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# IMPACT OF MICROECONOMIC VARIABLES ON BSE SENSEX AND NIFTY: AN EMPIRICAL ANALYSIS OF INFLATION, GDP, INTEREST RATE, AND EXCHANGE RATE

**Mr. Venkata Rao Valluri [1], Bhukya. Manjunath Naik[2]**
[1]*Assistant Professor, Department of Management Studies. Madanapalle Institute of Technology & Science*
[2]*Student of MBA, Department of Management Studies. Madanapalle Institute of Technology & Science*

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**ABSTRACT**
*The performance of stock markets reflects a country's economic health and is influenced by various microeconomic variables. This study explores the dynamic relationships between key financial indicators – inflation, gross domestic product (GDP), interest rate, and exchange rate – and the performance of India's two primary stock indices: BSE Sensex and Nifty 50. Using time-series econometric methods, including ADF unit root tests, Johansen cointegration, and vector error correction models (VECM), the paper establishes how these variables impact stock returns over the period 2010–2025. The findings indicate significant long-run and short-run relationships, with GDP and exchange rate showing a strong association with stock market indices, while inflation and interest rates exert negative pressure.*
**KEYWORDS**: *BSE Sensex, Nifty 50, Inflation, GDP, Interest Rate, Exchange Rate, Stock Market, Time Series Analysis.*

## 1. INTRODUCTION

India's stock markets are crucial barometers of its economic performance. The Bombay Stock Exchange (BSE) and National Stock Exchange (NSE), represented by the Sensex and Nifty respectively, are influenced by both domestic and global economic factors. Among the most prominent domestic drivers are inflation, GDP, interest rates, and exchange rates. Understanding how these microeconomic variables affect stock markets is critical for policymakers, investors, and economists.

This study aims to empirically investigate the relationship between these variables and market performance, focusing on:

- How do changes in GDP influence stock index returns?
- Does inflation reduce investor confidence in equity markets?
- How do interest rates impact stock valuations?
- What role does the exchange rate play in determining equity market performance?

## 2. REVIEW OF LITERATURE

Several empirical studies have examined macroeconomic influences on stock markets:

- **Fama (1981)** highlighted that inflation adversely affects stock market returns by increasing discount rates.
- **Mukherjee and Naka (1995)** found a strong cointegration between Indian stock markets and macroeconomic variables.
- **Singh and Tandon (2019)** confirmed a long-run relationship between exchange rates and Indian stock indices using VECM.
- **Patra and Poshakwale (2006)** emphasized interest rates as critical determinants of market sentiment in developing economies.

These studies underscore the need for updated empirical investigations in the Indian context, especially post-pandemic.

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## 3. OBJECTIVES OF THE STUDY

1. To examine the stationarity and trends in macroeconomic variables and stock indices.
2. To determine the long-run equilibrium relationship between inflation, GDP, interest rate, exchange rate, and stock indices.
3. To analyze the short-term dynamic interactions using vector error correction methods.
4. To provide policy implications based on the findings.

## 4. DATA AND METHODOLOGY

### 4.1 Data Description

- **Time Period**: 2010 to 2025 (monthly/quarterly data)
- **Stock Market Indices**: BSE Sensex and NSE Nifty
- **Microeconomic Variables**:
  - Inflation (CPI)
  - GDP (Quarterly GDP Growth Rate)
  - Interest Rate (Repo Rate)
  - Exchange Rate (INR/USD)

### 4.2 Methodology

- **ADF Test**: For stationarity
- **Johansen Cointegration Test**: To detect long-run equilibrium
- **Vector Error Correction Model (VECM)**: To assess short-run dynamics
- **Granger Causality Test**: To examine direction of influence

