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Impact of Macroeconomic Variables on Stock Market Returns: An ARDL Analysis of the Indian Market

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Abstract

This paper explores how the key macroeconomic variables affect stock market returns on investment (ROI) in the Indian setting with special focus to inflation, exchange rates movement, and foreign direct investment (FDI). Using time-series data related to the Indian economy and its capital markets, the study explores both short and long run processes that correspond to macroeconomic variables and market returns. Augmented DickeyFuller (ADF) test is used to determine the stationarity, and an Autoregressive Distributed Lag (ARDL) error-correction model is applied to determine the relationship among the variables. The results affirm the presence of the long-run equilibrium relationship between stock markets returns and the macroeconomic factors under study. Inflation did not have a statistically significant impact on returns either in the long or short term whereas exchange rate movements have a significant impact on returns especially in the short term where currency depreciation adversely impacts market performance. The approximate error -correction value is negative and high, which signifies a prompt adaptation to long-run equilibrium after short-run shocks. These findings highlight the significance of exchange rate stability in the performance of the market and provide valuable information to the policy makers and investors, particularly younger and long-term market participants on the macroeconomic risks that determine investment returns in India.

Keywords: *Insurance Returns; Time-Series Trend; Volatility; Negative Shocks; Recovery; Performance Stability*

Introduction

Market performance in India was below the global performance till 2025 but analysts and brokers expect that by 2026, the market will recover because of rising corporate earnings, expected long-term economic growth, and appealing valuations, although foreign institutional investors remain cautious (Hsu et al., 2022). Throughout the years 2000-2025, the Nifty 50 index has shown strong volatility within the macroeconomic factors of foreign direct investment (FDI), inflation, and GDP growth (Mehta and Dhaka, 2025). Most young investors in India have entered capital markets with low exposure to financial literacy

and a short-term focus on profits in recent years and are frequently driven by digital platforms and market hype. Market volatility and lack of knowledge of the fundamentals of the economy have triggered massive losses to these players. In turn, an increasing number of young Indians start to feel that the stock market is too risky and inappropriate to invest in over time. Previous studies found the correlation between Nifty 50 volatility and the main macroeconomic variables to fill this knowledge gap and enable young investors to participate in it with informed and long-term commitment (Kumar and Banu, 2023).

The earlier studies have mainly studied the intersection of GDP growth and ROI with some finding a strong relationship between the general economic growth and the performance in the market. Nevertheless, these works have more or less ignored the effects of inflation on ROI, which play a central role in determining real returns and purchasing power of the investor. Further, little empirical research has examined the interplay between moves in the currency exchange rate and ROI, especially in a world that is becoming more global in terms of investment. Moreover, the interaction between the FDI flows and currency exchange rates and their joint influence on the returns to investments has not been studied sufficiently. These knowledge gaps in the literature underscore the need to have a more integrated macroeconomic framework to explain market returns variations (Fernandez, 2015). The stock market has been one of the most important predictors of recessionary trends. There is a statistically significant dependence between market returns and fluctuations in GDP growth (Sreenivasan et al., 2022). The increase in GDP creates bigger stock returns in industries. GDP growth has a strong impact on the prices of stocks, and sensitivity in sectors is different (Jaya, 2024).

The positive correlation between the growth in GDP and S&P 500 performance (R= 0.830) illustrated a high explanatory power (Bunjaku, 2024). The returns from the stock markets, i.e., the S&P 500 annual return predicted the change in the growth rate of the economy implying that the market is a leading economic indicator and GDP moves the stock markets (Sreenivasan et al., 2022). MVE/GDP ratio is a good predictor of long-term equity returns; high MVE/GDP ratio presupposes low future returns (Umlauft, 2020). According to a research, there is a unidirectional causal influence such that the GDP movements directly affect the BSE SENSEX; therefore, GDP changes significantly affect the overall investment returns in the stock market and, as a result, economic prosperity (Kaushik and Kumar, 2023). Higher GDP is associated with high stock prices, i.e there is a robust long-term relationship between stock returns and GDP in India, which points to better health of the economy and trust of investors in the market (Keswani et al., 2024). There is no significant relationship between GDP growth and stock market returns in firms of different sizes, and it can be contended that market valuations are mostly determined by future growth expectations, but not caused by the direct impacts of economic growth (Klement, 2015).

