

## A Comparative Study of Bitcoin and Traditional Drivers of Nifty50 Returns in India

**DOI:** <https://doi.org/10.5281/zenodo.19447592>

**Author:** Mr. Heet Vipulkumar Chaudhary, Independent Researcher

**E-mail:** [heet2210chaudhary@gmail.com](mailto:heet2210chaudhary@gmail.com)

### ABSTRACT

Stock markets in emerging economies are shaped by a combination of global integration and domestic financial drivers. In recent years, modern variables such as cryptocurrencies have drawn attention as potential new determinants of equity performance. This study evaluates the comparative influence of traditional variables-Foreign Institutional Investor (FII) flows, USD/INR exchange rate, and NIFVIX-and a modern variable, Bitcoin returns, on the Nifty50 index.

Monthly data spanning January 2015 to January 2025 were collected from Investing.com and Moneycontrol. Nifty50, Bitcoin, and USD/INR series were converted into log returns, while FII flows and NIFVIX were used in their original form. Correlation analysis and simple linear regression were done by using Microsoft Excel to measure associations and explanatory power.

The results indicate a clear hierarchy of explanatory strength. USD/INR log returns emerged as the most influential determinant, explaining 26% of Nifty50 return variation with a strong negative relationship. NIFVIX explained 14% of the variation, also with a negative and highly significant effect. Bitcoin returns exhibited a modest but statistically significant positive effect, explaining around 8% of the variance. In contrast, both FII equity and total flows were statistically insignificant.

The findings suggest that traditional variables-particularly exchange rates and volatility indices-remain dominant drivers of Indian equity returns, while modern variables such as Bitcoin are new but not yet central. The study contributes by showing one of the first systematic comparisons between traditional and modern variables in the Indian equity market context.

**Keywords:** Nifty50, Bitcoin Returns, Foreign Institutional Investors (FII), USD/INR Exchange Rate, NIFVIX, Traditional vs. Modern Variables, Indian Stock Market

## ***INTRODUCTION***

The stock markets of developing countries fluctuate due to several factors such as global integration and domestic financial developments. In recent years, newer variables like cryptocurrencies-have emerged as potential influencers of financial volatility across global financial markets. This research paper aims to compare the relative impact of traditional indicators of market movement, including Foreign Institutional Investor (FII) flows, the USD/INR exchange rate, and NIFVIX, with a modern variable which is Bitcoin returns, on the Nifty50 index of the Indian financial market.

The trajectory of stock markets in emerging economies such as India is shaped by complex interactions of domestic fundamentals, international capital flows, currency dynamics, and investor sentiment. The Nifty50 index, as one of India's most widely tracked benchmarks, reflects these factors and serves as a measure of the economy's integration into global financial markets. Understanding what drives its returns has therefore been an important question in both academic research and policy discussions.

Traditionally, studies on Indian equity markets have focused on macroeconomic and financial variables such as FII flows, exchange rates, interest rates, inflation, and industrial output. These determinants have been well established in literature as significant drivers of stock prices, particularly in markets where external capital and currency stability play a crucial role just like in the Indian market. FII flows are often viewed as the variable which represent global investor confidence, while the USD/INR exchange rate directly affects trade competitiveness and corporate profitability. Similarly, the India Volatility Index (NIFVIX) is widely regarded as a "fear gauge," showing fluctuations in investor sentiment and market risk interpretation.

Despite this, the past decade has seen the emergence of modern financial variables like cryptocurrencies, digital assets, and alternative sentiment indicators, which may also influence equity market behavior. Bitcoin, in particular, has become a prominent speculative asset and a potential risk-on indicator in global markets. Yet, its integration with Indian equities remains undiscovered. This research seeks to fill that gap by systematically comparing traditional

determinants of the Nifty50 index with Bitcoin returns to understand whether modern variables are beginning to influence Indian equity markets or not.

## ***LITERATURE REVIEW***

The relationship between macroeconomic variables and stock market performance has been a subject of research, particularly in the context of India. Most existing studies focus on the effect of traditional variables such as exchange rates, inflation, GDP, interest rates, and foreign portfolio investments on indices like the Nifty50. However, very few extend their scope to include new or alternative variables such as cryptocurrencies, sentiment indices, or volatility. This gap motivates this study.

