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MARKET MANIPULATION THROUGH ALGORITHMIC AND HIGH FREQUENCY TRADING (HFT) WITH SPECIAL REFERENCE TO THE JANE STREET GROUP CASE

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Abstract

The migration of securities trading from human-scale execution to automated, high-speed decision-making has changed both the form of market manipulation and the evidentiary problem faced by securities regulators. High-frequency trading (HFT) is not itself manipulative: many HFT strategies improve liquidity, reduce transaction costs, and contribute to price discovery. The regulatory problem arises when speed, automation, and cross-market positioning are used to create artificial price or trading signals. This article examines whether India's existing market-manipulation framework is capable of addressing that problem. It argues that the Securities and Exchange Board of India (SEBI) Act, 1992 and the SEBI (Prohibition of Fraudulent and Unfair Trade Practices relating to Securities Market) Regulations, 2003 (PFUTP Regulations) are sufficiently technology-neutral to reach algorithmic manipulation, but that the principal weakness lies elsewhere: fragmented surveillance, inadequate visibility into strategy-level behaviour, and uncertainty about how knowledge and manipulative purpose should be inferred from automated trading patterns. The article uses the July 2025 interim order against Jane Street Group as a case study, not as a final adjudication of liability, because the proceedings remained pending before the Securities Appellate Tribunal as of 8 October 2026. It then compares the Indian framework with United States and European Union approaches and proposes a strategy-level model built around cross-segment surveillance, auditable algorithmic provenance, calibrated intent inference, pre-trade risk controls, and procedural safeguards. The article concludes that India does not presently require a wholly new offence of "algorithmic manipulation"; instead, it needs clearer regulatory guidance and an enforcement architecture designed for machine-speed, multi-instrument trading.

Keywords

Algorithmic trading; high-frequency trading; market manipulation; PFUTP Regulations; SEBI; Jane Street; spoofing; layering; marking the close; index manipulation; market surveillance; financial regulation.

I. INTRODUCTION

The rapid evolution of technology has fundamentally transformed securities markets worldwide, enabling high-frequency trading and algorithmic trading to play a dominant role in modern trading ecosystems. While these technological advancements improve market efficiency, liquidity, and price discovery, they also create significant risks of market manipulation. Manipulative practices executed through sophisticated algorithms can create false impressions of market activity, distort prices, and undermine investor confidence. Recognizing these threats, regulators such as the Securities and Exchange Board of India have developed a comprehensive legal and regulatory framework to prevent fraudulent or unfair trading practices, including those executed through automated trading systems.

In India, this disparity is stark. A recent study by Securities Exchange Board of India (SEBI), highlighted by the All-India Brokers' Association (AIBI), revealed that 93% of individual traders incurred losses in equity and derivatives markets between FY 2022 and FY 2024.¹ Such data underscores the challenges faced by retail investors in a market increasingly dominated by institutional algorithmic strategies. The asymmetry has prompted regulators to scrutinize practices that may distort fair price formation or create artificial market movements, particularly in derivatives and index-based securities.

The rapid advancement of algorithmic trading, fuelled by developments in AI and sophisticated coding, has created significant regulatory challenges worldwide. A recent SEBI study highlights the growing dominance of such strategies, revealing that 97% of profits for foreign portfolio investors and 96% of proprietary trading profits in F&O markets for FY24 were generated through algorithmic trading.

Market manipulation in the context of algorithmic trading presents unique challenges because the complexity and speed of trades make detection and enforcement difficult. SEBI's statutory framework, which includes the SEBI Act, 1992 and the Prohibition of Fraudulent and Unfair

¹ Department of Economic and Policy Analysis, 'Analysis of Profits & Losses in the Equity Derivatives Segment (FY22-FY24)' (SEBI, 23 September 2024) <https://www.sebi.gov.in/reports-and-statistics/research/sep-2024/study-analysis-of-profits-and-losses-in-the-equity-derivatives-segment-fy22-fy24-_86905.html> accessed 13 October 2025.

Trade Practices Regulations, 2003, addresses both traditional and algorithmic forms of manipulation. This framework distinguishes between fraudulent acts that require proof of intent and manipulative practices where the creation of misleading market activity is sufficient to invoke regulatory action. This dual standard allows SEBI to adapt enforcement to the rapidly evolving technological landscape, as reflected in cases such as the NSE co-location matter, the Ajay Shah and Infotech algorithmic software case, and the Jane Street high-frequency trading enforcement action.