Literature Review

Positive market capitalization has a relatively small impact on equity returns, and lagged negative deviations in market capitalization have a stronger impact. The exchange-rate risk becomes an important factor that determines the performance of stock-market performance in the long-run. Negative inflationary shocks have a greater effect on stock returns in the short run, which highlights the sensitivity of the market to monetary policy changes (Pamba, 2025). It has been empirically confirmed that there exists a strong negative relationship between interest rates and equity returns on Karachi Stock Exchange, thus confirming the global trends and pointing at peculiar features of the emerging economies between 1997 and 2010 (Ghazanvi & Akram, 2025). There is a strong positive relationship between interest rates and stock returns but also proves that changes in interest rates can have a substantial impact on the performance of capital-market performance and provide valuable information to investors when managing a portfolio (Rohman, 2024).

A strong correlation between exchange rates and global equity returns is found, which is unlike in previous studies which focused on relative equity-market performance. The results indicate that currencies with high interest rates have a positive relationship with international equity returns, but lower rate currencies show a negative relationship. It is postulated by the analysis that exchange-rate movements are induced by global equity returns, and not bilateral relative performance, with the level of interest rates dictating the direction of the relationship. The appreciation of a domestic currency will lead to a fall in local stock prices because of unfavourable terms of trade and vice versa. These findings complement the existing exchange-rate theory and have far reaching policy implications (Katechos, 2011). The volatility of the Australian currency, Canadian currency, and euro has significant impacts on the U.S. equity returns, especially in the S&P 500 index. In addition, any volatility in the Australian dollar and the euro spreads over into the volatility of the S&P 500 (Bhargava & Konku, 2023). There exists a strong long-run correlation between currency exchange rates and equity returns in India whereas instant changes in exchange rates have a negative effect on market returns. These results highlight the relevance of exchange-rate dynamics to investors ("Impact of Exchange Rate and Inflation rate on Stock Market Return Volatility In India, 2022). The interaction between real exchange-rate movements and real stock-price returns, which demonstrates that the changes in the currency have a significant effect on the equity market, thus indicating the interdependence between the foreign-exchange and equity market (Wong, 2017).

The volatility of foreign-exchange has a positive effect on equity market volatility in India with different degrees of effect on small-cap, mid-cap, and large-cap indexes. The dynamic conditional correlation (DCC) parameter of 20 is significant in USD and GBP in small-cap indices and in GBP and CNY in mid-cap indices. In the short term, there are significant impacts of USD, Euro, CNY, and JPY in the large-cap index. The exchange rates are found to exert a long-run spillover effect on all capitalization thresholds, the largest spillover effect is detected in the large-cap case (Mohanty et al., 2023). The study clarifies a complicated connection in which elevated inflation is normally linked with increased market turmoil and lower returns on equities, though with contingent varieties in sectors and macro-policy (Shenoy H et al., 2024). There are also positive long-run associations between the inflation rates and equity returns in China, which suggests that with the increase in inflation, stock prices can be increased and act as a buffer against inflationary shocks (Jacob et al., 2025). There is a negative correlation between the rate of inflation and aggregate U.S. stock returns, which are replicated in the G7 economies. The sector-level analysis shows that the inflation coefficients are mainly negative except in the case of the energy sector that shows a positive coefficient (Chiang & Chen, 2023).

