STOCK MARKET DATA MANIPULATION DETECTION

A PROJECT REPORT

Submitted by

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ABSTRACT

Market manipulation is the act of using unethical or fraudulent means to interfere with the free and fair operation of the market. It can take many forms, and one way it can occur is through manipulating market structure. Market structure refers to the features of the market that determine how it operates, such as the number and types of market participants, the degree of competition, and the level of transparency. Market manipulation can occur when someone takes advantage of these features to mislead or deceive other market participants and to profit from the resulting market inefficiencies.

One example of market manipulation through the manipulation of market structure is wash trading, which is the act of simultaneously buying and selling the same financial instrument to create the appearance of increased market activity. This can be done to manipulate the instrument's price or mislead other market participants about its liquidity. Wash trading is illegal in most jurisdictions.

Detecting stock market manipulation based on the market structure can be challenging, as manipulators often use sophisticated methods to conceal their activities.

Benford's law can be used to detect market manipulation in the stock market by analysing the distribution of the first digits in stock prices. The law states that the first digit of a number in a data set is most likely to be a "1", and the probability of the first digit being a "9" is less than 5In the stock market, if the first digit distribution of stock prices deviates significantly from the patterns predicted by Benford's law, it may indicate that the market is being manipulated.

For example, if a large number of stocks are suddenly trading at a high price, it may indicate that the prices have been artificially inflated, and that market manipulation is taking place. Thus, our research will focus on detecting such manipulations to maintain a fair and unbiased market environment.

SOURCE OF DATA: www.bseindia.com

For this research the data has been collected from the official website of the Bombay Stock Exchange and the company name is ADANI ENTERPRISES LTD. The data contains 12 parameters and they are: 1) Open Price 2) High Price 3) Low Price 4) Close Price 5) WAP 6) No. of Shares 7) No. of Trades 8) Total Turnover 9) Deliverable Quantity 10) % Deli. Qty to Traded Qty 11) Spread High-Low 12) Spread Close-Open

The dataset contains 13 columns and 249 rows.

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CHAPTER 1: INTRODUCTION

1.1 MOTIVATION

A stock market enables the buying, selling and issuance of the shares of a publicly-held company. With a large number of transactions in the market happening every second, it is hard to accurately and fast detect market abuse. The act of falsely affecting the supply or demand for a security by distorting the security prices or trading volume is referred market manipulation. There are several reasons why it is important to stop stock market manipulation:

Protects Investors: Stock market manipulation undermines the trust of investors in the market and can lead to significant financial losses for individual investors. By stopping market manipulation, investors can have confidence that the prices of securities reflect the true underlying value of the companies and that their investments are not being artificially inflated or deflated.

Maintains Fairness: Market manipulation creates an uneven playing field for investors and traders, as some market participants have access to privileged information or are able to manipulate prices for their own benefit. Stopping market manipulation helps to maintain the fairness of the market and ensures that all participants have equal access to information and opportunities.

Promotes Market Integrity: Market manipulation can erode the integrity of the market and lead to widespread mistrust and skepticism among market participants. Stopping market manipulation helps to maintain the credibility of the market and

reinforces the public's confidence in the financial system.

Supports Market Efficiency: Stock market manipulation can disrupt the efficient functioning of the market by distorting prices and creating false signals. By stopping market manipulation, the market can operate more efficiently, leading to more accurate pricing and more efficient allocation of capital.

Overall, stopping stock market manipulation is essential for maintaining the health and stability of financial markets and ensuring that they operate in a fair, transparent, and efficient manner.

1.2 PROCESS

To analyze the data, I have started by creating some visualizations to help understand the trends and patterns in the data. For example, I have created line graphs of the Open Price, High Price, Low Price, and Close Price over time to see how these values have changed over the year. It was also very useful to create a bar graph of the Total Turnover (in Rupees) to see how it has varied over the time period.

Next, I have examined the No. of Shares and No. of Trades to see how these values have changed over the year 2022. This information could help to identify any unusual patterns in trading volume or activity, which could indicate market manipulation.

Finally, I have examined the Deliverable Quantity and the % Deli. Qty to Traded Qty to see how these values have changed over the period. This information could help to identify any unusual patterns in the delivery of shares, which could also indicate market manipulation.

And to analyze this data I will use Benford's law, if the graph of the data nearly matches the graph of the Benford's law then the given can be said to be random. If the data highly deviates from the Benford's law then it is very evident that the data has been manipulated.

CHAPTER 2: CONCLUSION

In conclusion, market structure plays a crucial role in the detection of stock market manipulation. A well-designed market structure can help regulators to more easily detect and prevent market manipulation by providing transparency, fairness, and integrity to the market.

To effectively detect and prevent stock market manipulation, regulators must have a deep understanding of market structure and the trading strategies used by manipulators. They must also have the tools and resources necessary to monitor market activity in real-time, detect unusual trading patterns, and take action to stop market manipulation when it occurs.

In summary, while market structure is an important factor in detecting stock market manipulation, it is only one part of a larger effort to maintain the health and stability of financial markets. Regulators, market participants, and investors must all play a role in ensuring that markets operate in a fair, transparent, and efficient manner.

2.1 FUTURE WORK

I have done this research only on market structure data but there are a lot more areas through which we can identify stock manipulation.

There are a few ways that deep learning techniques could potentially be used to detect stock market manipulation:

Sentiment analysis: Deep learning algorithms can be trained to analyze large

amounts of social media data, news articles, and other sources of information to detect changes in market sentiment that could be indicative of manipulation.

Trading patterns: Deep learning algorithms can be trained to recognize patterns in trading data that may be indicative of manipulation, such as wash trades or spoofing.

Market structure: Deep learning algorithms can be used to analyze market structure data, such as order book data and trade flow data, to detect changes in market dynamics that could be indicative of manipulation.

Compliance: Deep learning algorithms can be used to assist with compliance and surveillance efforts by identifying unusual trading activity and flagging it for further investigation.

It is important to note that detecting stock market manipulation is a complex task and deep learning techniques are just one tool that can be used to help identify potential manipulation.

REFERENCES

[1] www.bseindia.com for dataset

[2] https://www.overleaf.com/7895376364jnkvpyjyjytc

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