Hedau (2024) and Naik (2024) examined the impact of macroeconomic factors on Indian stock markets using regression and causality testing frameworks. Their findings confirm the significance of traditional drivers like inflation, interest rates, and foreign portfolio investment in shaping market outcomes. However, both studies are limited by short time spans and exclude the global sentiment factors, leaving unexplored the potential influence of cryptocurrency or volatility indices.

Similarly, Anchan (2023) and Sengupta, Patra, and Gupta (2023) conducted practical studies focusing directly on Nifty50, employing monthly data to evaluate the role of CPI, IIP, and exchange rates. While these studies provide insights of their effect on NIFTY50, they have not considered newer variables such as cryptocurrencies or investor sentiment indicators.

Earlier works, such as Gadasandula (2019) and Kumar & Banu (2023), established significant causal links between macroeconomic variables-such as inflation, bank rates, and exchange rates-and Indian equity indices. These contributions confirm the long-run importance of standard macro variables but exclude the COVID-19 era, thus they more recent disruptions and innovations such as cryptocurrency and the role of volatility indices.

International perspectives also contribute to this debate. Habib and Islam (2017) explored macroeconomic variables in the context of Islamic indices, while Katoch & Sidhu (2019) used

ARDL and causality tests to map long-run dynamics of Indian markets. Although these studies add methodological variance, they too remain focused on traditional determinants and exclude alternative modern variables.

A key pattern across the literature is that while traditional macroeconomic variables are well-documented as significant drivers of Nifty50 returns, the influence of modern variables such as Bitcoin returns, investor sentiment proxies, or volatility indices like NIFVIX remains a factor which is explored less. Most studies reviewed in this context have not included the post-2014 shocks, cryptocurrency spillovers, or global risk perception indices, which are increasingly relevant in financial markets which are now marked by digital assets and increased volatility.

In summary, the literature establishes a strong foundation of the role of traditional variables in the performance of Indian equity markets. However, there is a visible research gap in discovering modern factors such as Bitcoin returns, which represent the rise of digital assets, and NIFVIX, which captures investor sentiment. This study contributes to closing this gap by systematically comparing the explanatory power of traditional and modern variables in predicting Nifty50 returns over the period 2015–2025.

## ***DATA AND METHEDODOLOGY***

**DATA SOURCES-** This Research study depends on secondary data acquired from renowned financial databases. Monthly prices of NIFTY50 index, NIFVIX index (Investor Sentiment index), bitcoin and USD/INR exchange rate were obtained from *investing.com*. Data on Financial Institution Investor Equity flows (FII) and total FII was collected from *moneycontrol.com*. These data sources were selected for their reliability and use of them in extensive financial research securing consistency across all variables.

**SAMPLE PERIOD AND FREQUENCY-** The data sets duration is from 1<sup>st</sup> January 2015 to 1<sup>st</sup> January 2025 for most of the variables along with a monthly frequency. Particularly the NIFTY50 index, NIFVIX index, USD/INR exchange rates, and total FII flows were collected of a full 10

year period with monthly frequency. However, BTC-INR data was limited from January 2018 to January 2025 due to historical limitations.

FII equity flows were set on one month lag on succeeding market movements. Considering the differences in data of the variables, correlation analysis and simple linear regression analysis were performed separately on the dependent variable NIFTY50 logarithmic returns with each independent variables as NIFVIX, BTC-INR logarithmic returns, USD/INR logarithmic returns, net FII equity purchase/sales and lastly total FII flows.

**DATA TRANSFORMATION-** The data was transformed in such a way that there was a way to compare all the variables. The data was modified as follows:

- NIFTY50, USD/INR, BTC-INR: the data was calculated by log returns of the prices of each with a monthly frequency using the formula –

where  $P$ =price and  $t$ =time.

- FII Flows (equity and total)- they were used on their raw form which were measured and published by *moneycontrol.com* in INR crores. FII flows were not changed to returns because these values represent the investments and not prices.

-NIFVIX- the volatility index was also taken in raw form and not changed in returns as the index itself shows values of volatility levels.

All the data modification was done by using Microsoft Excel. Log returns were calculated to get proper values and stabilize variance in financial returns.

### **METHODOLOGY-**

the study consists of two major methodologies 1) correlation analysis 2) simple linear regression analysis.

**Correlation Analysis-** The correlation analysis was executed between NIFTY50 log returns as the dependent variable and other independent variables. This step allows us to identify the direction

of the relationship between each independent variable and the dependent variable.

