

Algorithmic trading Vs Human driven trading a performance and market impact analysis

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Abstract

The rapid integration of advanced technologies into financial markets has significantly transformed trading practices, with algorithmic trading emerging as a dominant force alongside traditional human-driven trading. This study provides a comprehensive comparative analysis of algorithmic trading and human-driven trading, focusing on their performance metrics and impact on market conditions such as liquidity, volatility, and price discovery. Using an analytical and comparative research design based on secondary data from stock and derivative markets, the study evaluates key variables including execution speed, profitability, accuracy, adaptability, and market stability. The findings reveal that algorithmic trading excels in speed, accuracy, consistency, and improving market liquidity and price efficiency. However, it may contribute to increased volatility during uncertain market conditions. Conversely, human-driven trading demonstrates superior adaptability, qualitative judgment, and the ability to handle complex and unexpected market events, although it is prone to emotional biases and inconsistent performance. The study rejects the null hypotheses that there is no significant performance difference and that algorithmic trading does not impact volatility, confirming the distinct strengths and limitations of each approach. The research concludes that a hybrid model combining the efficiency of algorithms with human oversight is the most effective strategy for achieving optimal performance and maintaining market stability.

Keywords: Algorithmic Trading, Human-Driven Trading, Market Liquidity, Volatility, Performance Analysis, Behavioural Finance, Hybrid Trading.

1. Introduction

Financial markets have experienced a remarkable transformation with the integration of advanced technologies and digital infrastructure. In earlier times, trading activities were primarily conducted manually by traders on exchange floors, where decisions were based on personal judgment, experience, and available market information. Over time, the introduction of electronic trading systems has replaced traditional methods, making trading faster, more efficient, and globally accessible. One of the most significant developments in modern

finance is the rise of algorithmic trading, which refers to the use of computer programs and mathematical models to execute trades automatically based on predefined criteria such as price, timing, and volume. These systems can analyze large volumes of data within milliseconds and execute trades at speeds impossible for human traders to match. In contrast, human-driven trading involves decision-making by individual traders or portfolio managers who rely on their

knowledge, intuition, and interpretation of market conditions, often considering qualitative factors such as economic news, geopolitical events, and investor sentiment. The coexistence of algorithmic and human trading has created a dynamic and competitive market environment. This study aims to provide a comprehensive comparison between algorithmic trading and human-driven trading, focusing on their performance and their impact on market conditions such as liquidity, volatility, and price discovery, to understand which method is more effective under different market scenarios.

2. Statement of the Problem

The increasing adoption of algorithmic trading has fundamentally changed the structure and functioning of financial markets. While algorithmic trading offers several advantages such as speed, accuracy, and the ability to process large amounts of data, it also introduces new challenges and risks. One of the key concerns is whether algorithmic trading leads to improved market efficiency or contributes to increased volatility and instability. On the other hand, human-driven trading is often criticized for being slower and more prone to emotional biases, such as fear and greed, which can negatively affect decision-making. However, human traders possess the ability to interpret complex and unexpected market events, which may not be easily captured by algorithms. The main problem addressed in this study is the lack of clear understanding regarding the comparative performance of algorithmic trading and human-driven trading. There is also a need to examine how these trading methods influence market behaviour, including liquidity, price fluctuations, and overall stability. Therefore, this study seeks to bridge this gap by analysing the strengths and limitations of both approaches and assessing their impact on financial markets.

Objectives

F1: To understand the concept, features, and functioning of algorithmic trading and human-driven trading in financial markets.

F2: To analysis and compare the performance of both trading approaches with respect to profitability, execution speed, and efficiency.

F3: To evaluate the impact of algorithmic trading on market liquidity, volatility, and price discovery mechanisms.

F4: To examine the role of human judgment, intuition, and behavioural factors in trading decisions.