The gap can therefore be stated precisely. Existing research tends either to ask whether HFT should be regulated more strictly or whether a new offence is necessary. Less attention is paid to the middle layer between statutory prohibition and technological supervision: the evidentiary architecture through which a regulator converts a high-speed sequence of trades into a legally intelligible allegation of manipulation. The present article addresses that layer by proposing a strategy-level test that connects economic exposure, timing, price impact, reversal or offsetting behaviour, and the rationality of the trading pattern with the legal elements of knowledge and manipulation.

The paper is structured as follows: *Firstly*, it discusses the legal and regulatory framework governing market manipulation in India, outlining SEBI's statutory provisions and their interpretation by courts and tribunals. *Secondly*, it examines notable Indian cases involving algorithmic and high-frequency trading, analysing the facts, contentions, and rulings in each instance. *Thirdly*, it explores SEBI's regulatory responses and circulars aimed at curbing unfair practices through algorithmic trading. *Lastly*, it considers international perspectives and jurisprudence, highlighting enforcement actions by the SEC, CFTC, ESMA, and Japan's Financial Services Agency against manipulative algorithmic trading.

II. LEGAL FRAMEWORK INVOLVED IN MARKET MANIPULATION

The following provisions govern this subject matter in the Indian law enforcement, wherein, **Section 12A of the SEBI Act, 1992** lists down the prohibited activities in the Securities market.²

It provides that no person shall, directly or indirectly:

- a) Use deceptive or manipulative practices when issuing, buying, or selling securities listed or proposed to be listed on a recognized stock exchange, in violation of SEBI laws and regulations.

² Securities and Exchange Board of India Act, 1992 (15 of 1992) s 12A.

- b) Resort to any device, scheme, or artifice to defraud or mislead others in connection with securities trading or issuance.
- c) Carry out any action, practice, or business method that results in fraud or deception in dealing with listed or proposed securities.
- d) Engage in insider trading, including transactions based on material, non-public information.
- e) Disclose or share material non-public information with others in a way that breaches SEBI rules.
- f) Acquire excessive control over a company or its listed/proposed securities, exceeding the limits set under SEBI regulations.

Further, **SEBI (Prohibition of Fraudulent and Unfair Trade Practices relating to Securities Market) Regulations, 2003³:**

Regulation 2(1)(c): The meaning of "fraud"

- The term "fraud" is defined widely. It covers acts, statements, omissions or concealment done to induce another person to deal in securities, "whether in a deceitful manner or not", and "whether or not there is any wrongful gain or avoidance of any loss".

Regulation 3: Prohibition of certain dealings in securities

- It forbids any person, directly or indirectly, from:
 - a) buying, selling or otherwise dealing in securities in a fraudulent manner;
 - b) using any "manipulative or deceptive device or contrivance" in connection with the issue, purchase or sale of listed or proposed-to-be-listed securities, contrary to SEBI's laws and rules;
 - c) using any device, scheme or artifice to defraud in connection with dealing in or issuing such securities;
 - d) engaging in any act, practice or course of business that "operates or would operate as fraud or deceit" in dealings in such securities.

Regulation 4: Prohibition of manipulative, fraudulent, and unfair trade practices

- i. **Regulation 4(1):** Apart from Regulation 3, no person is allowed to engage in fraudulent or unfair trading activities in the securities market.
- ii. **Regulation 4(2):** Dealings are treated as such a practice "if it involves fraud", and the provision lists examples, including:

³ SEBI (Prohibition of Fraudulent and Unfair Trade Practices relating to Securities Market) Regulations, 2003.

- a. **4(2)(a):** an act that creates a "false or misleading appearance of trading in the securities market", and
- b. **4(2)(e):** any act or omission that amounts to "manipulation of the price of a security".

III. JUDICIAL AND REGULATORY TREATMENT OF ALGORITHMIC MANIPULATION IN INDIA

SEBI's framework governing market manipulation under the Prohibition of Fraudulent and Unfair Trade Practices Relating to Securities Market Regulations (FUTP Regulations), 2003⁴ reflects a nuanced and evolving approach towards the requirement of intention. Under Regulation 2(1)(c), "fraud" includes acts or omissions "whether deceitful or not" that induce another person to deal in securities. This represents a significant departure from the 1995 formulation, which required that acts be committed "with the intent to deceive." The removal of the express intent requirement indicates that *mens rea* is not an essential element to establish "fraud" under the current framework. This interpretation was affirmed by the Supreme Court in *SEBI v Kanaiyalal Baldev Patel* (2017),⁵ which held that intention is not necessary for establishing fraudulent conduct under Regulation 2(1)(c).⁶