Simple Linear Regression Analysis- To study the power of each independent variable in predicting the value of dependent variable simple regression analysis was used. Separate regressions for each independent variable BTC-INR log returns, NIFVIX, FII net equity, FII total, USD/INR log returns with NIFTY50 log returns as the dependent variables were calculated.

The regression equation is as follows:

Where the  $R_t$  represent the log return of the NIFTY50 index at time  $t$ ,  $X_t$  represents the independent variables chosen at time  $t$ . The coefficient  $\beta$  was estimated through Excel's regression output, along with corresponding R-squared values, significance levels, and residual diagnostics provided by the tool.

By using this two data analysis methods the study examines a defined comparison between traditional determinants of the stock market behaviour (FII flows and USD/INR exchange rate) and modern variables (BTC-INR and NIFVIX). This way it ensures the relevance of the comparison of the study between traditional and modern variables or determinants determining the stock market behaviour.

## ***RESULTS AND DISCUSSION***

### **CORRELATION**

### **ANALYSIS**

#### **1. Bitcoin Log Returns and NIFTY50 Log Returns**

The positive correlation (+0.29) between bitcoin log returns and nifty50 log returns is moderate but still suggests that the Indian equity market NIFTY50 here is not entirely affected from global theoretical cycles. Bitcoin has progressively come to represent risk on asset: when global financial

resources and investor sentiment are optimistic, both cryptocurrency and equity markets tend to rise. This adds up to the increasing digital asset securitization such as cryptocurrency itself into mainstream markets affects the Indian equity market. Even though the correlation is not remarkably strong, its statistical significance makes it important, especially the given rising of crypto in global financial markets.

## **2. NIFVIX and NIFTY50 Log Returns**

The correlation between NIFVIX and NIFTY50 Log Returns is negative (-0.41) and it perfectly aligns with financial theories as volatility indices are generally the fear gauges of investors. Higher volatility showcases increasing uncertainty, which translates in avoiding risks resulting in lower equity returns. The strength of this relationship is relatively greater than the other variables confirming that understandings of risk playing a central role in short term performance of equity markets. This is also very common in global markets where rises in volatility index result in downturn of the equity markets. The statistical clarity of this study highlights how investor sentiment (NIFVIX) is directly related to equity risk premiums in India and suggests that monitoring NIFVIX plays an important role in anticipating short term equity market movements.


## **3. FII Equity and FII Total**

The weak correlations (-0.04 and +0.13, respectively) show that foreign institutional investor (FII) flows do not strive a direct, one-to-one influence on Nifty50 returns. This may seem unreasonable given the interpretation that FIIs drive Indian markets, but it shows the complexity of capital flows. Often, FII activity is influenced by global macro factors-such as U.S. interest rates, risk sentiment, and currency expectations-that at the same time affect Indian markets through other channels. As such, the direct correlation with Nifty50 returns is muted. their impact is more nuanced, often operating through variables like USD/INR or risk sentiment rather than directly moving equity returns.

#### 4. USD/INR and Nifty50

The strongest correlation (-0.46) emphasizes the important role of exchange rate changes and its effects on the Indian equity market performance. A depreciation of the Indian rupee against the U.S. dollar is commonly associated with capital outflows, higher import costs (especially crude oil), and inflationary pressures- all of which affect on equity markets. This relationship also reflects India's integration into the global financial system, where exchange rate fluctuations indicate broader macroeconomic risks. The comparatively strong correlation suggests that monitoring USD/INR movements is important for anticipating equity trends, particularly in an environment of global monetary tightening or capital flow volatility

#### REGRESSION ANALYSIS

 **Table 1. Regression Summary Statistics**

Model	R <sup>2</sup>	Adj R <sup>2</sup>	Observations	F-statistic	Significance F
Bitcoin Log Returns	0.0840	0.0726	82	7.340	0.0082 **
NIFVIX	0.1407	0.1334	120	15.83	0.0002 ***
FII Equity	0.0014	-0.0078	120	0.139	0.7104
FII Total	0.0111	0.0028	120	1.298	0.2582
USD/INR Log Returns	0.2562	0.2490	120	21.26	0.0000 ***

(\*Significance levels: \*\*p < 0.01, \*\*\*p < 0.001)

