



EFFECT OF MACRO ECONOMIC VARIABLES ON STOCK MARKET RETURNS IN INDIA

Akash Manojbhai Tiwari¹, Dr. Vivek Ayre²

¹ (Student) B.V. Patel Institute of Management, Uka Tarsadia University.

² (Teaching Assistant) B.V. Patel Institute of Management, Uka Tarsadia University.

ABSTRACT :

This study explores the impact of macroeconomic variables—crude oil prices, interest rates, domestic gold prices, GDP, and exchange rates—on stock market returns in India, focusing on the Nifty 50 index. It analyses data over a decade (2014–2024) using statistical methods like regression analysis and unit root tests to uncover relationships and causality. Key findings reveal that crude oil price fluctuations moderately correlate with Nifty 50 due to their influence on inflation and consumer purchasing power. Interest rates show a negative relationship with stock market returns, aligning with economic theories. Gold prices display limited influence despite an overall upward trend, while GDP reflects a weak positive correlation, indicating economic growth momentum. Exchange rates demonstrate minimal correlation with stock movements, highlighting the complexities of global financial dynamics. The study emphasizes the need for investors and policymakers to monitor these factors for strategic decision-making and advocates further research employing advanced econometric models to deepen the understanding of these intricate interactions.

Introduction

The Indian financial markets have undergone significant changes over the last two decades, driven by shifts such as the elimination of fixed exchange rates and the rise of international financial flows. These developments have increased volatility in stock prices and trading volumes, with market sentiments often clashing with economic growth due to irrational investor behaviour and speculative practices. Amid this unpredictability, macroeconomic variables like inflation, interest rates, and gold prices play a critical role in shaping stock market trends. The Indian stock market, particularly since the economic liberalization policies of 1991, has emerged as a pivotal driver of financial development and economic growth. Despite remarkable progress in terms of trading volume, listed stocks, and intermediary services, challenges such as high market volatility, speculative practices, and transparency issues persist. This study aims to explore the impact of domestic and international macroeconomic variables on the performance of the Indian stock market, focusing on the Nifty 50 index. By analysing the relationships between stock prices and macroeconomic indicators, the research seeks to guide policymakers, investors, and researchers in understanding and predicting stock market behaviour for better decision-making.

LITERATURE REVIEW

Vandana Bhama 2022-The study found a negative relationship between exchange rate volatility and Indian stock market performance, while the impact of crude oil prices was weak. COVID-19 cases also negatively affected stock returns, but the relationship was relatively less significant.

Dodi Sukma Yana, Sugiyanto Ikhsan 2022-The paper indicates that macroeconomic variables, particularly inflation, interest rates, and exchange rates, significantly influence stock returns. Previous studies in India found inflation impacts stock returns in the long run, aligning with the findings of this research.

R. Gopinathan, S. Raja Sethu Durai 2019-Macroeconomic variables have a systematic effect on stock market returns in India. However, the study found no long-run linear relationship; instead, it identified a nonlinear and time-varying relationship, indicating complexities in how these variables interact with stock prices.

Aggarwal, Najia 2017- The study finds that macroeconomic variables such as US GDP, S&P index, gold prices, Indian WPI, fiscal deficit, IPI, and exchange rate significantly affect the Indian stock market, specifically the NIFTY 50 index, from 2001 to 2016.

Pooja Misra 2018- The study confirms a long-run causality between BSE Sensex and macroeconomic variables like Index of Industrial Production, inflation, interest rates, gold prices, exchange rate, foreign institutional investment, and money supply, significantly impacting stock market returns in India.

Research Methodology

The study investigates the causal relationship between macroeconomic variables—crude oil prices, interest rates, domestic gold prices, GDP, and exchange rate—and the Indian stock market, particularly the Nifty 50 index.

• **Problem Statement:** Understanding the dependence and causality between selected economic variables and stock market indices in India.

• **Objective:**

- o Analyse the relationship between crude oil prices and the Nifty 50 index.
- o Examine interest rates and their impact on stock returns.
- o Assess the influence of domestic gold prices on stock market trends.
- o Explore GDP's effect on stock indices.
- o Study the relationship between exchange rates and Nifty 50 returns.

Research Design: Descriptive in nature, focusing on statistical methods to identify causality and dependence.

• **Data Collection:** The study uses monthly time-series data spanning 14 years (January 2014–July 2024), covering the variables listed above.

