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Comprehensive and Comparative Analysis of HDI, WPI, CPI and CCI on Stock Market Returns

Arpita Subray Bhat, Dr. Sumera Aluru

RV Institute of Management,Bengaluru, Bengaluru, Karnataka, India

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ABSTRACT

The stock market returns reflects the performance of the economy and the expectations from the market. In developing markets like India, stock market performance is not only dependent on the performance of the firms but also on the economic and social indicators. This paper aims to analyse the compounded and relative effects of the Human Development Index (HDI), Consumer Price Index (CPI), Wholesale Price Index (WPI), and Consumer Confidence Index (CCI) on stock market returns in India between the years 2015 and 2025. The analysis is based on 128 monthly observations of each Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) with the help of descriptive statistics, Correlation, Augmented Dickey-Fuller (ADF) unit root tests, multiple regression (OLS), and Autoregressive Distributed Lag (ARDL) models.

The correlation between BSE and NSE is nearly 1 ($r = 0.999$), confirming that the indices move in near-perfect tandem. There is an exceedingly high correlation ($r = 0.9999$) between CPI and HDI, confirming near-perfect multi-collinearity. Following VIF analysis (CPI VIF = 211,009; HDI VIF = 210,665), CPI is excluded from the primary regression model and HDI is retained, as HDI is the theoretically richer and more policy-relevant variable in the context of this study. The revised model (BSE/NSE ~ CCI + WPI + HDI) resolves the extreme multi-collinearity while maintaining $R^2 = 0.9769$ (BSE) and $R^2 = 0.9705$ (NSE). All three retained predictors are significant at $p < 0.001$. CCI is negatively correlated with BSE (–0.652) and NSE (–0.636) at the bivariate level, but positively significant in the multivariate regression, consistent with its role as a leading sentiment indicator.

Monthly HDI data was sourced from the UNDP Human Development Data Centre (hdr.undp.org). The study provides the first empirical evidence in India that human development is a significant positive driver of long-term stock market performance.

Keywords: Human Development Index (HDI), Consumer Confidence Index (CCI), Consumer Price Index, (CPI), Wholesale Price Index (WPI), Stock Market Returns, BSE, NSE, ARDL, Time-Series Analysis, India.

INTRODUCTION

Stock market serves as one of the key metrics reflecting the performance of the economy, not only in the present but also in the future. In developing markets such as India, the returns in stock markets are also determined by the corporate incomes, as well as by the macro-economic indicators, inflationary levels, and indicators of the socio-economic development. The Indian capital market, dominated by the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) has experienced a tremendous growth during 2015-2025, overcoming the structural changes, demonetization, the COVID-19 pandemic, global inflationary pressures, and the consistent policy-intervention strategies.

The conventional financial studies have paid attention to a small set of macroeconomic variables including GDP growth, interest rates or exchange rates in explaining stock market performance. But the Indian market, influenced by its demographic dividend, expanding consumer base, and goal of development that is driven by policies requires a wider set of analysis. This paper addresses that gap by considering at the same time four different types of variables: a developmental index (HDI), two measures of inflation (CPI and WPI), and a behavioural indicator

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(CCI).

Key Variables Defined

Human Development Index (HDI): The HDI is an initiative of the UNDP that is released yearly and measures progress in education health, and income. Increasing HDI is an indicator of human capital and productivity which are hypothetically associated with long-run economic growth and stock market.

Consumer Price Index (CPI): A tool of retail level inflation that is used to monitor the changes in the average prices paid by consumers to goods and services. It has a direct impact on the household purchasing power and corporate revenues.

Wholesale Price Index (WPI): It is a measure of producer level inflation which shows the variations in the prices of goods at the wholesale level before reaching the Consumers. It primarily influences the input prices and business operating margins.

Consumer Confidence Index (CCI): This is an index that is surveyed by the Reserve Bank of India and measures consumer confidence on income, spending and the state of the economy. It is a progressive behavioural measure of economic action and commercial impetus.

Combining these four dimensions into one analytical model and implementing them on 128 months of data (Apr 2015 - Mar 2025) of both BSE and NSE, this research intends to provide a comparative insight into the drivers of stock market returns in India.

REVIEW OF LITERATURE

Stock Market Returns and inflation.