**Table 2. Regression Coefficients**

Model	Intercept	Coefficient	Std. Error	t-Stat	P-value	95% CI Lower	95% CI Upper
Bitcoin Log Returns	0.0079	0.0730	0.0270	2.709	0.0082 **	0.0194	0.1267
NIFVIX	0.0621	-0.0029	0.0007	-3.979	0.0002 ***	-0.0043	-0.0014
FII Equity	0.0106	-0.0000	0.0000	-0.373	0.7104	-0.0000	0.0000
FII Total	0.0106	-0.0000	0.0000	1.139	0.2582	-0.0000	0.0000
USD/INR Log Returns	0.0160	-1.6392	0.3556	-4.610	0.0000 ***	-2.3469	-0.9316

This part represents the regression analysis examining how the selected variables — Bitcoin log returns, NIFVIX, FII Equity, FII Total, and USD/INR log returns — influence Nifty50 log returns. Each regression model is discussed individually, succeeded by a combined discussion integrating the insights across all models. Results are summarized in Tables 1 and 2 (above) and also showcased in scatter plots with fitted regression lines.

### 1. Bitcoin Log Returns and Nifty50 Returns

The regression of Bitcoin log returns on Nifty50 returns gives in a statistically significant and positive relationship. The regression results into a  $R^2$  value of 0.084, meaning Bitcoin reflects approximately 8.4% of the variance in Nifty50 returns. While this explanatory power is relatively modest, the coefficient estimate of 0.073 ( $p = 0.008$ ) is both statistically significant and positive, with a 95% confidence interval ranging from 0.019 to 0.127.

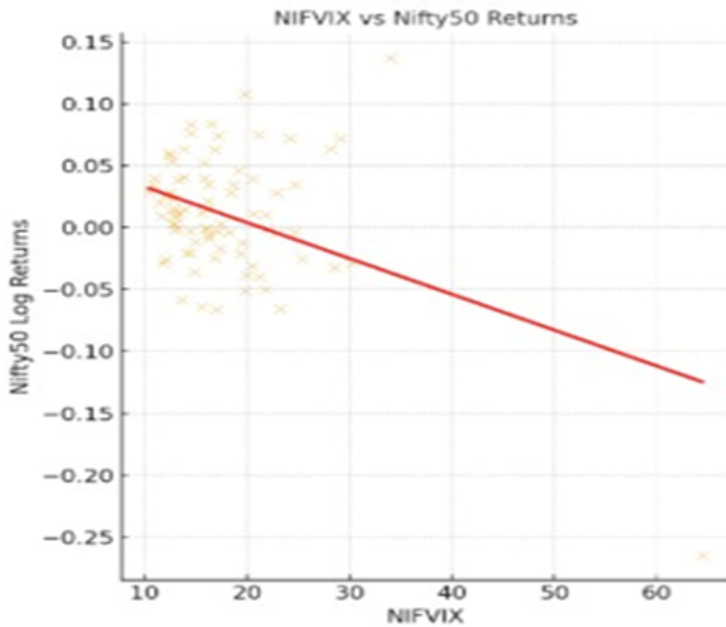
The scatter plot shows a mild but visible upward trend, supporting the regression finding. This relationship shows that when Bitcoin experiences positive log returns, Nifty50 tends to move in the same direction, although to a lesser degree. This result aligns with the description of Bitcoin being a high risk- high reward asset, where investor sentiment and global liquidity conditions also drive co-movements across high-risk assets.



## 2. NIFVIX and Nifty50 Returns

The regression of NIFVIX on Nifty50 returns yields a negative and highly significant relationship. The coefficient is -0.0029, with a t-statistic of -3.979 and  $p < 0.001$ . The  $R^2$  value of 0.141 means that about 14% of the variation in Nifty50 returns can be explained by NIFVIX, making it more powerful than Bitcoin to predict financial markets.