• **Statistical Methods:**

- o **Descriptive Analysis:** Measures such as mean, median, skewness, and kurtosis are calculated for variables.
- o **Unit Root Tests:** ADF tests are applied to determine stationarity in time-series data.
- o **Regression Analysis:** Establishes the impact of macroeconomic indicators on Nifty 50 returns, treating stock indices as dependent variables and economic indicators as independent ones.

• **Significance Level:** 5% significance is used for hypothesis testing with a 95% confidence level.

• **Software Used:** MS Excel is used for statistical analysis and data modelling.

• **Limitations:**

- Findings are specific to Indian economic indicators and may not apply universally.
- Data excludes significant events like the COVID-19 pandemic, potentially affecting results.

Results and Data Analysis

This section presents the findings of the study, which investigates the relationship between macroeconomic variables (crude oil prices, interest rates, domestic gold prices, GDP, and exchange rates) and stock market performance, specifically focusing on the Nifty 50 index in India.

1. Crude Oil Prices and Nifty 50

o Crude oil prices exhibited a moderate positive correlation with Nifty 50 (Multiple R = 0.4957, $R^2 = 24.57\%$), implying that approximately 24.57% of variations in Nifty 50 returns can be attributed to crude oil price fluctuations.

o the results of the Augmented Dickey-Fuller (ADF) test indicated that crude oil prices were stationary (p-value > 0.05).

o Crude oil's price volatility significantly affects inflation, consumer purchasing power, and corporate profitability, thereby influencing the stock market.

crude oil price						
<i>Regression Statistics</i>						
Multiple R	0.4957168		P<0.05			
R Square	0.2457351		We reject the Ho			
Adjusted R Square	0.206037					
Standard Error	9.2665867		data is stationary			
Observations	41					
ANOVA						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	2	1063.08158	531.5408	6.190091	0.004709269	
Residual	38	3263.045893	85.86963			
Total	40	4326.127473				
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	13.594	5.139044872	2.645239	0.011805	3.190548021	23.99745292

Yt-1	-0.207917	0.072426296	-2.87074	0.006658	-0.354536301	-0.06129756
D(Yt-1)	0.3590304	0.143286152	2.505688	0.016623	0.06896277	0.649098071

2. Interest Rates and Nifty 50

o Interest rates (10-year T-bill rate) showed a moderate negative correlation with Nifty 50 (Multiple R = 0.4939, R² = 24.39%).

o Higher interest rates discourage equity investments by making interest-based instruments more attractive, leading to reduced demand in the stock market.

o The ADF test confirmed the stationary behaviour of interest rate time series data.

interest rate						
Regression Statistics						
Multiple R	0.493900516		P<0.05	We reject the Ho		
R Square	0.24393772		data is stationery in nature			
Adjusted R Square	0.204144968					
Standard Error	0.241328516					
Observations	41					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	2	0.714039554	0.35702	6.130205	0.004927128	
Residual	38	2.2130992	0.058239			
Total	40	2.927138753				
Coefficients						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1.114479679	0.411665722	2.707244	0.010109	0.281105994	1.947853364
Yt-1	-0.16021897	0.057223376	-2.79989	0.007991	-0.276061639	-0.0443763
D(Yt-1)	0.305663289	0.141366553	2.162204	0.036964	0.019481663	0.591844915

3. Domestic Gold Prices and Nifty 50

o Domestic gold prices exhibited a weak positive correlation with Nifty 50 (Multiple R = 0.241, R² = 5.8%).

o Statistical insignificance (p-value > 0.05) indicated a limited direct impact of gold prices on Nifty 50 performance despite their steady upward trend during the study period.

o The ADF test identified gold prices as non-stationary, requiring appropriate data transformations.

domestic gold price						
Regression Statistics						
Multiple R	0.240665383					
R Square	0.057919827					
Adjusted R Square	0.00833666				We fail to reject the Ho	
Standard Error	30.39770019			P>0.05	data is non stationary in nature	
Observations	41					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	2	2158.760385	1079.38	1.168135	0.321861785	

Residual	38	35112.76672	924.0202			
Total	40	37271.5271				
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	-6.783524064	24.11339255	-0.28132	0.779993	-55.59853521	42.03148708
Yt-1	0.027531374	0.045190807	0.609225	0.546001	-0.063952631	0.119015379
D(Yt-1)	0.183708802	0.171910636	1.06863	0.291978	-0.164306086	0.531723691

4. Gross Domestic Product (GDP) and Nifty 50

- o GDP demonstrated a weak positive correlation with Nifty 50 (Multiple R = 0.257, R² = 6.6%), reflecting limited influence on stock market trends.
- o the regression analysis results were statistically insignificant (p-value > 0.05), indicating that GDP's impact on stock market returns might be mediated by other factors.
- o ADF tests revealed that GDP data was non-stationary, necessitating further processing for advanced analyses.