Inflation has a positive effect on returns in banking companies, but it is the interest rates that have a strong negative impact on the equity performance. The exchange rates also have a positive impact on stock returns (Ananda & Santoso, 2022). The demand-pull inflation is positively associated with corporate profitability, which drives stock-market yields and cost-push inflation is negatively associated with the same; high inflation might not impact profitability directly, but may indicate declining returns, thus affecting market responses (Park, 2023). Past studies dwell on FII as opposed to FDI, and it reveals the presence of bidirectional causality between FII inflows and Nifty returns, and unidirectional impact of Nifty returns on FII flows (Bulsara et al., 2015). Another study focuses on foreign portfolio investment (FPI), rather than FDI and concludes that FPI has a positive impact on Qatar stock-market performance measures suggesting that external capital inflow may positively impact returns and general market efficiency. On the other hand, foreign direct investment (FDI) has a negative and significant influence on bank equity returns and systematic risk in the banking sector in Turkey. The rise in FDI inflows is associated with the decline in bank returns, as well as, systematic risk, and shows that banks are more sensitive to international capital flows. Causal paths are established between FDI and equity of Garanti Bank and Vakubank and FDI, which highlight bank specific relationships with FDI. The long-run effects of openness and the VIX index on stocks are insignificant, but they have a strong impact on systematic risk, with the effect of openness increasing risk and VIX decreasing it. The policymakers are encouraged

to consider the returns and risks in the banking sector during the formulation of FDI-promoting policies because these are capable of reducing system risks that banks cannot avoid (Akyol, 2021). It is also established that FDI has positive impact on the development of stock-markets and that portfolio investment is positively associated with a market progress (Ikpesu & Abass, 2022). The general aim of the research is to evaluate the performance of the Indian stock-market by evaluating the impacts of major macroeconomic variables on investment returns with focus on the relationship between the gross domestic product growth and the returns on investment in India.

Methodology

Research Design

The current study follows a quantitative, explanatory study design and uses the time-series econometric tools to evaluate the impact of the macroeconomic factors on the return on investment (ROI) of the Indian equity market. The interest rate analyses both short-run and long-run relation between equity returns and macro-economic indicators selected strategically. The ARDL specification is selected because it is best suited to a small sample, as well as to variables with mixed integration orders.

Data Sources and Variables

The source of secondary data consisted of well-known institutions, that is, the Reserve Bank of India (RBI), the World Bank database, and official economic releases. The Nifty 50 index was used in extracting the equity returns, whereas the macro-economic factors used included inflation based on the Consumer Price Index, the USDINR exchange rate, and foreign direct investment (FDI) inflows. The data set consists of 23 observations that cover various economic periods.

Econometric Techniques

Before the model was estimated, the Augmented Dickey–Fuller (ADF) test has been used to test stationarity, and it has been determined that no variables were integrated to order two. The ARDL model was, therefore, estimated to not only explain the long-run equilibrium relationships but also the short-run dynamics. The Error-Correction Mechanism (ECM) is an estimation of the rate of adjustment of deviations of long-run equilibrium following short-term shocks based on the ARDL model.

Model Diagnostics and Hypothesis Testing

Diagnostic tests were conducted with inspections of residual plots, histogram tests, and time-series analysis of the residuals to verify the existence of normality, stability and non-existence of serial correlation. The hypotheses on the relationship between ROI and macro-economic variables were tested at standard levels of significance (1, 5 and 10). The existence of a statistically significant negative error-correction term supports the existence of a long-run relationship between variables.

Objectives

1. To examine the impact of inflation (CPI) on return on investment in the Indian stock market.
2. To evaluate the effect of USD–INR exchange rate movements on stock market return on investment.
3. To assess the influence of foreign direct investment (FDI) inflows on stock market returns.
4. To analyse the short-run and long-run relationship between selected macroeconomic variables and stock market returns using the ARDL approach.

Hypotheses of the Study

H_0: Inflation has no significant impact on stock market returns.
H_1: Inflation has a significant impact on stock market returns.

H_0: Exchange rate movements have no significant impact on stock market returns.
H_1: Exchange rate movements have a significant impact on stock market returns.

H_0: FDI inflows have no significant impact on stock market returns.
H_1: FDI inflows have a significant impact on stock market returns.

