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A Comparative Study on Error Analysis & Forecasting of selected Stocks listed in NSE

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Abstract : This research aims to analyze the effectiveness of different moving average periods (e.g., 50-day, 100-day, 200-day) in predicting stock price movements of selected stocks listed on the National Stock Exchange (NSE). By comparing the performance of various moving averages, the study seeks to identify the most suitable indicator for making informed investment decisions.The research methodology involves selecting a representative sample of stocks from different sectors listed on the NSE. Historical price data for these stocks will be collected and analyzed using statistical techniques. The study will investigate the correlation between different moving averages and stock price changes, as well as the potential for generating trading signals.The findings of this research will be valuable to investors and traders as it will provide insights into the effectiveness of moving averages as a technical analysis tool. The study may also contribute to the existing literature on stock market analysis and technical indicators.

Index Terms **- Stock Market, NSE (National Stock Exchange),Error Analysis, Forecasting, Moving Average, Intraday Trading, Delivery Trading, Risk and Return, Beta & Alpha (Stock Volatility and Performance),Sampling Technique**

INTRODUCTION

The financial services sector in India is undergoing rapid expansion and diversification, driven the entry of new market players and the growth of established financial institutions. This sector includes commercial banks, insurance companies, non-banking financial institutions (NBFCs), cooperatives, mutual funds, pension funds, and smaller financial entities. Commercial banks dominate the sector, holding over 64% of the financial system's assets. Recent regulatory changes have allowed new entities like payment banks to emerge, further diversifying the landscape. Financial markets in India are classified into the capital market, money market, credit market, and forex market. The capital market, regulated by SEBI, facilitates long-term investment in bonds and stocks, whereas the money market deals with short-term, highly liquid financial instruments. The credit market is essential for government and corporate borrowing, whiles the forex market, the largest financial market globally, involves currency trading and is regulated by the RBI.

The Indian financial services sector is also seeing significant growth in fintech, particularly in digital payments, digital lending, InsurTech, and WealthTech. The fintech market is projected to grow substantially, with the digital lending sector expected to reach ₹350 billion by 2023 and the payments industry anticipated to generate ₹50 billion in revenue by 2030. India's fintech market, especially in payments and InsurTech, is one of the fastest-growing globally.

Government initiatives play a crucial role in the sector's expansion, with programs like the Pradhan Mantri Jan Dhan Yojana (PMJDY) promoting financial inclusion and the BHIM-UPI platform revolutionizing digital payments. Regulatory bodies such as the RBI, SEBI, IRDAI, and PFRDA ensure the smooth functioning and stability of the financial system.

In the stock market, where listed company shares are traded, indices like the BSE and NSE provide a measure of market performance. The stock market involves risks, classified as systematic (market risk) and unsystematic (specific to a company or industry). Beta and Alpha are key metrics used to assess these risks, with Beta measuring stock volatility relative to the market and Alpha indicating performance against a benchmark index.

The rapid growth of India's financial services sector, coupled with the increasing complexity of financial markets and instruments, underscores the importance of educating investors on trading patterns, market risks, and investment strategies. Understanding these dynamics is essential for making informed decisions and optimizing returns in both intraday and delivery trading. This study aims to analyze market fluctuations, assess stock performance, categorize stocks based on risk and return, and provide a decision-making tool for investors, particularly in the context of the fast- growing Indian financial services sector.

India's financial system is comprised of four main components: financial institutions, financial markets, financial instruments, and financial services. Financial institutions are categorized into banking institutions (commercial and cooperative banks) and non-banking financial companies (NBFCs). While commercial banks provide a wide range of services including deposit acceptance, lending, and utility services, cooperative banks operate in smaller areas, focusing on supporting local industries and rural economies. NBFCs, though not authorized to accept public deposits, engage in lending, investment in securities, and other financial activities.

Literature Review

The literature review covers various studies that examine different aspects of intraday trading, market behavior, and liquidity in the Indian and global stock markets. Several key areas are explored:

Intraday Liquidity Trends: Research on the Indian National Stock Exchange (NSE) reveals that intraday liquidity indicators like volume and spread exhibit U-shaped patterns, akin to those in quote-driven markets. The study also highlights the simultaneous occurrence of high trade volumes and wide spreads, a unique feature for an order-driven market like NSE (Krishnan, 2013).

Trading Volume, Bid-Ask Spread, and Volatility: A study using high-frequency data indicates a positive relationship between trading volume, bid-ask spread, and stock return volatility in the Indian market. The findings suggest that investors receive information sequentially, challenging the mixed distribution hypothesis (Paita, 2016).

