas there is no causative connection between export, shopper and KSE one hundred index. Ouma & Muriu (2014) explored the effect of economic factors on African country securities market yields from 2003 to 2013. The research did not hide that exchange rate, money supply, and inflation distress the securities market is backing the African country and that they are NSE's essential unit determinants while exchange rates have a adverse effect on the return on the securities market. Ilahi, I et al. (2015) investigated the link between securities exchange return funding costs and macroeconomic variables, particular swelling rates, conversion standard in Pakistan (Karachi stock trading), using month-to-month recurrence data from January 2007 to December 2012. The linked approach was Multiple Linear Regression with the end objective of data review. The inquiry discovered that macroeconomic factors and returns on securities exchange are powerless associated. Mugambi and Okech (2016) investigated "the connection between macroeconomic factors on the Nairobi Securities Exchange's stock returns of listed companies." Research has shown that exchange rate, interest rate, and inflation have a significant impact on stock returns from banks, while GDP has a negligible impact on stock returns from banks. The same secondary data was used by the Central Bank of Kenya between 2000 and 2015. To establish the link, the research used correlation evaluation, unit root test and linear regression model. Poornima and Ganeshwari (2016) examined “the vibrant connection between the NIFTY index and the exchange rate” by taking into account the daily closing index information from July 2014 to July 2016. Research investigated the adverse link between these variables and Granger causality tests underscored that NIFTY returns and exchange rates had a unidirectional cause relationship.

II RESEARCH METHODOLOGY

Research Design
This study tried to assess the effect on stock-market returns at the National and Bombay Stock Exchange of selected macroeconomic variables (Disposable income, Govt. Policies, Interest Rate, Exchange Rate and Inflation). Therefore, the study used an empirical research design. Therefore, an empirical research design helped identify the causal relationship between selected macroeconomic variables and stock market returns from NSE and BSE.

Data Collection
For this study, the interaction between stock price and selected macroeconomic factors is evaluated for disposable income, Govt policies (tax rates), interest rates, inflation, and exchange rates. In this study, the secondary information was used. Secondary data was collected from the various websites. To have consistency in the analysis, available annual average data of NSE index was transformed into monthly data. Empirical analysis in this study covers a 10-years period (April 2006 -
March 2016) using monthly time series data. Nifty and sensex price index values were used for stock prices (NSE and BSE) at the end of the month. CPI (consumer price index) has been used as a proxy for inflation. The exchange rate represented by the use of nominal effective exchange rate, the dollar-related bilateral exchange rate. Database of inflation, exchange rates, interest rates, Government policies and disposable income was taken from website of economic outlook and industry outlook. i.e. prowess database. All values converted into log.

Data Analysis
The data was analyzed using using E-views version 8.0. Descriptive statistics of the study variables was computed and presented in the form of the mean, maximum, minimum and standard deviation whereas several inferential statistical models were used to draw conclusions.

Analytical Models
Augmented dickey fuller model, normality test, serial correlation, multicollinearity, heteroskedasticity, multiple regression and the granger causality test were used to analyze the relationship between study variables.

Augmented Dickey Fuller Model or Unit Root Tests (ADF)
To estimate the unit root, the Augmented Dickey Fuller (ADF) test was implemented. ADF tests normally check the series of stationarities where; if the ADF statistics exceeded the critical value, the series ‘null unit root hypothesis was rejected.

Multiple Regression Analysis
In order to define the connection between the autonomous and dependent variable, regression analysis was used.

Stock returns = a + β1 DOI + β2 GP + β3 INF + β4 INT + β5 ER + e
Where Stock returns are the monthly % change in stock market returns.

DOI= the disposable income.

GP = direct and indirect tax policy of the govt.

INF = inflation rate change measured in the CPI by monthly changes.

INT = rate is the monthly change in interest rate

ER = the change in the exchange rate

εt is defined as the error term

Multiple Analysis and Interpretation

Five macroeconomic predictors in the research, namely: disposable income, Govt policies (taxes), exchange rate, inflation rate and interest rate and the criterion variable were stock market returns measured by the NSE Share Index. 120 monthly time series information for all factors from April 2006 to March 2016 were compiled, i.e. N=120 (see Table 1 below). Calculations were implemented for the different descriptive statistics. Descriptive statistics presented in Table 1. The table showed sample mean, median, maximum, minimum, standard deviations.