Analysis

Table 1

Augmented Dickey-fuller test for unit root
H0: Random walk without drift, d = 0

	Test statistic	Dickey–Fuller critical value 1%	5%	10%
Z(t)	**-5.190**	**-3.750**	**-3.000**	**-2.630**

MacKinnon approximate *p*-value for Z(t) = **0.0000**

Table 1 shows the statistics of the Augmented Dickey-Fuller (ADF). The calculated value of -5.190 is in the negative dimension, which is greater than the critical values of the 1, 5, and 10 percent of levels of significance, and the MacKinnon p-value of the value is 0.0000. This leads to the rejection of the null hypothesis of unit root and the series is therefore stationary at its level and is therefore subject to the usual time-series analytical methods.

Table 2

Augmented Dickey–Fuller test for unit root

H0: Random walk without drift, d = 0

	Test statistic	Dickey–Fuller critical value 1%	5%	10%
Z(t)	**-3.854**	**-3.750**	**-3.000**	**-2.630**

MacKinnon approximate *p*-value for Z(t) = **0.0024**

Table 2 gives the results of the Augmented Dickey Fuller (ADF) test. The statistic of -3.854 is lower than the critical values of 1, 5, and 10 of the significance levels and MacKinnon p-value of 0.0024 is smaller than 1. Based on this, the null hypothesis that the series has a unit root is rejected which means that the series is level stationary.

Table 3

Augmented Dickey–Fuller test for unit root

H_0: Random walk without drift, d = 0

	Test statistic	Dickey–Fuller critical value 1%	5%	10%
Z(t)	**-3.387**	**-3.750**	**-3.000**	**-2.630**

MacKinnon approximate *p*-value for Z(t) = **0.0114.**

Table 3 shows the Augmented Dickey-Fuller results (ADF). The test value of -3.387 is even smaller than the critical values of -3.387 being found at the 5 and 10% level, yet it is slightly above the 1% level. The null hypothesis of unit root is rejected at the 5 percent significance level with a MacKinnon p-value of 0.0114, thus, establishing levels of stationarity in the series.

Table 4

Augmented Dickey–Fuller test for unit root
H_0: Random walk without drift, d = 0

	Test statistic	Dickey–Fuller critical value 1%	5%	10%
Z(t)	**-3.029**	**-3.750**	**-3.000**	**-2.630**

MacKinnon approximate *p*-value for Z(t) = **0.0323.**

The Augmented DickeyFuller (ADF) test results are given in Table 4. The value of -3.029 is negative and less than the values of 5% and 10% critical values but is less than the 1% value. The MacKinnon p -value of 0.0323 is used to reject the unit -root null hypothesis at the 5 per cent significance level and therefore, we assume that the series is stationary at the levels and unit root.

Table 5

Augmented Dickey–Fuller test for unit root
H0: Random walk with drift, d = 0

	Test	t-distribution critical value		
	statistic	1%	5%	10%
Z(t)	**-2.670**	**-2.552**	**-1.734**	**-1.330**

p-value for Z(t) = **0.0078**

Table 5 presents the Augmented Dickey–Fuller (ADF) test results with a drift term. The calculated value of the test is found to be less than the critical values of the 1% level of significance, 5 percent level of significance and 10 percent level of significance. The related p-value of 0.0078 makes it reject the null hypothesis that does not assume drift, which means that the series is stationary despite having a deterministic trend.

Table 6

Regression Model

Number of obs = **23**
R-squared = **0.7698**
Adj R-squared = **0.7021**
Log likelihood = **-49.128226** Root MSE=**2.3826**