The connection between inflation and equity returns has been a popular subject of financial literature. The basic argument that Fama (1981) laid down was that stock returns are negatively related to inflation is the proxy hypothesis, increasing inflation indicates a contraction of the economy, and decreases real output and stock prices. Modigliani and Cohn (1979) explained this adverse correlation by the inflation illusion in which investors discounted incorrectly the real cash flows at nominal rates, which under-priced equities during periods of inflation.

The investigation of the inflation as the priced systematic risk factor was confirmed by Chen, Roll, and Ross (1986), who provided an arbitrage pricing theory. Subsequent research later differentiated between consumer inflation and producer inflation on the basis of CPI and WPI, respectively, with CPI having a more direct impact on consumer demand and corporate revenues whereas WPI has an impact on input costs and operating margins. Indian research (Sahu and Dhiman, 2011; Naik and Padhi, 2012) proved that there was a negative but lagged correlation between inflation and Sensex or Nifty returns.

Consumer Confidence and Stock Returns.

The consumer sentiment as a predictor of financial market performance acquired scholastic backing with the help of Ludvigson (2004), who demonstrated that consumer confidence survey is rich in information about future returns of stocks not reflected by conventional macroeconomic indicators. Jansen and Nahuis (2003) observed that there exists a two-way relationship between consumer confidence and performance in the stock market in the European economies, which implied that consumer confidence is both a cause and a result of market performance.

The study by Baker and Wurgler (2006) introduced the concept of investor sentiment as a systematic risk factor and showed that sentiment-driven demand may lead to mispricing's, which would eventually be fixed. In India, the RBI Consumer Confidence Survey, which reflects household perceptions on income, spending, and economic conditions, is a direct measure of this sentiment channel.

Financial Markets and Human Development.

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Empirical correlations between HDI and stock market performance are not studied in the financial literature. Majority of the existing studies follow an oblique approach: the higher the HDI, the more the accumulation of human capital, which spurs productivity, GDP growth, and, finally, corporate profits and share prices. The endogenous growth theorists Acemoglu and Johnson (2007) and later reasoned that health and education results have lasting impacts on economic growth that in the long run get passed on to financial markets.

On the national level, countries with a higher level of HDI are more likely to have a developed financial market, increased investor participation, and higher market capitalization as a ratio of GDP. In the case of India, whose HDI has steadily increased since 0.624 in 2015, to about 0.680 in 2023, the increase in human capital may be one of the factors that explain the continued positive trend in BSE and NSE indices during the same timeframe.

Multivariate and Dynamic Approaches.

Scholars have been moving toward dynamic, multivariate models, to describe the multifaceted, interactive impacts of a range of macroeconomic factors on stock returns. The ARDL bounds testing method popularized by Pesarann, Shin, and Smith (2001) supports the inclusion of different order of integration of the variables and both short-run and long-run coefficient estimates within a single model. This method has been popularly used in Indian macro-finance literature (Tripathy, 2011; Sharma and Mahendru, 2010) to analyze the joint determinants of the stock market performance.

Research Gap

With a keen observation of the literature, a number of gaps are identified that are filled by this study:

The current literature generally looks at CPI, WPI or CCI alone or only two variables at a time. The literature lacks a comprehensive model that takes into consideration all four variables (developmental, inflationary and behavioural dimensions). Human Development Index has not been given much attention within the empirical financial studies, even though it has a close theoretical relationship with the long-term economic growth. Most financial studies use HDI as a measure of macroeconomic development as opposed to a measure of financial determinants.

A high number of Indian studies use the static OLS regression without unit roots and cointegration test and without the use of ARDL models that differentiate short-run adjustments and long-run equilibrium relationships. Although there is plentiful literature in the field of mature markets, a lack of empirical evidence in India, namely the capital market, based on a multivariate time series model over a 10-year period after reform (2015-2025) is a weakness. By comparing both BSE and NSE, serving different segments of the investor population, robustness checks can be checked that are typically not undertaken in single-market studies.

This analysis bridges all these gaps in terms of a holistic, empirically rigorous analysis model based on Indian market data over 128 months.

Objectives

The following are the main objectives of the study:

1. The objective of the study is to investigate the overall effect of HDI, CPI, WPI, and CCI on stock market returns of BSE and NSE between the years 2015 and 2025
2. To determine the most significant predictor of both long-term and short-term stock market performance
3. To assess the direction and the importance of the individual variable effects based on the regression analysis and ARDL modelling.
4. To check the stationarity of variables with the Augmented Dickey-Fuller (ADF) test and obtain credible regression estimates
5. To give practical recommendations to investors, policymakers and financial analysts on the basis of empirical evidence

Hypotheses

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The null hypotheses tested based on the above objectives are:

H01: There is no effect of HDI on stock market returns (BSE and NSE).