GDP						
SUMMARY OUTPUT						
<i>Regression Statistics</i>						
Multiple R	0.257320311					
R Square	0.066213742					
Adjusted R Square	0.017067097					
Standard Error	181.6388041					
Observations	41					
<i>ANOVA</i>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	2	88899.95079	44449.9754	1.347268814	0.272083425	
Residual	38	1253720.896	32992.65516			
Total	40	1342620.847				
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	-135.781547	186.4024454	-0.72843222	0.470814482	-513.1335695	241.5704755
Yt-1	0.030625111	0.020921452	1.463813824	0.151468683	-0.011728155	0.072978377
D(Yt-1)	-0.18931882	0.164485085	-1.15097865	0.256932141	-0.522301465	0.143663825

5. Exchange Rates and Nifty 50

- o Exchange rates (INR/USD) showed a weak positive correlation with Nifty 50 (Multiple R = 0.304, R² = 9.24%).
- o While depreciation of the Indian Rupee against the US Dollar was observed during the study, its direct effect on stock market indices remained statistically insignificant (p-value > 0.05).
- o The ADF test indicated that exchange rate data was non-stationary, requiring adjustments for econometric modelling.

exchanges rate						
<i>Regression Statistics</i>						
Multiple R	0.304027759		P>0.05			
R Square	0.092432879		We fail to reject the Ho			
Adjusted R Square	0.044666188		data is non stationary in nature			
Standard Error	1.229579873					
Observations	41					

ANOVA						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	2	5.851198225	2.925599	1.935091	0.158378539	
Residual	38	57.4509332	1.511867			
Total	40	63.30213143				
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	2.182552135	2.016026053	1.082601	0.285808	-1.898679241	6.263784
Yt-1	-0.024499536	0.02829835	-0.86576	0.392056	-0.081786551	0.032787
exchange rates.	0.284130772	0.15003297	1.893789	0.065885	-0.019595096	0.587857

Discussion

The findings from this study highlight the intricate and multifaceted relationship between macroeconomic variables and the Nifty 50 index in India. Crude oil prices were observed to have a moderate positive correlation with stock market returns, underscoring their role in influencing inflation, purchasing power, and corporate profitability. Interest rates exhibited a negative relationship with stock market performance, as expected, since higher rates often drive investors towards safer, interest-based investment options, reducing demand in equity markets. Gold prices showed an upward trend, but their impact on the stock market was weak, suggesting that gold's role as a "safe haven" asset may divert investments away from equities during economic uncertainty. GDP displayed a weak positive correlation with stock market returns, reflecting a limited direct influence, possibly overshadowed by other factors in the economy. Exchange rates revealed weak correlations with stock movements, signifying the complexities of global financial dynamics and their indirect effect on domestic stock indices. Overall, while crude oil prices and interest rates emerged as significant influencers, gold prices, GDP, and exchange rates exhibited less pronounced effects, indicating the need for deeper exploration into these relationships through advanced modelling techniques. This study highlights the importance of macroeconomic monitoring for policymakers and investors seeking strategic decisions in volatile financial markets.

Conclusion

This study concludes that macroeconomic variables like crude oil prices, interest rates, domestic gold prices, GDP, and exchange rates significantly impact stock market returns, particularly the Nifty 50 index in India. Among these, crude oil prices and interest rates have shown notable direct influences, with crude oil affecting inflation and corporate profitability, and interest rates shaping investment behaviour by making fixed-income options more attractive during their rise. Conversely, variables like gold prices, GDP, and exchange rates, while theoretically important, exhibited weaker correlations with stock market returns. This suggests that their impact might be indirect or influenced by mediating factors not fully captured in this analysis. The inherent non-stationary nature of all variables underscores the need for advanced data transformation techniques and econometric modelling to refine future research findings. The study emphasizes the importance of macroeconomic monitoring for investors and policymakers and highlights the complexities and nuanced interplay of these variables in influencing stock market performance. It encourages further research to uncover deeper insights into these relationships for improved market predictions and policy development.

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