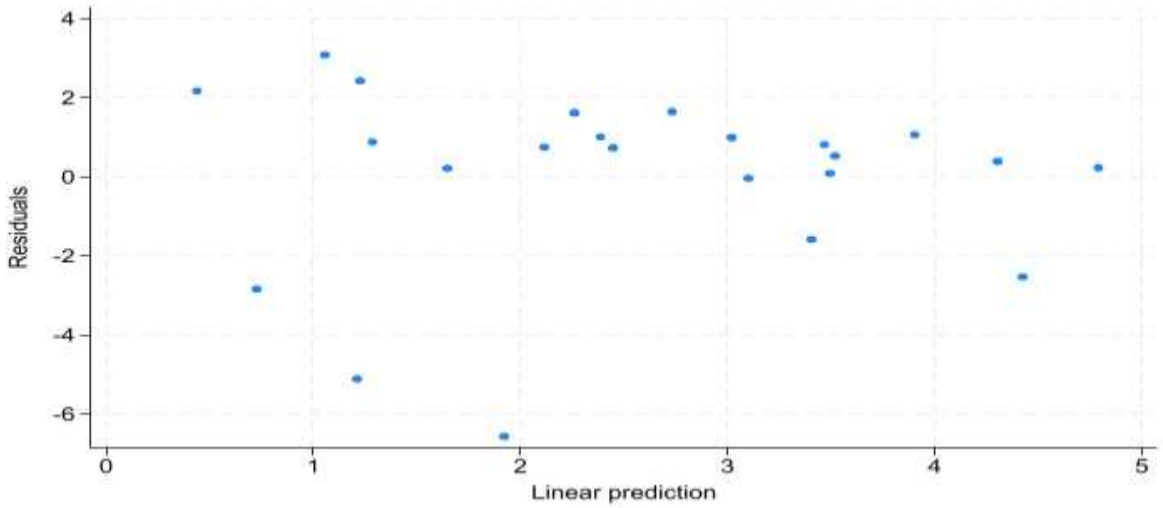
D.ihs_return	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
ADJ						
ihs_return L1.	**-1.418964**	**.1948131**	**-7.28**	**0.000**	**-1.829984**	**-1.007944**
LR						
CPIINPERCENT	**.0714338**	**.1755108**	**0.41**	**0.689**	**-.2988617**	**.4417293**
EXCHANGERATETOUSD	**.06483**	**.0335453**	**1.93**	**0.070**	**-.0059443**	**.1356044**
SR						
CPIINPERCENT D1.	**.5551934**	**.3430617**	**1.62**	**0.124**	**-.1686034**	**1.27899**
EXCHANGERATETOUSD D1.	**-.6793298**	**.268316**	**-2.53**	**0.021**	**-1.245427**	**-.1132325**
_cons	**-1.481877**	**3.608727**	**-0.41**	**0.686**	**-9.095626**	**6.131872**

Table 6 presents the results of the ARDL error-correction model examining the relationship between stock market returns and macroeconomic variables. The error-correction term is -1.419 which is statistically significant (-1.419, $p < 0.01$) and this proves that there exists a long run relationship and is a rapid adjustment to equilibrium after short run shock. The inflation (CPI) does not have a statistically significant effect on stock-market returns in the long run, but the exchange rate has a marginally significant positive effect in the 10 percent level. In the short term, the exchange rate changes have a negative statistically significant impact on returns ($p < 0.05$), whereas changes in short-term inflation are

not significant. In general, there is high explanatory power of the model and the adjusted R 2 is 0.70 and thus it implies that the variables incorporated in the model explain a significant percentage of the variation in stock-market returns.

Figure 1

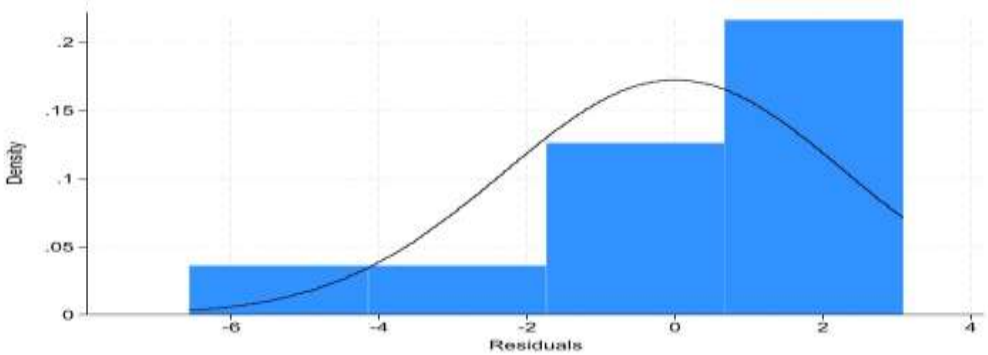
Residual Plot



The plots of residuals against fitted values are in figure 1. The residuals seem to be randomly distributed about zero and no strong systematic pattern exists hence the specifications of the model are correct and the assumption of linearity and independence is also met reasonably. No strong evidence of heteroskedasticity can also be pointed out as there is no clear funnel shape.