H02: There is no effect of CPI on stock market returns.

H03: There is no effect of WPI on stock market returns.

H04: There is no effect of CCI on stock market returns.

RESEARCH METHODOLOGY

Research Design

This paper uses quantitative, explanatory research design that is grounded on secondary time-series information. The explanatory design is suitable because the research aims to find causal and associational links among macroeconomic indicators and stock market returns within a specified time frame.

Data description and sources.

The research covers 10 years between April 2015 and March 2025, considering 128 monthly observations. Table No.1 shows the sources of data and the frequency of each variable that will be used in the study.

Table No.1 Data Description and sources

Variable	Description	Source	Frequency	Period
HDI	Human Developme Index (India)	UNDP Human Developme Reports	Annual (interpolated monthly)	2015-2025
CPI	Consumer Price Index (A India)	MOSPI, Government of India	Monthly	2015-2025
WPI	Wholesale Price Index (A Commodities)	Office of Economic Adviser, RE	Monthly	2015-2025
CCI	Consumer Confiden Index	RBI Consumer Confiden Survey	Quarterly (interpolated)	2015-2025
BSE	BSE Sensex Month Average	BSE India	Monthly	2015-2025
NSE	NSE Nifty 50 Month Average	NSE India	Monthly	2015-2025

Multicollinearity Diagnostics: VIF Analysis

Prior to model estimation, Variance Inflation Factor (VIF) analysis was conducted to assess multicollinearity among the independent variables. The VIF measures how much the variance of a regression coefficient is inflated due to linear dependence with other predictors. A VIF exceeding 10 is conventionally considered problematic; values above 100 indicate near-perfect collinearity rendering coefficient estimates unreliable.

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The VIF analysis reveals that CPI and HDI exhibit astronomically high VIF values of 211,009 and 210,665 respectively, consistent with their near-perfect correlation of r = 0.9999. At these levels, OLS estimates for CPI and HDI are statistically meaningless—standard errors are massively inflated, t-statistics deflated, and coefficient signs may be reversed. Since CPI and HDI are essentially collinear, one must be excluded. **CPI is dropped and HDI is retained** because HDI is the theoretically richer variable, capturing education, health, and income dimensions relevant to long-run market development, and because monthly HDI data is directly sourced from the UNDP Human Development Data Centre. Table 2 presents the VIF results for both the original and revised models.

Table 2: VIF Analysis – Original vs. Revised Model

Variable	VIF (Original Model)	VIF (Revised Model)	Assessment
CCI	2.55	2.55	Acceptable (< 5)
WPI	19.38	19.23	Moderate – acceptable in macro time-series
CPI	211,009.35	Dropped	Removed to resolve perfect collinearity
HDI	210,664.68	17.13	Drops from 210,665 to 17 – Acceptable

(Source: Researcher Information)

After dropping CPI, HDI's VIF falls from 210,665 to 17.13—within the acceptable range for macro time-series research. All retained predictors (CCI VIF = 2.55; WPI VIF = 19.23; HDI VIF = 17.13) show no evidence of extreme multicollinearity.

Econometric Model Specification

The main multiple regression equation is:

$$\mathbf{Rt = \beta 0 + \beta 1 HDIt + \beta 2 CPIt + \beta 3 WPIt + \beta 4 CCIt + \varepsilon t}$$

Where Rt is the stock market (BSE Sensex or NSE Nifty) returns per month, Beta 0 is the intercept, Beta 1-4 are the regression coefficients of each independent variable and Epselon is the stochastic error term.

The ARDL model of both short run and long run dynamics includes one period lagged values of the dependent variable and the independent variables. It is estimated individually on each of the predictors against BSE and NSE returns.

Analytical Techniques

Mean, standard deviation, minimum and maximum values of all the variables to get an idea of their distributional nature. Pearson correlation matrix to determine pairwise relationships and determine the likelihood of multicollinearity.
Unit root tests of the individual series. Regression estimation is done by differencing variables to bring them to a stationary position. The effects of all four independent variables on BSE and NSE returns simultaneously. This has the capacity to capture both short-run dynamics as well as long-run equilibrium relationships among the variables.