Indicator-Free Intraday Trading Strategy: An approach based on price action, particularly using the Bank Nifty index, was analyzed. The strategy was effective in determining trade entry points but less so in deciding exit points (Gupta, 2021).

Month-of-the-Year Effect: Analysis of the Indian stock market over a 20-year period reveals significant returns in November and December, with smaller stocks showing pronounced seasonality. The study also applies the TGARCH model to correct for non-linearity in returns (Harshita, Singh et al., 2019).

Machine Learning in Stock Market Forecasting: The application of recurrent neural networks, particularly LSTM models, has been shown to improve predictive accuracy in stock market forecasting, with a hybrid multilevel classifier outperforming single classifiers (Kumar et al., 2019).

Momentum Trading Strategies: Momentum strategies applied to India’s liquid equity futures market demonstrate that such approaches can generate uncorrelated alpha across different time horizons (Srivastava et al., 2019).

Algorithmic Trading with Big Data: The use of Big Data analytics, particularly with frameworks like Hadoop and Spark, has facilitated profitable intraday trading strategies, such as those using Bollinger Bands (Parambalath et al., 2018).

Volatility and Trading Patterns: Various studies have explored the relationships between trading volume, volatility, and returns across different markets and instruments. For instance, one study focused on the predictability of intraday trading patterns and optimal trade execution to reduce costs (Heston, 2010).

Title of the Study

“A Comparative Study on Error Analysis & Forecasting of selected Stocks listed in NSE.”

Problem Statement:

There are about 1800+ actively listed stocks in NSE. Investors may not have the details of all the listed stocks, on account of the constraints such as time, technology and the lack of knowledge of the stocks. Hence an attempt has made here to understand the price movement of stocks based on intraday and delivery. 9 stocks will be cherry-picked in consultation with Geojit and the movements will be looked into on intraday and delivery basis. Based on these certain objectives have been drawn to assess the returns of the stocks which will help to build the appropriate portfolio for the investors.

Objectives of the Study

• To illustrate the current market scenario of selected stocks listed in NSE

• To demonstrate the trading pattern of the selected stocks on intraday and delivery basis

• To calculate the risk and return of the selected stocks

• To categorize the selected stocks based on risk and returns

Sampling

Sampling Technique: Convenient sampling technique of selected stocks ofdifferent sectors listed in NSE.

Sampling Frame: Stocks listed in NSE, displayed in Geojit Terminal. Sampling Unit: Intraday and T+1 patterns of selected stocks

Sample Size: 09 securities listed in NSE.

Tools for Data Collection

Downloadable files of stock exchanges pertaining to the selected stocks, company literature, notes to accounts and Directors reports, Blog sites of The Quint, Quora etc., Social networking sites like Facebook, LinkedIn, twitter etc.

Secondary Data:

• Intradayshare-prices and T+1 share-prices (high, low, opening and closingprices) displayed in Geojit Terminal linked to NSE.

• Selected stocks statement ofaccounts.

• Director's report and Notes to accounts.

• Websites of moneycontrol.com, Zerodha.com, motilaloswal.com andgeojit.com.

• Internal circular of Geojit pertaining to selected stocks.

Data Analysis

Some of the statistical tools and techniques to be used to analyze the data are:

• Correlation coefficient,

• Co efficient of Determination,

• Stock Variance and Standard Deviation

• Beta for risk and return

• Alpha for performance analysis

• Technical charts.

Limitations of Study

In this Study all the appropriate techniques were taken care to analyze the data. But there was some limitation also to conduct the study. Below are the limitations:

The market was too unpredictable and volatile due to the General Elections from 24th April, 2024 to 01st June, 2024.

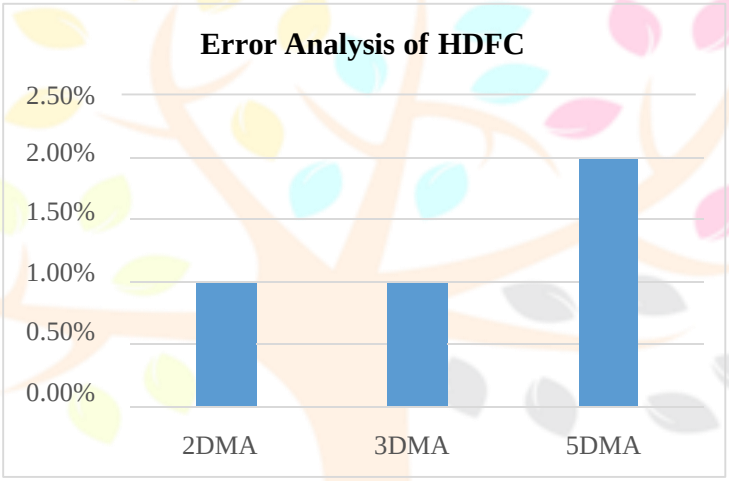
Error Analysis & Forecasting of selected stocks