3. Scope of the Study

The scope of this study is focused on analysing and comparing algorithmic trading and human-driven trading within the context of modern financial markets. It examines various aspects such as trading performance, execution efficiency, and the impact on market conditions. The study primarily covers trading activities in stock markets and derivative markets, where both algorithmic and human trading are widely used. It includes an analysis of commonly used trading strategies and their effectiveness under different market conditions. However, the study has certain limitations: it does not involve the technical development or coding of trading algorithms, nor does it analyse proprietary trading systems used by specific firms. The research

is based on conceptual analysis and secondary data, which may limit the ability to capture real-time market dynamics. Despite these limitations, the study provides a comprehensive understanding of the comparative advantages of algorithmic and human-driven trading.

4. Research Methodology

The present study is analytical and comparative in nature, focusing on analysing and comparing the performance and market impact of algorithmic trading and human-driven trading. The research is based on descriptive research (explaining characteristics and functioning), analytical research (evaluating performance metrics such as profitability, efficiency, and risk), and a comparative study design. The population includes all trading activities in financial markets, particularly in stock and derivatives markets. The sample consists of selected datasets related to trading performance, market indicators (such as volatility and liquidity), and case studies. The study uses non-probability sampling, specifically judgmental sampling, selecting data sources based on relevance and reliability. The study is based primarily on secondary data collected from financial reports, market analysis, stock exchange reports (e.g., National Stock Exchange), books, articles, and online financial databases. Key variables include trading performance (returns, profitability), market liquidity, price volatility, execution speed, and risk factors. Statistical analysis techniques employed include descriptive statistics (mean, standard deviation, percentage analysis), comparative analysis, correlation analysis, ANOVA, Chi-square test, and graphical representation using charts, graphs, and tables.

Findings

Based on the data analysis and interpretation, the following key findings are identified:

1. Algorithmic trading outperforms human trading in terms of execution speed, accuracy, and consistency.
2. Human traders are better at handling complex and uncertain market conditions, where qualitative judgment is required.
3. Algorithmic trading improves market liquidity by increasing trading volume and reducing transaction costs.
4. However, algorithmic trading may also increase market volatility, particularly during sudden market fluctuations or technical failures.
5. Human-driven trading is influenced by emotional and psychological factors (e.g., fear, overconfidence), which can lead to inconsistent performance.
6. A hybrid approach combining algorithmic efficiency and human judgment appears to be the most effective strategy.
7. The growing use of automation indicates that algorithmic trading will continue to dominate future financial markets, but human oversight remains essential.

Suggestions (Recommendations)

Based on the findings of the study, the following recommendations are suggested:

1. **Adoption of a Hybrid Approach:** Financial institutions and investors should adopt a combination of algorithmic trading and human-driven trading to leverage speed and efficiency while incorporating human judgment.
2. **Improved Risk Management Systems:** Firms using algorithmic trading should implement strong risk management controls to prevent excessive losses and reduce the chances of market disruptions.
3. **Regulatory Oversight:** Regulatory authorities should establish clear guidelines and monitoring mechanisms to ensure fair trading practices and prevent market manipulation caused by automated systems.
4. **Training and Skill Development:** Traders should be trained in both technical and analytical skills, including understanding algorithmic systems, data analysis, and behavioural finance.
5. **Technology Upgradation:** Continuous investment in advanced technologies such as artificial intelligence and machine learning can enhance the effectiveness of trading systems.

Conclusion

In conclusion, the study highlights that algorithmic trading and human-driven trading each play a vital role in modern financial markets. While algorithmic trading offers speed, efficiency, and consistency, human trading provides flexibility, intuition, and the ability to handle complex situations. The statistical analysis rejected the null hypotheses, confirming a significant difference in performance between the two approaches and a notable impact of algorithmic trading on market volatility. Human trading also demonstrated a significant contribution to market stability, especially during uncertainty. Neither approach can completely replace the other. A balanced integration of both approaches is essential for achieving optimal performance and maintaining market stability. The growing dominance of automation suggests algorithmic trading will continue to shape future markets, but human oversight remains indispensable.

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