Table 1 The summary of results is given below:-

| Variables | Index Nifty | Index Sensex | Disposable Income | Govt. Policies | Exchange Rate | Inflation Rate |
|-----------|-------------|--------------|------------------|----------------|---------------|---------------|
| Mean      | 554         | 184          | 6532             | 44.25          | 51.38         | 6.73          |
| Median    | 9.92        | 177          | 5485             | 42.50          | 49.09         | 6.73          |
| Maximum   | 890         | 293          | 1244             | 48.49          | 68.25         | 6.92          |
| Minimum   | 1.85        | 293          | 1244             | 48.49          | 68.25         | 6.92          |
| Std. Dev. | 275         | 889          | 2493             | 42.50          | 39.36         | 6.53          |
| Observations | 120     | 120          | 120              | 120            | 120           | 120           |

Descriptive statistics’ results are:
Mean and median showing the center of data. The maximum and the minimum information display the range of data. Standard deviation demonstrates that the information is closely clustered around the mean and more reliable.

Table 2: ADF Unit Root Test Analysis at level

| Variables | t-Statistics | ADF at level | Critical Value at 1% | Critical Value at 5% | Critical Value at 10% |
|-----------|--------------|--------------|----------------------|----------------------|-----------------------|
| Disposable Income | 0.9631      | 0.996        | -3.4860 (64)         | 2.28858 (63)         | 2.5798 (18)          |
| Govt. Policies | -0.2117      | 0.932        | -3.4860 (64)         | 2.28858 (63)         | 2.5798 (18)          |
| Interest Rate | 1.5871       | 0.486        | -3.4860 (64)         | 2.28858 (63)         | 2.5798 (18)          |
| Inflation Rate | 3.4287      | 0.011        | -3.4860 (64)         | 2.28858 (63)         | 2.5798 (18)          |
| Exchange Rate | 0.1954       | 0.934        | -3.4860 (64)         | 2.28858 (63)         | 2.5798 (18)          |
| Stock Prices Nifty | 1.1561      | 0.691        | -3.4860 (64)         | 2.28858 (63)         | 2.5798 (18)          |
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| Stock Prices | Sensex | Variable | t-Statistic | ADF at level | Critical Value at 1% | Critical Value at 5% | Critical Value at 10% |
|--------------|--------|----------|-------------|---------------|---------------------|---------------------|----------------------|
| -            | 1.1730 | -        | 5           | 0.684         | -                   | -                   | -                    |
| -            | 60     | -        | -            | 3.4860        | 64                  | -                   | -                    |
| -            |        | -        | -            | 2.28858       | 63                  | -                   | -                    |
| -            |        | -        | -            | 2.5798        | 18                  | -                   | -                    |

**Table 3: ADF Unit Root Test Analysis at 1st difference**

**IV. PRELIMINARY TESTS**

**Multicollinearity Test**

The results of the variance inflation factor (VIF) were shown in Table 4. The results in Table 4 show that the explanatory variables are not collinear, since the VIF for all the variables is less than ten, which means that multicollinearity does not exist. It exists among all the explanatory variables in the study. This is consistent with the investigation of multicollinearity tests carried out in similar studies in Kenya. Some of the studies that have shown similar results are: Kirui et al. (2014), Aroni (2011) and Olweny (2011).