Figure 2

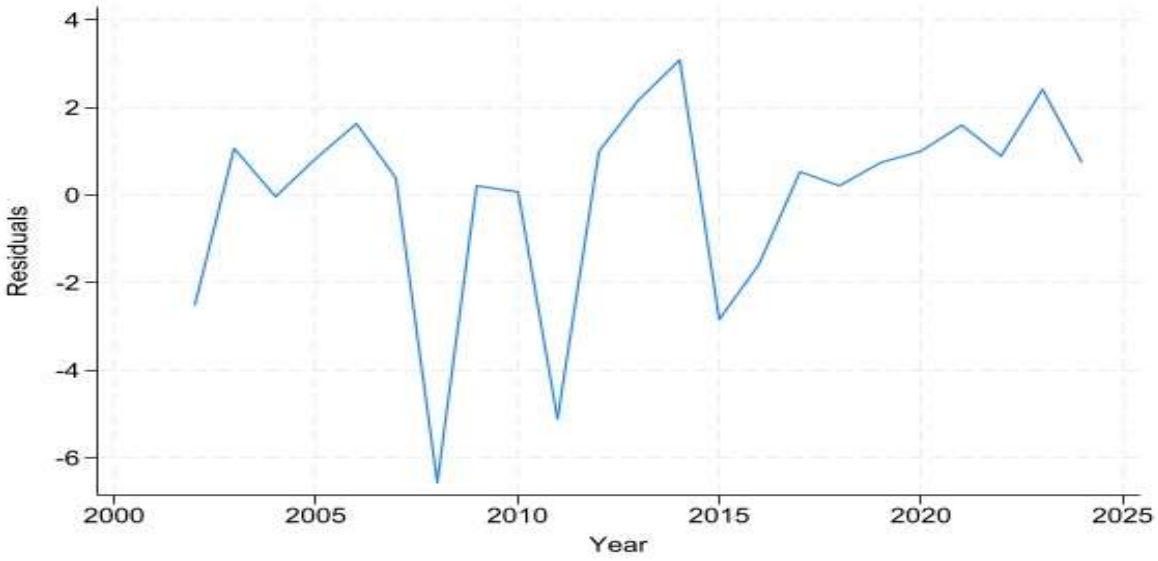
Histogram of Residuals



The histogram of the residuals in the figure 2 shows a normal density curve of the residual. The distribution of the residual value lies in the range that is approximately normal, there is neither extreme skewness nor excessive kurtosis. This indicates that there is an acceptable level of normality in the regression residues and the validity of statistical inference based on the model is acceptable.

Figure 3

Time series Plot of Residuals



The plot shown in Figure 4 depicts the time-series plot of regression residuals. The residuals do not show any tendency or trend or any systematic pattern, meaning that the model is sufficiently sufficient to capture the underlying dynamics of the data. Despite the temporary spikes in some of the periods, they do not indicate structural instability or serial dependence hence affirming the time stability of the estimated model.