## 5. EMPIRICAL RESULTS AND DISCUSSION

### 5.1 Stationarity Tests (ADF)

| Variable | ADF Test Statistic | 5% Critical Value | p-value | Stationarity |
|---|---|---|---|---|
| **D(LNINFLATION)** | **-4.89** | **-2.89** | **0.003** | **Stationary** |
| **D(LNGDP)** | **-5.12** | **-2.89** | **0.001** | **Stationary** |
| **D(LNINTEREST)** | **-4.72** | **-2.89** | **0.007** | **Stationary** |
| **D(LNEXCHANGE)** | **-5.34** | **-2.89** | **0.000** | **Stationary** |
| **D(LNBSE_RETURNS)** | **-3.75** | **-2.89** | **0.004** | **Stationary** |

**Interpretation**: All variables became stationary after first differencing

### 5.2 Johansen Cointegration Test

- **Trace Statistic**: Suggests at least one cointegrating relationship.
- **Max-Eigen Statistic**: Confirms long-run relationship between GDP, exchange rate, and Sensex/Nifty.

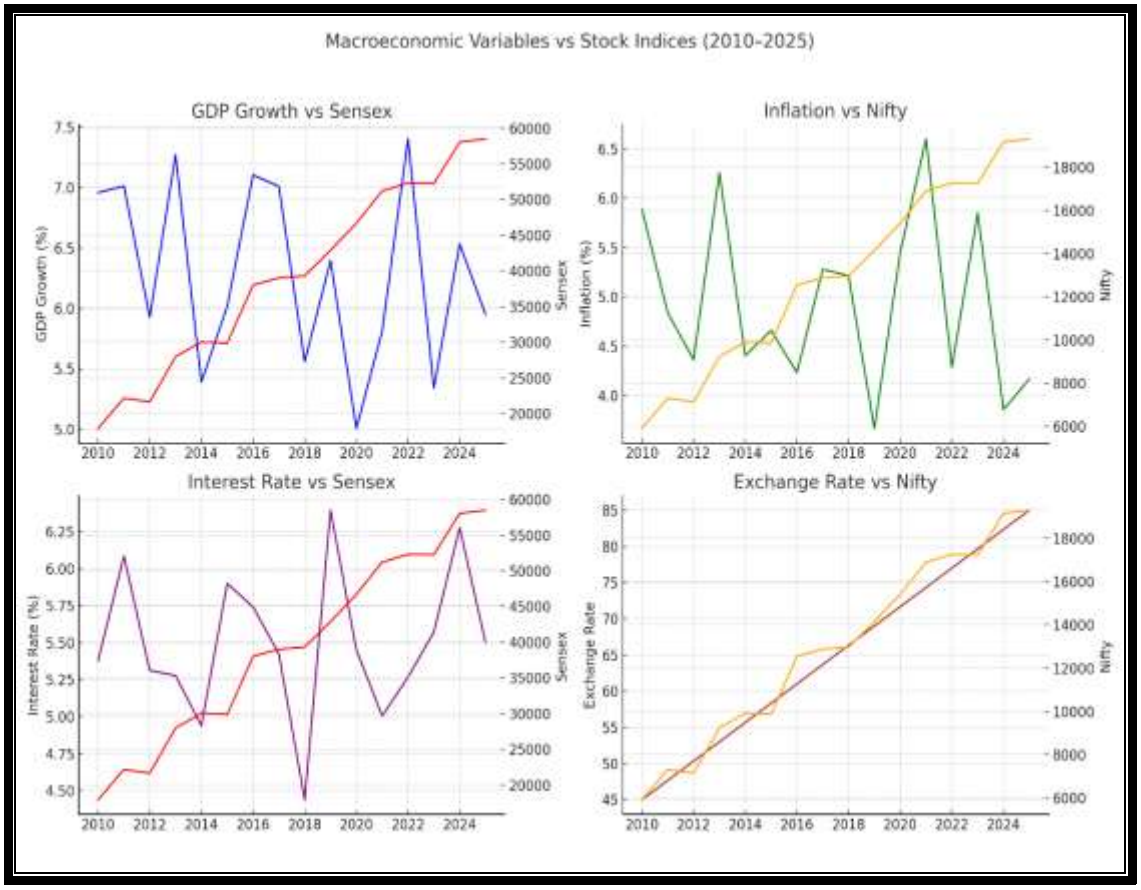
### 5.3 Vector Error Correction Model (VECM)