1. HDFC BANK LTD:

Graph :- Error Analysis of HDFC Bank on April 2024:

Error Analysis	
INTERVAL	**MAPE**
2DMA	1%
3DMA	1%
5DMA	2%

Forecast		
Min	1256.6	1255.1
Max	1256.6	1258.1



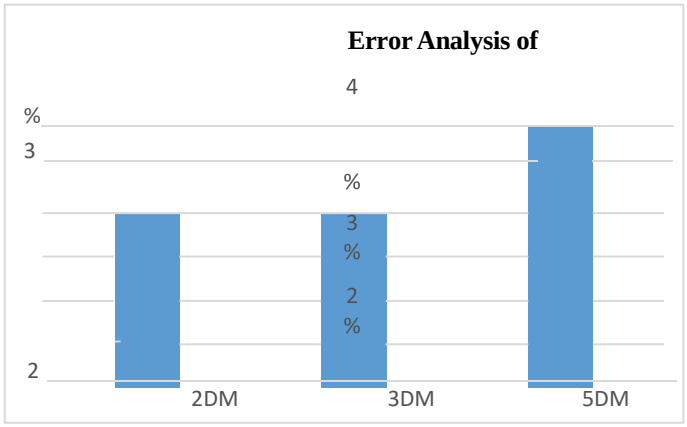
Interpretation: There is little fluctuation in the predicted numbers, suggesting a steady and accurate forecast withcomparatively small error margins. There is strong confidence in the forecast's accuracy due to its consistency in the predicted value of 1483.6 and its limited range of MAPE (1482.1 to 1485.1).There is a consistent prediction value of 1483.6 between the minimum and maximum ranges.Whereas the MAPE for the highest projection is 1485.1, it is 1482.1 for the minimum forecast. This range implies a reasonably minimal forecast error, with the estimate remaining consistent at1483.6.

2. AXIS BANK LTD:

Graph :- Error Analysis of AXIS Bank on April 2024:

Error Analysis	
INTERVAL	**MAPE**
2DMA	1%
3DMA	2%
5DMA	2%

Forecast		
Min	1145.6	1144.1
Max	1145.6	1147.1



Interpretation:-The 2DMA and 3DMA intervals provide forecasts with moderate accuracy, both having a MAPE of 2%. In contrast, the 5DMA interval has a higher error rate (MAPE of 3%), indicating it is less reliable. The forecasted values show minimal variation, with the forecasted value consistently being 1145.6. The range of MAPE (1144.1 to 1147.1) is narrow, indicating a high level of confidence in the forecast's accuracy.

3. INFOSYS LTD:

Error Analysis	
INTERVAL	MAPE
2DMA	1%
3DMA	1%
5DMA	1%

Forecast		
Min	1449.6	1448.1
Max	1449.6	1451.1

Graph: Error Analysis of INFOSYS on April 2024

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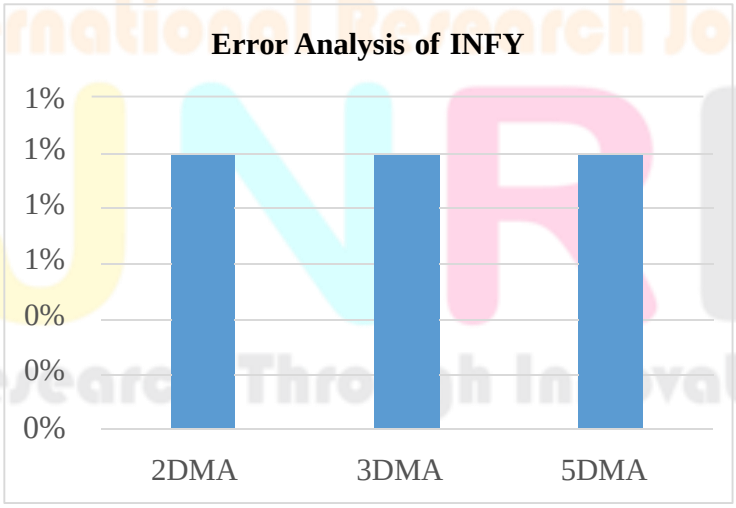