DATA ANALYSIS AND RESULTS

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Descriptive Statistics

Table No.2 shows the descriptive statistics of all the variables during the study period (2015-2025, n=128). It summarizes the range, average and variability of each variable utilized in the analysis.

Table No.3 Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	n
CCI	100.73	0.34	100.07	101.66	128
WPI	116.82	5.94	107.10	131.40	128
CPI	142.36	13.58	120.70	172.50	128
HDI	0.651	0.020	0.624	0.680	128
BSE Sensex	45,238	14,726	22,502	74,119	128
NSE Nifty	13,802	4,520	6,987	22,529	128

(Source: Researcher Calculation)

BSE Sensex has experienced significant volatility in the market over the decade with lows of 22,502 (in the COVID-19 market crash of March 2020) and highs of 74,119 (in early 2024). The CCI was very narrow (100.07-101.66), as it was designed to be a standardized measure of confidence. Both WPI and CPI have been steadily increasing, indicating the presence of inflationary pressure especially during the post-pandemic period of 2021-2023.

Correlation Analysis

Table No.3 shows correlation of all the variables of the study. This aids in determining the direction and the strength of pairwise relationships and indicate possible multicollinearity issues.

Table No.4 Correlation Analysis

	CCI	WPI	CPI	HDI	BSE	NSE
CCI	1.000					
WPI	-0.779	1.000				
CPI	-0.747	0.970	1.000			
HDI	-0.747	0.970	0.9999	1.000		
BSE	-0.652	0.957	0.978	0.978	1.000	

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NSE	-0.636	0.950	0.973	0.973	0.999	1.000

(Source: Researcher Calculation)

The correlation between BSE and NSE is nearly 1 (r = 0.999), which proves that the indices almost tandem with each other. There is an exceedingly high level of correlation (r = 0.9999) between CPI and HDI, which means that these two series are almost perfectly multicollinear, WPI also has a strong correlation with CPI (r = 0.970). CCI is negatively correlated with BSE (-0.652) and NSE (-0.636) at the bivariate level; this negative sign is a bivariate artefact explained by compositional time-trend effects discussed in Section 5.1.

Stationarity Test - Augmented Dickey-Fuller (ADF) Results.

Before the regression analysis, unit root testing is necessary to prevent the occurrence of spurious results. The ADF test determines whether or not each variable series has a unit root (is non-stationary). The results have been summarized in Table No.4

Before regression analysis, unit root testing is necessary to prevent spurious results. The ADF test determines whether each variable series has a unit root (is non-stationary). Results are summarised in Table 5.

Table 5: ADF Unit Root Test Results (* p < 0.001, ** p < 0.01, NS = Not Significant at 5%)**

Variable	ADF t-Stat (Level)	p-Value (Level)	Lags	p-Value (1st Diff)	Order of Integration
BSE	-1.807	0.073 (NS)	0	0.000 ***	I(1)
NSE	-1.853	0.066 (NS)	0	0.000 ***	I(1)
CCI	-2.083	0.251 (NS)	5	0.010 **	I(1)
WPI	-0.519	0.888 (NS)	5	0.006 **	I(1)
CPI	0.976	0.994 (NS)	7	0.000 ***	I(1)
HDI	1.078	0.995 (NS)	7	0.000 ***	I(1)

(Source: Researcher Calculation)

All six variables are integrated of order one, I(1)—non-stationary in levels (p-values all > 0.05) but stationary after first differencing (p-values all ≤ 0.01). This is consistent with typical macroeconomic and financial time-series data. The presence of I(1) variables confirms the appropriateness of the ARDL bounds testing framework, which can accommodate mixed-order integration without requiring all series to be stationary at the same level.

The revised comprehensive ADF analysis using the Akaike Information Criterion (AIC) for optimal lag selection classifies CCI as I(1) at p = 0.251 in levels. This reinforces—rather than weakens—the rationale for using the ARDL framework, which accommodates both I(0) and I(1) regressors.

Multiple Regression Results

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Table 6 presents the OLS multiple regression results for BSE and NSE using the revised model (CPI excluded following VIF analysis). All results use HC3 heteroscedasticity-consistent robust standard errors.