**Table 4: Multicollinearity Results for the Macroeconomic Variables**

| Variable         | VIF  |
|------------------|------|
| INTEREST_RATE    | 1.594642 |
| INFLATION_NEW    | 1.481506 |
| GOVT_POLICIES    | 1.061619 |
| EXCHANGE_RATE    | 1.088252 |
| DISPOSABLE_INCOME| 1.220328 |

**Table 5: Multicollinearity Results for the Macroeconomic Variables Sensex**

| Variable         | VIF  |
|------------------|------|
| INTEREST_RATE    | 1.051868 |
| INFLATION_NEW    | 1.576279 |
| GOVT_POLICIES    | 1.523118 |
| EXCHANGE_RATE    | 1.045766 |
Variable | Coefficient | Std. Error | t-Statistic | Prob.
---|---|---|---|---
C | 59265.94 | 6462.463 | 9.170798 | 0.0000
DISPOSABLE_INCOME | 0.001072 | 7.13E-05 | 15.04965 | 0.0000
GOVT_POLICIES | -490.2396 | 86.39349 | 5.674497 | 0.0000
INFLATION_RATE | -84.05487 | 26.75732 | 3.141378 | 0.0021
EXCHANGE_RATE | -137.6792 | 19.35593 | 7.113025 | 0.0000
INTEREST_RATE | -4730.986 | 556.6209 | 8.499476 | 0.0000

R-squared | 0.880722 | Mean dependent var | 5540.394
Adjusted R-squared | 0.875491 | S.D. dependent var | 1532.885
S.E. of regression | 540.8914 | Akaike info criterion | 15.47302
Sum squared resid | 33352243 | Schwarz criterion | 15.61240
Log likelihood | -922.3813 | Hannan-Quinn criter. | 15.52962
F-statistic | 168.3507 | Durbin-Watson stat | 0.688879
Prob(F-statistic) | 0.000000

**Interpretation**
The hypothesis has been accepted because (p < 0.05, 0.000) in this study there is the selected macroeconomic variables (disposable income, Govt policies, exchange rate, interest rate and inflation rate have influence on the on the stock prices at the NSE.

**H2:** There is a significant impact of selected macroeconomic variables on stock prices at the BSE.

**Table: 13 Multiple Regression with BSE**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 192014.9 | 22196.17 | 8.650812 | 0.0000 |
| DISPOSABLE_INCOME | 0.003457 | 0.000245 | 14.12423 | 0.0000 |
| GOVT_POLICIES | -1578.917 | 296.7297 | -5.321061 | 0.0000 |
| INFLATION_NEW | -322.8496 | 91.90153 | -3.512995 | 0.0006 |
| INTEREST_RATE | -1528.692 | 1911.787 | -0.797552 | 0.0000 |
| EXCHANGE_RATE | -445.3126 | 6648.047 | -6.698398 | 0.0000 |

R-squared | 0.868786 | Mean dependent var | 18482.34
Adjusted R-squared | 0.863031 | S.D. dependent var | 5019.722
---|---|---|---
S.E. of regression | 1857.762 | Akaike info criterion | 17.94084
Sum squared resid | 3.93E+08 | Schwarz criterion | 18.08021
Log likelihood | -1070.450 | Hannan-Quinn criter. | 17.99744
F-statistic | 150.9625 | Durbin-Watson stat | 0.625191
Prob(F-statistic) | 0.000000 | | |

**Interpretation**

The hypothesis has been accepted because (p <0.05, 0.000) in this study there is the selected macroeconomic variables (disposable income, Govt policies, exchange rate, interest rate and inflation rate) have influence on the on the stock prices at the BSE.

**Granger Causality Analysis**

**Table-14: Granger Causality Analysis (Nifty)**

| Null Hypothesis | Obs | F-Statistic | Prob | Result |
|---|---|---|---|---|
| Disposable Income does not Granger Cause stock prices. | 119 | 5.87452 | 0.016 | Rejected |
| Stock prices do not Granger Cause Disposable Income. | 9 | 0.26585 | 0.607 | Not Rejected |
| Govt Policies do not Granger Cause stock prices. | 11 | 2.74670 | 0.100 | Not Rejected |
| Stock prices do not Granger Cause Govt Policies. | 9 | 2.34549 | 0.128 | Not Rejected |
| Interest Rate does not Granger Cause stock prices. | 11 | 0.22952 | 0.632 | Not Rejected |
| Stock prices do not Granger Cause Interest Rate. | 9 | 1.17742 | 0.380 | Not Rejected |
| Inflation rate does not Granger Cause stock prices. | 11 | 0.279 | Not Rejected |
| Stock prices do not Granger Cause Inflation rate. | 9 | 8.74563 | 0.003 | Rejected |
| Exchange Rate does not Granger Cause stock prices. | 11 | 6.14832 | 0.014 | Rejected |
| Stock prices do not Granger Cause Exchange rate. | 9 | 0.75683 | 0.386 | Not Rejected |
| Exchange Rate does not Granger Cause stock prices. | 119 | 5.85550 | 0.0026 | Rejected |
| Stock prices do not Granger Cause Exchange rate. | 119 | 0.55883 | 0.4562 | Not Rejected |