INTERPRETATION:

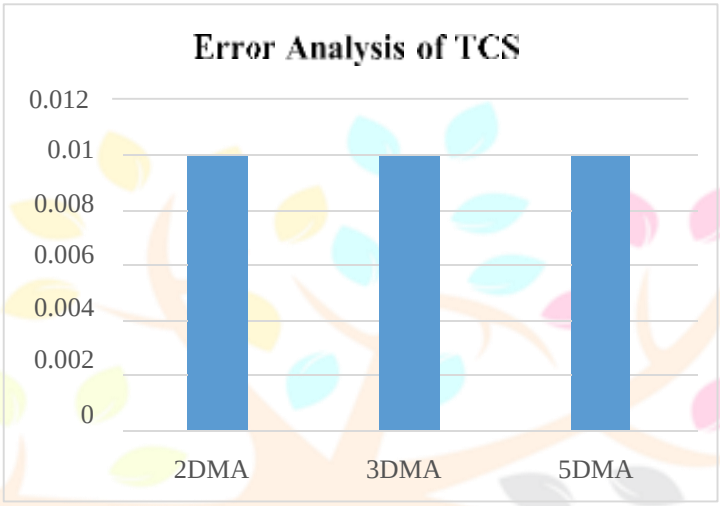
The 2dma, 3dma, and 5dma intervals provide forecasts with high accuracy, all having a mape of 1%. this consistency across different intervals indicates reliability in the forecast methods used. the forecasted values show minimal variation, with the forecasted value consistently being 1449.6. the range of mape (1448.1 to 1451.1) is narrow, indicating a high level of confidence in the forecast's accuracy.

4. TATA CONSULTANCY SERVICES LTD:

Error Analysis	
INTERVAL	MAPE
2DMA	1%
3DMA	1%
5DMA	1%

Forecast		
Min	3890.35	3888.85
Max	3890.35	3891.85

Graph : Error Analysis of TCS on April 2024:



INTERPRETATION:

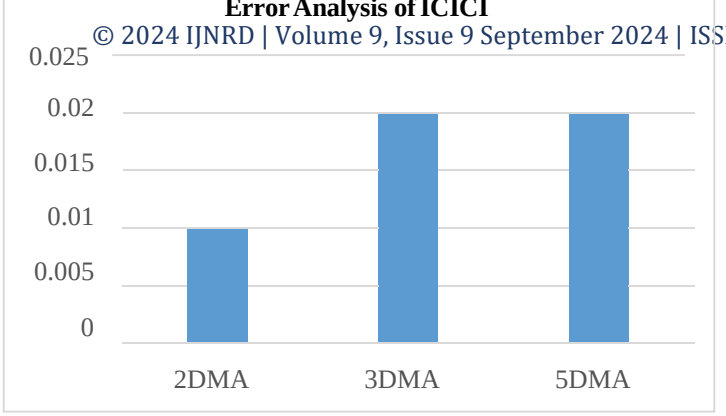
The 2DMA, 3DMA, and 5DMA intervals provide forecasts with high accuracy, all having a MAPE of 1%. This consistency across different intervals indicates reliability in the forecast methods used. The forecasted values show minimal variation, with the forecasted value consistently being 3888.35. The range of MAPE (3888.35 to 3891.25) is narrow, indicating a high level of confidence in the forecast's accuracy.

5. ICICI Bank Ltd:

Error Analysis	
INTERVAL	**MAPE**
2DMA	1%
3DMA	2%
5DMA	2%

Forecast		
Min	1,126.50	1,125.00
Max	1,126.50	1128

Graph :-Error Analysis of ICICI Bank on April 2024:



INTERPRETATION:

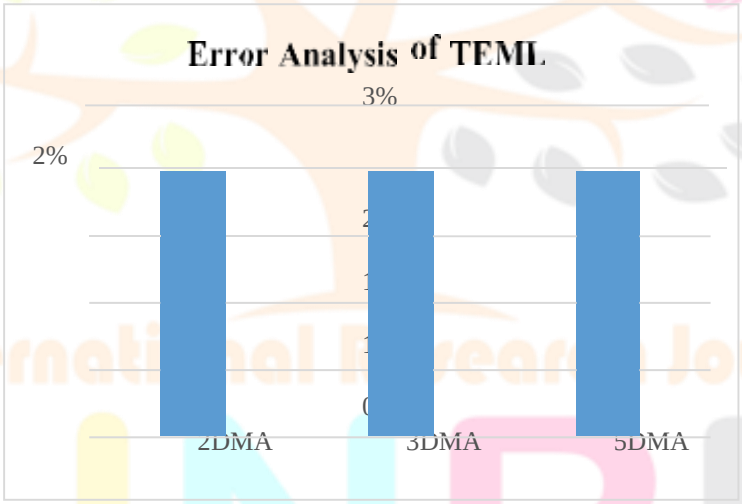
the table shows that compared to a longer period (5dma), which has a higher error (mape of 2.00%), shorter moving average intervals (2dma and 3dma) produce more accurate forecasts with fewer errors (mape of 1.00%). the values that are predicted exhibit minimal volatility, suggesting that the forecast is steady and has relatively small error margins.

6. TECH MAHINDRA LTD:

Error Analysis	
INTERVAL	MAPE
2DMA	2%
3DMA	2%
5DMA	2%

Forecast		
Min	1256.6	1255.1
Max	1256.6	1258.1

Graph : Error Analysis of TEML on April 2024:



INTERPRETATION:

The 2DMA, 3DMA, and 5DMA intervals provide forecasts with moderate accuracy, all having a MAPE of 2%. This consistency across different intervals indicates reliability in the forecast methods used. The forecasted values show minimal variation, with the forecasted value consistently being 1256.6. The range of MAPE (1255.1 to 1258.1) is narrow, indicating a high level of confidence in the forecast's accuracy.

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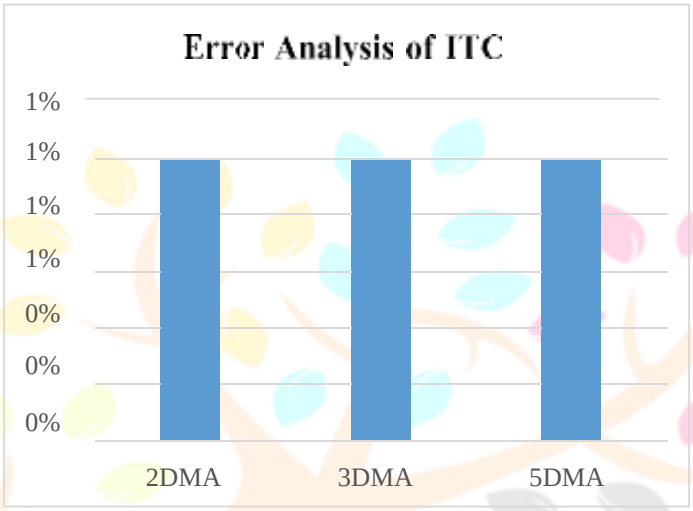
7. ITC LTD:

Error Analysis	
INTERVAL	MAPE
2DMA	1%
3DMA	1%
5DMA	1%

Forecast		
Min	445.75	444.25
Max	445.75	447.25

Graph : Error Analysis of ITC on April 2024:



Interpretation:

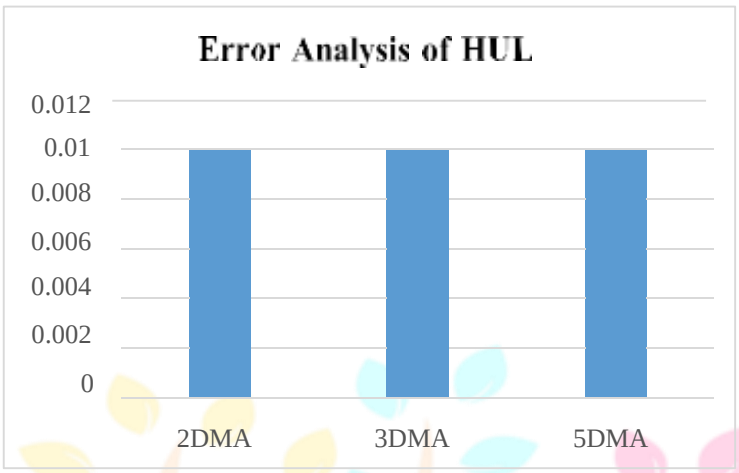
The 2DMA, 3DMA, and 5DMA intervals provide forecasts with high accuracy, all having a MAPE of 1%. This consistency across different intervals indicates reliability in the forecast methods used. The forecasted values show minimal variation, with the forecasted value consistently being 445.75. The range of MAPE (444.25 to 447.25) is narrow, indicating a high level of confidence in the forecast's accuracy.