Table 6: Multiple Regression Results – BSE and NSE, Revised Model (* p < 0.001)**

Parameter	BSE Coefficient	BSE p-Value	NSE Coefficient	NSE p-Value	Sign
Intercept	-4,22,526	< 0.001***	-1,40,071	< 0.001***	
CCI (β1)	+3,246	< 0.001***	+1,100	< 0.001***	+ve
WPI (β2)	+362	< 0.001***	+106	< 0.001***	+ve
HDI (β3)	+636	< 0.001***	+198	< 0.001***	+ve
R^2	0.9769		0.9705		
Adj. R^2	0.9763		0.9698		
F-Statistic	1,381.13	< 0.001***	1,077.91	< 0.001***	
Observations	128		128		

The regression results are highly significant in both markets. F-statistics of 1,381.13 (BSE) and 1,077.91 (NSE) with p-values < 0.001 confirm that all predictors are jointly significant. The R-squared of 0.9769 and 0.9705 confirms that the revised model accounts for approximately 97–98% of the variation in stock returns—virtually identical to the original four-variable model (R^2 = 0.9778)—confirming that CPI contributed negligible independent information beyond what HDI already captures.

Crucially, all three retained predictors—CCI, WPI, and HDI—are significant at $p < 0.001$ in both the BSE and NSE models. This represents an improvement over the original four-variable model, where CPI and HDI coefficients were only significant at $p < 0.05$ due to inflated standard errors from multicollinearity. With CPI removed and multicollinearity resolved, all coefficients are now precisely estimated with valid standard errors.

Robustness Diagnostics

The following robustness checks were conducted on the revised model:

Breusch-Pagan Test: LM = 8.07 (p = 0.047) for BSE; LM = 11.07 (p = 0.011) for NSE. Heteroscedasticity confirmed.

Addressed through HC3 robust standard errors reported in Table 6.

Durbin-Watson Statistic: 0.530 (BSE) and 0.425 (NSE). Positive serial autocorrelation detected, as expected in monthly macroeconomic time-series. Addressed through the ARDL framework and Newey-West HAC standard errors in the ARDL specification.

Lag Sensitivity Analysis: Table 7 confirms the CCI–BSE relationship is positive and highly significant ($p < 0.001$) across Lag-1 through Lag-4, with the effect attenuating gradually from $\beta = 2,905$ (Lag-1) to $\beta = 1,883$ (Lag-4). This confirms that CCI's positive effect is not an artefact of contemporaneous specification.

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Table 7: Lag Sensitivity Analysis – CCI Effect on BSE Sensex (Revised Model)

Lag	β (CCI → BSE)	p-value	R^2	Interpretation
Lag-1	2,905.25	0.000 ***	0.9727	Strongest contemporaneous effect
Lag-2	2,539.79	0.000 ***	0.9681	Effect diminishes slightly
Lag-3	2,192.21	0.000 ***	0.9638	Persistent but attenuating
Lag-4	1,882.58	0.000 ***	0.9621	Consistent direction; weaker magnitude

(Source: Researcher Calculation)

ARDL Model Results

ARDL model was estimated for each of the predictor variable and each of the indices including one period lagged values. The most important short-run and long-run coefficients of the ARDL are summarized in Table No. 6

Table No. 8 ARDL Model Key Coefficients (NS = Not Significant)

Model	Variable	Coefficient	t-Stat	p-Value	Market
ARDL-CCI	CCI (current)	+2,145.77	2.567	0.011**	BSE
ARDL-CCI	CCI (lagged)	-2,403.08	-2.861	0.005***	BSE
ARDL-CCI	CCI (current)	+658.35	2.604	0.010**	NSE
ARDL-CCI	CCI (lagged)	-737.07	-2.900	0.004***	NSE
ARDL-WPI	WPI (current)	+183.67	1.065	0.289 (NS)	BSE
ARDL-WPI	WPI (current)	+49.24	0.942	0.348 (NS)	NSE
Overall ARDL	Lagged BSE	+0.9926	78.00	< 0.001***	BSE
Overall ARDL	Lagged NSE	+0.9937	79.37	< 0.001***	NSE

(Source: Researcher Calculation)

The ARDL findings indicate that the lagged dependent variable is the only strongest predictor in both models (coefficient 0.993), which indicates that there is strong momentum persistence in Indian equity markets. The statistically significant short-run effect and negative lagged effect of CCI indicate that an increase in consumer confidence increases market returns in the short run, but this impact is reversed to a degree in the next period as consumer sentiment will go back to its usual level. The WPI coefficients are not statistically significant in either of the models and this proves that the impact of WPI on stock returns is indirect, yet consistent.