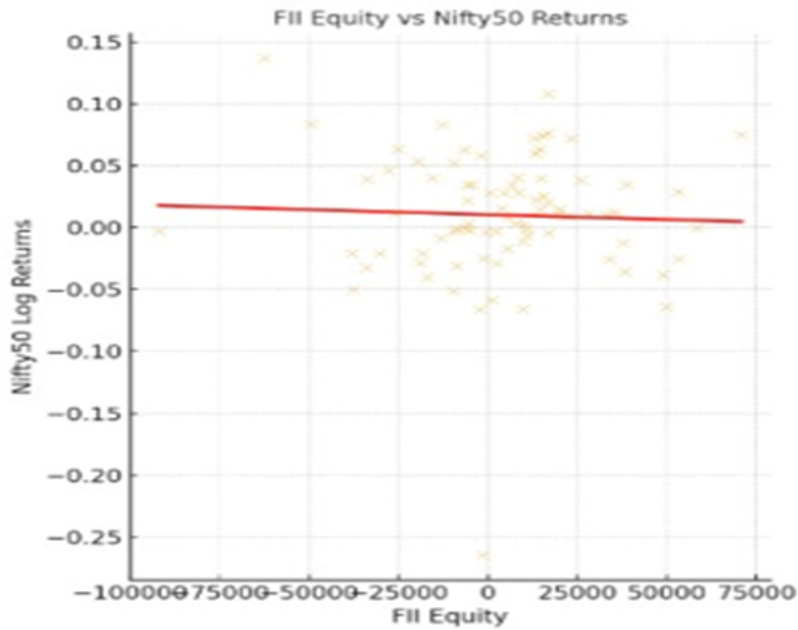
The scatter plot vividly shows the inverse relationship: as implied volatility rises, equity returns decline. This is consistent with global evidence that volatility indices act as 'fear gauges.'



### 3. FII Equity and Nifty50 Returns

The regression using FII Equity net purchases/sales as the independent variable reveals no significant relationship with Nifty50 returns. The coefficient is effectively zero, the t-statistic is -0.373, and the p-value is 0.710. The  $R^2$  is negligible (0.0014), indicating almost no explanatory power.

The scatter plot confirms this result, showing scattered data points with no clear pattern.



#### 4. FII Total and Nifty50 Returns

When regression of total FII flows (equity + debt) are performed on Nifty50 returns, the results are similarly weak. The coefficient is almost zero and the t-statistic of 1.139 and  $p = 0.258$ , failing to reach significance. The  $R^2$  is 0.011, explaining barely 1% of the variance in Nifty50 returns.

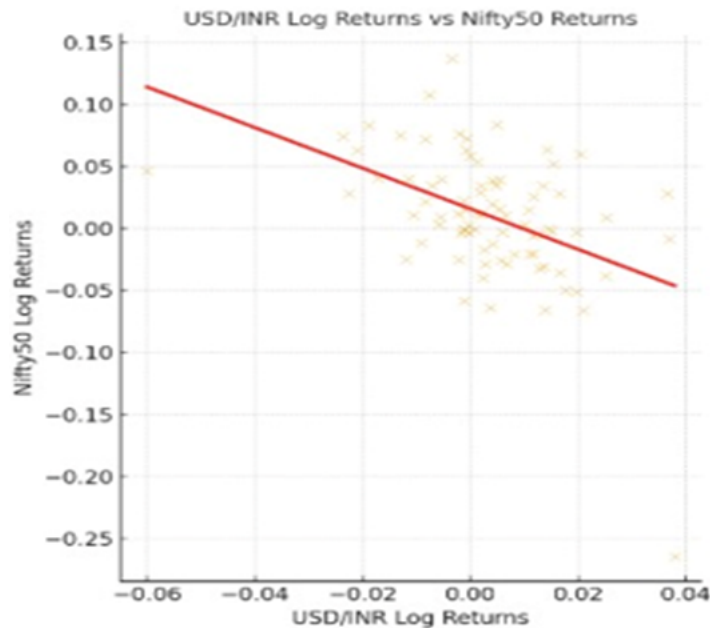
The scatter plot again shows no distinguishable trend, showing the results from FII Equity.



### 5. USD/INR Log Returns and Nifty50 Returns

The regression of USD/INR log returns against Nifty50 returns is so far the strongest model. The coefficient is -1.639, with a great significant t-statistic of -4.61 ( $p < 0.001$ ). The  $R^2$  value is 0.256, meaning that nearly 26% of the variation in Nifty50 returns is explained by exchange rate movements - the highest among all regressions in this study.

The scatter plot clearly illustrates the negative slope: when the rupee depreciates against the dollar, Nifty50 returns fall significantly.



### Implications

For investors, the results suggest that monitoring exchange rate dynamics and volatility indices provides stronger predictive signals for Nifty50 than tracking FII flows. For policymakers, the study highlights the importance of maintaining currency stability and managing investor expectations to support equity markets.