The null hypothesis indicates that stock prices (Nifty) do not create macroeconomic factors and there is no hypothesis that the macroeconomic variable does not cause Granger to trigger stock prices (Nifty), except for disposable income, inflation and stock price exchange owing to the important F-statistical ratio. Consequently, the findings of the Granger causality test are described below, a change in macroeconomic factors except for disposable income, inflation, and exchange rates have had a statistically insignificant effect on changes in share prices, while stock prices appear to be an insignificant variable explaining portion of the movements in macroeconomic factors. This indicates that at the cost of the shares there is a unidirectional causality of disposable income, inflation rate and exchange rate.

**Table-15: Granger Causality Analysis (Sensex)**

| Null Hypothesis | Obs | F-Statistic | Prob | Result |
|---|---|---|---|---|
| Disposable Income does not Granger Cause stock prices. | 119 | 5.31104 | 0.0230 | Rejected |
| Stock prices do not Granger Cause Disposable Income. | 119 | 0.36943 | 0.5445 | Not Rejected |
| Govt Policies do not Granger Cause stock prices. | 119 | 2.64596 | 0.1065 | Not Rejected |
| Stock prices do not Granger Cause Govt. | 119 | 1.96291 | 0.1639 | Not Rejected |

In the first distinction, all variables are stationary. The residues are normally distributed and multicollinenery, heteroskedasticity and serial correlation are no issue. The hypothesis was accepted because there are selected macroeconomic variables (disposable income) government policies in this study (p<0.05, 0.000), the exchange rate, interest rate and inflation rate influences the NSSE share prices, the hypothesis was accepted because (p<0.05, 0.000) selected macroeconomic variables (disposable income) are present in this study. Government policies, exchange rates, interest rates and inflation rates affect the prices of BSE stocks, the theory indicates that stock prices (Nifty) do not create macroeconomic factors and neither does the assumption that the macroeconomic variable does not cause Granger to cause share prices (Nifty) and (Sensex) with the exception of available revenue, inflation and BSE. A change in macroeconomic factors except for disposable income inflation and exchange rates have been statistically impacted by changes in share prices, whereas changes in stock prices also appear to be an insignificant factor explaining portion of stock market movements. The variables of macroeconomics. This indicates that at the cost of the shares there is a unidirectional causality of disposable income, inflation rate and exchange rate.
VI. CONCLUSION

The research’s primary goal is to evaluate the connection between Indian stock markets’ macroeconomic factors and stock prices. The monthly information of disposable revenue, Govt, is used to justify the goal. Collected policies, inflation rate, and interest rate. The findings indicate that in the first difference the variables are stationary. The residues are normally distributed and multicollinearity and heteroskedasticity and serial correlation are no issue. Furthermore, to check the effect of chosen macroeconomic factors on Indian equity prices, the multiple regression showing these variables (available revenue, interest rate and inflation rate) affects both the NSE and the stock prices as opposed to BSE. The null theory indicates that stock prices (Nifty) do not produce macroeconomic factors, nor does the theory that the macroeconomic variable Granger does not cause stock prices (Nifty) and (Sensex), except for accessible revenue, inflation and stock price exchange owing to the important F-statistics ratio. Furthermore, the study suggests that a change in the net macroeconomic factors of disposable income, inflation, and exchange rates has had a statistically insignificant effect on changes in share prices, while a change in share prices appears to be an insignificant factor explaining portion of the movements within the variable macroeconomic structure. The study article proposes a unidirectional causality of disposable revenue, inflation rate, and share-price exchange rate.

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