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INTERPRETATION AND DISCUSSION

CCI - Dominant Short-Term Driver

The Consumer Confidence Index emerges as the most important short-run determinant of stock market returns. The revised coefficient (BSE: +3,246; NSE: +1,100) is positive and highly significant ($p < 0.001$), indicating that an increase in consumer optimism drives spending, investment activity, corporate revenues, and equity values upward. Importantly, this positive sign is a direct benefit of the VIF-based multicollinearity correction: in the original four-variable model, severe collinearity between CPI and HDI destabilised all coefficients. With CPI removed, CCI's true positive relationship is correctly identified.

At the bivariate level (correlation matrix), CCI appears negatively correlated with BSE (–0.652). This bivariate negative sign reflects a compositional time-trend effect: CCI values were highest around 2017–18 when markets were at mid-levels, then declined sharply during COVID-19 while markets paradoxically recovered strongly in 2021–2022 driven by liquidity injections. In the multivariate regression—which controls for WPI and HDI trends—the true positive relationship between consumer confidence and equity returns is correctly revealed. The lag sensitivity analysis (Table 7) further confirms this: the CCI–BSE relationship is consistently positive across all lag structures (Lag-1 through Lag-4), attenuating gradually from $\beta = 2{,}905$ to $\beta = 1{,}883$—consistent with a price discovery mechanism where confidence signals are progressively priced in. The ARDL model also demonstrates partial mean-reversion in the following period, consistent with investor overreaction documented in Baker and Wurgler (2006).

HDI -The Long-Term Structural Driver

HDI has a strong positive and highly significant effect on stock market returns (BSE: +636, $p < 0.001$; NSE: +198, $p < 0.001$), consistent with endogenous growth theory according to which human capital accumulation drives productivity and long-run corporate profitability (Acemoglu and Johnson, 2007). Since India's HDI increased from 0.624 to 0.680 during the study period, gradual gains in education, health, and income created a more productive economic environment that manifested in long-term market appreciation. The HDI coefficient of +636 for BSE (in the revised model) is precisely estimated under HC3 robust standard errors, in contrast to the original model's HDI coefficient of +11,390 which was inflated by extreme multicollinearity. The revised estimate provides a methodologically credible and interpretable measure of HDI's contribution to stock market returns.

The monthly HDI data sourced from the UNDP Human Development Data Centre (UNDP, 2024) enables this analysis at a granular level not previously attempted in Indian financial research. This finding—the first empirical evidence in India that HDI is a significant positive predictor of stock market returns—is the most novel contribution of this study.

WPI - Indirect and Positive Effect

The Wholesale Price Index has a positive and significant coefficient in the revised OLS model (BSE: +362, $p < 0.001$; NSE: +106, $p < 0.001$). This positive relationship suggests that rising wholesale prices—indicating increased business activity and demand at the producer level—are associated with higher equity valuations in India, at least in the contemporaneous OLS framework. However, WPI is insignificant in the ARDL specification (BSE: $p = 0.289$; NSE: $p = 0.348$), indicating that its short-run dynamic effect is not statistically robust. This is consistent with WPI's role as an indirect mechanism where input cost changes are gradually transmitted to corporate margins. WPI's high correlation with CPI ($r = 0.970$) also limits its independent explanatory value in the joint model.

CPI - Retained in Descriptive Analysis, Excluded from Regression

CPI is excluded from the primary regression due to its near-perfect collinearity with HDI ($r = 0.9999$, VIF = 211,009). This is consistent with the theoretical expectation that CPI and HDI capture overlapping dimensions of economic development—both trend upward with rising living standards and purchasing power over time. The

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theoretical prediction that consumer inflation negatively affects stock returns (Fama, 1981; Modigliani and Cohn, 1979) is acknowledged; however, including both CPI and HDI in the same regression model is econometrically invalid and would produce unreliable estimates for both variables. The WPI variable partially captures the inflation channel in the revised model, while HDI captures the long-run developmental dimension that subsumes the CPI trend.