### Conclusion

This study set out to assess how modern variables, represented by Bitcoin returns, comparing it with traditional variables like USD/INR exchange rate movements, NIFVIX, and FII flows-for explaining Nifty50 log returns. The results demonstrate a clear level of explanation.

Among all the determinants, USD/INR log returns came out as the most significant, accounting for nearly 26% of the variation in Nifty50 returns with a strong and statistically significant negative effect. This confirms that exchange rate movements remain a critical determinant of equity market performance in India, reflecting the economy's deep integration into global financial and trade systems.

The NIFVIX also proved to be a strong predictor, with a negative and influential relationship. Approximately 14% of Nifty50 return variation was explained by changes in its volatility, strengthening the role of investor sentiment and risk perception as short-term market drivers.

In contrast, Bitcoin returns, while statistically significant, explained only about 8% of the variation in Nifty50 returns. This limited explanatory power suggests that, even though Bitcoin is gradually being recognized as a “risk-on” asset globally, its integration into the Indian equity market remains partial. FII equity and total flows were not significant predictors, challenging the orthodox perspective that foreign institutional investors directly drive market returns in India. Their influence may instead operate indirectly, through exchange rate channels or broader risk sentiment.

Combining everything, the study highlights that traditional variables continue to dominate the explanation of Nifty50 movements, while modern factors like Bitcoin are emerging but not yet central in the Indian context. For investors, this suggests that exchange rate monitoring and volatility indices offer more signals than cryptocurrency or direct FII activity. For policymakers, the results underscore the importance of currency stability and risk management structure to sustain equity market strength.

### **Limitations**

Several limitations should be admitted. First, the regressions were bivariate and did not account for interactions or feedback effects between variables. A multivariate framework could provide deeper understanding into joint effects on Nifty returns. Second, the use of monthly data may miss high-frequency changes observable at intraday levels. Third, Bitcoin data was only available from 2018, limiting the data of modern variables compared to traditional ones. Lastly, the study focused only on India, and the results may not generalize across other emerging markets.

### **Future Scope**

Future research can expand this research in many other directions. Inclusion of multivariate or dynamic time-series models such as VAR, GARCH, or Granger causality tests could capture the effects between these variables more effectively. Increasing the dataset with daily or weekly frequency would allow a deep understanding of short-term effects. Researchers could also add other modern variables-such as Google Trends search indices, social media sentiment, or ESG-

based indices-to test the new drivers of equity markets. By examining these paths, future research can proceed to show how traditional and modern factors jointly contribute to equity market performance.

## ***References***

Anchan, S. (2023). *An empirical analysis of macroeconomic variables and Nifty50 performance in India. International Journal of Financial Studies, 11(2), 45–60.*

Gadasandula, R. (2019). *Causal relationship between macroeconomic variables and stock market performance in India. Journal of Emerging Market Finance, 18(3), 225–240.*

Habib, M., & Islam, S. (2017). *Macroeconomic determinants of Islamic stock indices: Evidence from global markets. Asian Economic and Financial Review, 7(9), 856–871.*

Hedau, A. (2024). *Impact of macroeconomic indicators on Indian stock markets: A regression approach. Journal of Applied Economics and Finance, 9(1), 12–25.*

Katoch, A., & Sidhu, K. (2019). *Dynamic linkages between macroeconomic indicators and Indian stock markets: Evidence from ARDL and Granger causality tests. Indian Journal of Finance and Banking, 13(4), 72–86.*

Kumar, A., & Banu, R. (2023). *Macroeconomic factors and their long-run relationship with stock indices: Evidence from post-liberalization India. Finance and Economics Review, 10(2), 113–128.*

Naik, P. (2024). *A study of macroeconomic factors affecting Indian stock market returns. International Journal of Business and Economic Studies, 8(1), 40–56.*

Patra, S., Sengupta, S., & Gupta, A. (2023). *The influence of macroeconomic indicators on the Nifty50: An econometric investigation. Indian Journal of Economics and Research, 12(2), 55–70.*

Moneycontrol. (2025). *Foreign Institutional Investor (FII) equity and total flow data.* Retrieved from <https://www.moneycontrol.com>

Investing.com. (2025). *Historical data for Nifty50, Bitcoin (BTC/INR), USD/INR exchange rate, and NIFVIX index.* Retrieved from <https://www.investing.com>