Figure 4

CPI percent

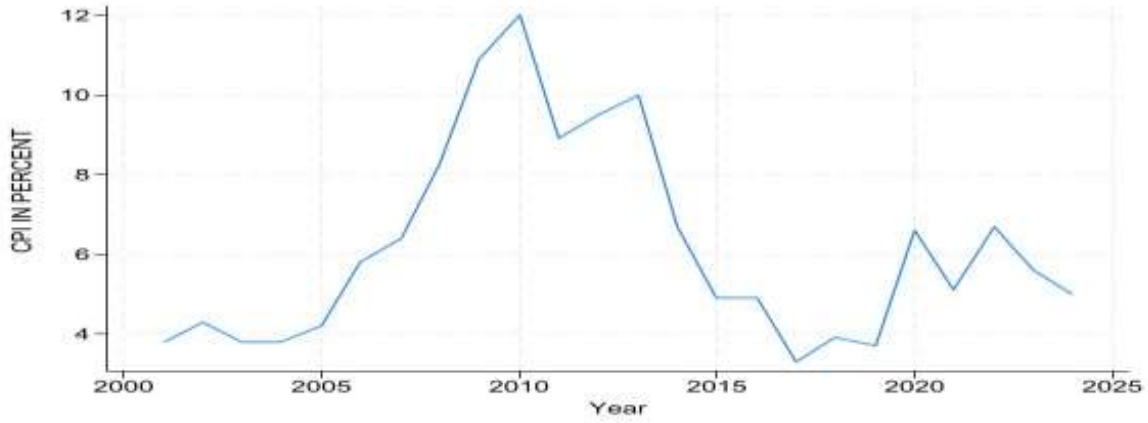
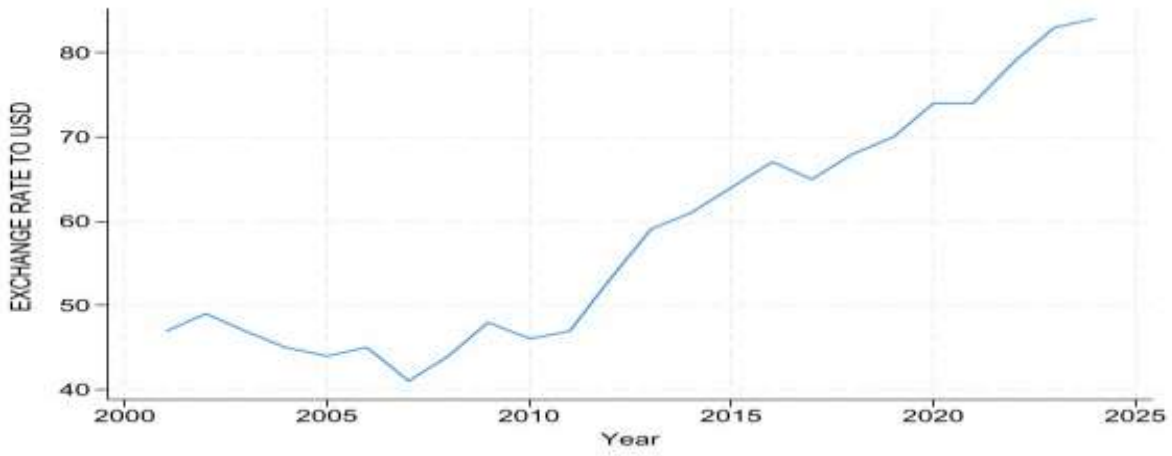


Figure 4 shows the time-series development of the inflation (CPI) during the study. The inflation is quite sporadic, and its peak was observed at the end of the 2000s, after which it stabilized to a less active level in the mid-2010s and began to fluctuate again in the recent years. The shifting macroeconomic trends and policy settings support this pattern, and hence the importance of inflation as a major explanatory variable in the modelling of stock-market returns.

Figure 5

Exchange Rate Dynamics



The figure 5 shows the time-series behaviour of the exchange rate between the three periods of the study between the INR and the US dollar. The exchange rate indicates a definite positive trend which implies a gradual decline of the Indian rupee against the US dollar, with irregular bursts of variability between them. This long-term trend illustrates the relevance of exchange-rate dynamics as a macroeconomic driver of returns in the Indian stock-market.