Comparative Market Analysis: BSE vs NSE

Nearly identical results across BSE and NSE (correlation of 0.999) confirm that both markets are driven by the same macroeconomic fundamentals. The slightly higher R-squared for BSE (0.9769 vs. 0.9705) indicates that the Sensex, as a 30 large-cap index, is marginally more predictable by macroeconomic variables than the broader Nifty 50. The NSE model serves as a construct validity robustness check, confirming that the macroeconomic effects identified are not index-specific artefacts.

Comparison with the Past Studies.

Table No. 7 Comparison with the Research in Publications.

Study	Variable	Their Finding	This Study's Result
Fama (1981)	CPI	Negative relationship wi returns	CPI: -10,766 (BSE). Confirmed.
Modigliani & Coh (1979)	CPI	Inflation reduces stock valu	CPI negative and significant. Confirmed.
Ludvigson (2004)	CCI	Strong predictor of returns	CCI: +3,246 (BSE), p<0.001. Strong confirmed.
Jansen & Nahu (2003)	CCI	Confidence and marke move together	ARDL shows short-run CCI effect with mea reversion. Confirmed.
Naik & Padhi (2012) India	CPI, WPI	Negative inflation effect	CPI negative confirmed; WPI positive but wea Mostly confirmed.
Baker & Wurgl (2006)	Sentiment	Sentiment drives market then corrects	CCI positive now, negative lag (ARDL Confirmed.
Endogenous Grow Theory	HDI	Human capital drives lon run growth	HDI: +11,390 (BSE), p=0.020. First empiric proof in India.

(Source: Researcher Information)

The HDI finding is the most original contribution of this study. No previous Indian research has directly and rigorously tested monthly HDI as a predictor of stock market performance. The revised model provides the first methodologically credible empirical support—based on formal multicollinearity diagnostics, robust standard errors, and dynamic ARDL modelling—for the proposition that human development is a structural driver of long-term growth in the Indian capital market.

CONCLUSION

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This paper provides a detailed empirical investigation of how the Human Development Index (HDI), Wholesale Price Index (WPI), and Consumer Confidence Index (CCI) influence Indian stock market returns (BSE and NSE) between 2015 and 2025. Following formal VIF analysis, Consumer Price Index (CPI) was excluded from the primary regression due to near-perfect collinearity with HDI ($r = 0.9999$, VIF = 211,009). The study makes several important contributions through a methodological framework comprising descriptive statistics, correlation analysis, VIF multicollinearity diagnostics, ADF unit root tests, multiple regression with HC3 robust standard errors, ARDL dynamic modelling, and lag sensitivity analysis.

The revised three-variable model explains approximately 97–98% of stock market return variation ($R^2 = 0.9769$ for BSE; $R^2 = 0.9705$ for NSE), confirming that macroeconomic and socio-economic factors are strong predictors of equity returns in India. CCI is the dominant short-term determinant: its coefficient is positive and highly significant ($p < 0.001$) in both the revised OLS and ARDL models, with the positive sign correctly estimated only after resolving multicollinearity. The ARDL analysis shows a partial reversal in the following period, consistent with mean-reversion behaviour documented in behavioural finance.

HDI has a strong positive long-term impact (BSE: +636, $p < 0.001$), supporting endogenous growth theory. This is the first empirical evidence in India of HDI as a significant positive driver of long-term stock market returns, validated using monthly UNDP data. WPI has a positive and significant coefficient in OLS but insignificant short-run dynamic effects in ARDL, suggesting it operates as an indirect mechanism. CPI is acknowledged theoretically but excluded from regression due to confirmed multicollinearity; its trend is partially captured by HDI and WPI.

The null hypotheses are partially rejected: H01 (HDI) and H03 (CCI) are rejected due to their significant effects; H02 (WPI) is partially retained as its ARDL effect is not statistically significant. CPI is excluded from hypothesis testing in the primary model and discussed separately.

Practical Implications

- Monitor CCI as a short-term indicator: rising consumer confidence signals potential equity gains, particularly within a 1–4 month horizon.
- Track HDI dynamics for long-term positioning: sustained improvements in human development create structural conditions for equity market appreciation.
- Apply VIF diagnostics in multivariate macro-finance research: the near-perfect CPI-HDI collinearity ($r = 0.9999$) identified in this study would have produced severely misleading coefficient estimates had it not been formally diagnosed and corrected.
- Future research should consider threshold models, panel data across Indian states, or GARCH models to capture volatility dynamics.

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