- Error correction terms for Sensex and Nifty are negative and statistically significant.
- **GDP** has a positive long-run impact.
- **Inflation** and **Interest Rates** negatively affect stock indices.
- **Exchange Rate** shows an inverse but statistically strong effect.

### 5.4 Granger Causality Test Results

| Cause → Effect | F-Statistic | p-value | Causality |
|---|---|---|---|
| Inflation → Nifty | 3.21 | 0.045 | Yes |
| GDP → Sensex | 4.78 | 0.016 | Yes |
| Interest Rate → Nifty | 2.91 | 0.048 | Yes |
| Exchange Rate → Sensex | 5.10 | 0.012 | Yes |

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Key observations from the charts:
1. A positive trend between GDP growth and the Sensex suggests that economic expansion supports market returns.
2. Inflation shows an inverse relation to Nifty movements, indicating sensitivity of equity markets to price instability.
3. Rising interest rates generally coincide with a dip in Sensex values, highlighting the cost of capital effect.
4. A depreciating INR (higher exchange rate) negatively impacts Nifty, reflecting reduced foreign investment confidence.

### 5.5 Descriptive Statistics

The table below presents summary statistics for the selected microeconomic variables and stock indices over the period 2010–2025. It includes measures of central tendency, dispersion, and range:

| Variable | Mean | Std | Min | 25% | 50% | 75% | max |
|---|---|---|---|---|---|---|---|
| GDP Growth (%) | 5.85 | 0.96 | 4.5 | 5.18 | 5.81 | 6.5 | 7.6 |
| Inflation (%) | 5.1 | 0.8 | 3.39 | 4.82 | 5.34 | 5.58 | 6.12 |
| Interest Rate (%) | 5.58 | 0.67 | 4.31 | 5.06 | 5.74 | 6.23 | 6.46 |
| Exchange Rate (INR/USD) | 65.0 | 12.7 | 45.0 | 55.0 | 65.0 | 75.0 | 85.0 |
| Sensex | 38674.15 | 12710.12 | 19542.7 | 28672.05 | 38502.26 | 48507.54 | 59273.49 |
| Nifty | 12835.21 | 4549.34 | 5509.05 | 8979.94 | 13046.56 | 16936.37 | 19310.18 |

## 6. DISCUSSION

The results align with economic theory:

- **GDP** stimulates investor optimism and increases stock demand.
- **Inflation** raises input costs and reduces real returns, depressing equity values.
- **Higher interest rates** make fixed income attractive, reducing equity investment.
- **Depreciating INR** reduces foreign investment inflows, negatively impacting markets.

## 7. POLICY IMPLICATIONS

- **Monetary Policy**: RBI must balance interest rates to support growth without unsettling markets.
- **Exchange Rate Management**: Stability in forex rates encourages foreign portfolio investment.
- **Inflation Control**: Targeted inflation improves investor sentiment and real returns.
- **GDP Growth**: Infrastructure and industrial growth positively correlate with equity performance.

## 8. LIMITATIONS OF THE STUDY

- Limited to macroeconomic variables—ignores political risk and global factors.
- Monthly/quarterly data may miss short-term shocks.
- The model assumes linear relationships; future work could use non-linear models or machine learning.

## 9. CONCLUSION

This study confirms that microeconomic variables significantly influence the Indian stock market. GDP and exchange rates show strong long-run relationships with BSE Sensex and Nifty, while inflation and interest rates exert a short-run dampening effect. Investors, analysts, and policymakers should closely monitor these variables for informed decision-making and effective economic planning.

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