Figure 6

IHS return

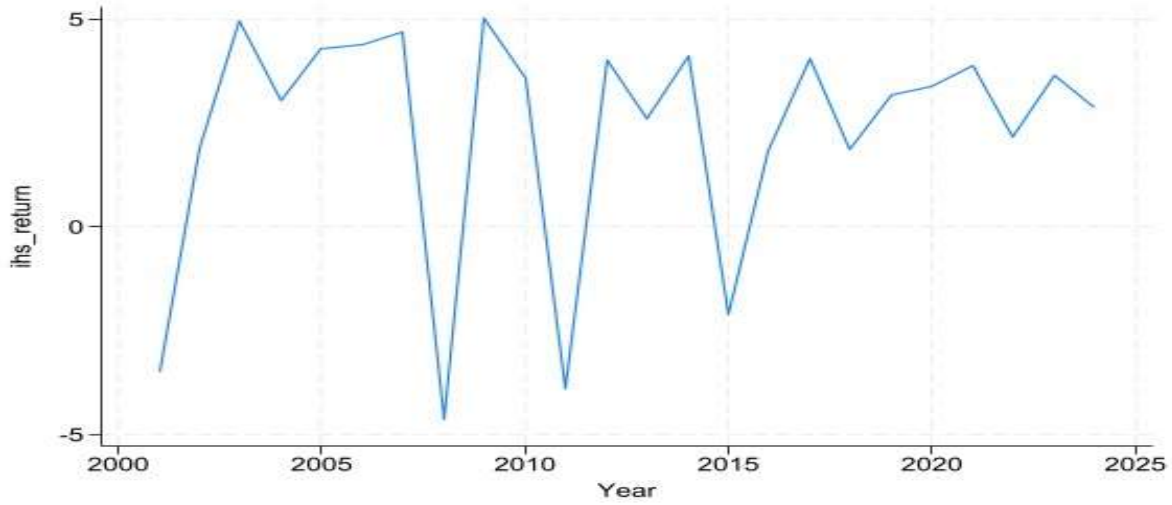


Figure 6 indicates how the insurance returns changed every year throughout the years, with drastic changes over the years. Most years show positive returns which tend to stay around the range of 2 -5 per cent, however we have had several extraordinary negative returns, which are highly negative, and we associate these with larger economic or financial shocks. Nevertheless, even with such occasional declines, the series has shown that recovery is strong following all the declines, and it recovers quickly to positive values. The returns have been seen to be not so volatile and generally positive in the recent years, which would mean a higher resilience and predictability of performance in comparison to the previous half of the period.

Limitations

The analysis of the macroeconomic variables is limited to the selected variables of inflation, exchange rate, and FDI only whilst the other variables which may significantly influence the stock-market returns including interest rates, GDP growth, political uncertainty, and global market conditions are not included.

Conclusion

The study provides empirical information with respect to the nexus between equity market returns on the one hand and salient macroeconomic variables on the other hand in the Indian context. The results support the presence of a long-run equilibrium interrelationship between investment returns and macroeconomic variables, which are statistically significant and have a negative error-correction coefficient. The analysis reveals that the fluctuation of the exchange rates is one of the determinant driving factors of the performance of the equity markets, especially in the short term. The depreciation of the Indian rupee against the United States dollar has a significant negative impact on the market returns which highlights how the currency has a fast transmission process to the domestic securities valuation. On the other hand, the inflationary pressures do not show any statistically significant effect on returns in either time frame. This attenuation means that over the time of the study, the Indian equity returns may not be a useful inflation hedge, which is contrary to traditional expectations in developed markets. The extended meaning of the findings is that the Indian equity market is highly sensitive to extrinsic sector factors and monetary variations. The exchange rate stability therefore comes out as a determinant that is critical to maintaining investor confidence and generating market growth in the long run. The policymakers must thus focus on good macro-economic and currency management in order to reduce volatility and stabilize the money climate. Investment-wise, the research provides practiceable information to both new and old entrants. Explaining how macro-economic environments can moderate investment returns, the study stimulates serious, evidence-based decision-making that could help to strengthen portfolios. The research, however, is constrained by some limitations, especially a small sample size and the lack of other variables that could better explain the research like interest rates and sentiment measures. Future research must strive to expand the analytical model, which includes a wider set of macro-economic factors and industry specificities to narrow the insight into the complex set of forces that impact Indian equity performance. These extensions would significantly contribute to the relevance and practical application of the findings to the policy and thus enhance both the scholarship and practice of the findings.

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