8.HUL LTD:

Error Analysis	
INTERVAL	MAPE
2DMA	1%
3DMA	1%
5DMA	1%

Forecast		
Min	2243.65	2242.15
Max	2243.65	2245.15

Graph : Error Analysis of HUL on April 2024:



INTERPRETATION:

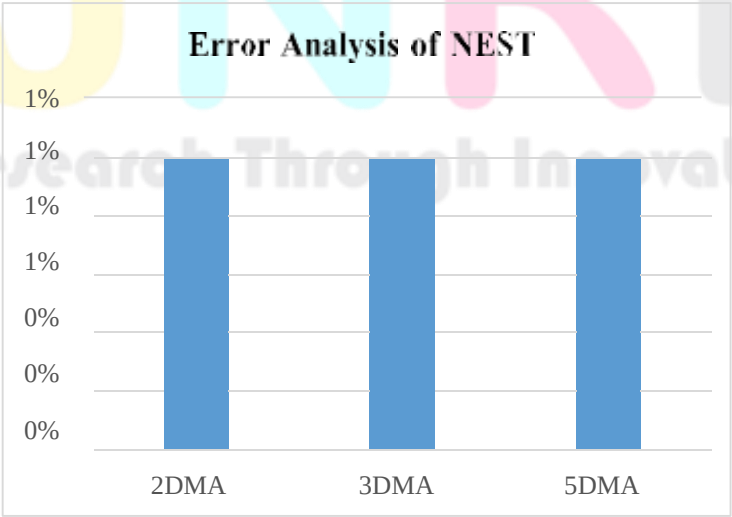
The 2dma, 3dma, and 5dma intervals provide forecasts with high accuracy, all having a mape of 1%. this consistency across different intervals indicates reliability in the forecast methods used. the forecasted values show minimal variation, with the forecasted value consistently being 2243.65. the range of mape (2242.15 to 2245.15) is narrow, indicating a high level of confidence in the forecast's accuracy.

9.NEST LTD:

Error Analysis	
INTERVAL	MAPE
2DMA	1%
3DMA	1%
5DMA	1%

Forecast		
Min	2522.22	2520.72
Max	2522.22	2523.72

Graph : Error Analysis of NEST on April 2024:



INTERPRETATION:

The 2DMA, 3DMA, and 5DMA intervals provide forecasts with high accuracy, all having a MAPE of 1%. This consistency across different intervals indicates reliability in the forecast methods used. The forecasted values show minimal variation, with the forecasted value consistently being 2522.22. The range of MAPE (2520.72 to 2523.72) is narrow, indicating a high level of confidence in the forecast's accuracy.

Summary and Findings

The study aimed to analyze the volatility, risk, and returns of selected stocks on both intraday and delivery trading bases. Here are the key findings:
Market Volatility and Risk:

The market is currently volatile, with high beta values indicating increased risk for many stocks.

High-Risk Stocks: ICICI Bank, Infosys Ltd, and Axis Bank Ltd exhibit higher beta values, suggesting they are more volatile and have higher risk.

Low-Risk Stocks: HDFC Bank, Tata Consultancy Services (TCS), ITC Ltd, and Tech Mahindra show lower beta values, indicating less risk.

The ongoing General Elections (from 24th April to 1st June 2024) are likely contributing to the market's volatility. Despite the overall risk, some stocks like Infosys Ltd, Tata Consultancy Services Ltd, and Hindustan Unilever Ltd are underperforming.

Trading Patterns

There is a variance in stock performance between intraday and delivery trading.

Underperforming in Delivery Trading but Performing in Intraday: TCS and Hindustan Unilever Ltd (HUL) are examples where intraday trading yields better returns compared to delivery trading.

Risk and Return Analysis:

The study calculated and analyzed the risk and returns of selected stocks, revealing distinct patterns in how stocks behave differently under intraday versus delivery trading.

Conclusion

Investing in the stock market has become increasingly popular and accessible. Unlike the past, where only a limited population invested due to lack of knowledge and limited platforms, today's investors are well-informed about financial instruments and stock market dynamics. Understanding the behavior of stocks —whether on an intraday or delivery basis—is crucial for maximizing returns.