However, Regulation 4(2)(a) of the FUTP Regulations which prohibits creating a "false or misleading appearance of trading" expressly requires *knowledge*.⁷ This element was introduced by the 2018 amendment following recommendations of the Committee on Fair Market Conduct, intended to exclude inadvertent trades from liability. The concurring opinion in *SEBI v Rakhi Trading*⁸ further clarified that the provision involves "a deliberate attempt to interfere with the free and fair operation of the market," thus implying a requirement of intention. SEBI itself relied on this interpretation in its interim order against Jane Street.⁹

Accordingly, SEBI's framework presents a dual standard: while *Kanaiyalal* confirms that "fraud" under Regulation 2(1)(c) does not necessitate proof of intention, a violation of Regulation 4(2)(a) requires some degree of deliberate or knowing conduct. Therefore, in enforcement actions, SEBI can strategically invoke provisions that do not require proof of

⁴ SEBI (Prohibition of Fraudulent and Unfair Trade Practices relating to Securities Market) Regulations, 2003.

⁵ *Securities and Exchange Board of India v Kanaiyalal Baldevbhai Patel* (2017) 15 SCC 1.

⁶ SEBI (Prohibition of Fraudulent and Unfair Trade Practices relating to Securities Market) Regulations, 2003 reg 2(1)(c).

⁷ SEBI (Prohibition of Fraudulent and Unfair Trade Practices relating to Securities Market) Regulations, 2003 reg 4(2)(a).

⁸ *Securities and Exchange Board of India v Rakhi Trading Private Ltd* (2018) 13 SCC 753.

⁹ *Interim Order in respect of Jane Street Group* WTM/AN/MRD/MRD-SEC-3/31516/2025-26.

intention, depending on the factual matrix of the case.

There have been various instances where SEBI has ruled on cases involving usage of algorithmic and high frequency trading for manipulation of market. One of the most notorious cases is the *matter of NSE and Others (Co-location)*, often referred to as *NSE Co-location scam*.¹⁰ This is closely linked to high-frequency and algorithmic trading. While SEBI's initial order took a strict stance on governance lapses, the SAT ruling highlighted that negligence without proven intent does not amount to fraud. The case remains a critical precedent in shaping India's regulatory approach to HFT and co-location practices, balancing technological complexity with principles of market fairness.

The author shall now discuss the co-location matter which illustrates the evidentiary difficulty of distinguishing technological advantage from conduct amounting to fraud or manipulation.

*i. In the matter of NSE and Others (Co-location)*¹¹

From around 2010, the National Stock Exchange (NSE) introduced a co-location facility that allowed brokers to place their trading servers within or near the exchange's premises. This provided faster access to market data and reduced latency in order execution. In 2015, a whistleblower alleged that certain trading members involved in algorithmic trading, particularly OPG Securities, were consistently accessing a secondary server, which was less congested, and therefore received Tick-By-Tick (TBT) data ahead of others. This created a microsecond advantage in placing orders and executing high-frequency trades. Allegations also included preferential treatment, misuse of infrastructure, and lack of an adequate monitoring mechanism.

SEBI's investigation consequently focused on whether the exchange's governance failures compromised fair and equitable access to the co-location facility.

SEBI found that NSE had not ensured fair and equitable access to the co-location facility and lacked effective internal controls governing server access. In 2019, it held the exchange responsible for governance and system lapses under the applicable securities-law framework, imposed a penalty of approximately ₹625 crore and barred NSE from introducing new products for six months, while also directing former CEOs Ravi Narain and Chitra Ramkrishna to return portions of their salaries. SEBI's later review, however, found insufficient evidence of collusion between NSE officials and OPG Securities and continued to treat the principal failing

¹⁰ *In the matter of NSE and Others (Co-location)* WTM/KV/MRD/MRD- PoD-3/30754/2024-25.

¹¹ *ibid.*

as one of procedural negligence.

The position was substantially reconsidered by the Securities Appellate Tribunal in January 2023, which set aside much of SEBI's 2019 order and treated the conduct as negligence and lack of due diligence rather than fraudulent intent. SAT also questioned the evidentiary basis of the disgorgement calculation, while maintaining some findings against OPG Securities and reducing NSE's penalty to ₹100 crore before remanding certain issues for reconsideration.

In January 2023, the Securities Appellate Tribunal (SAT) set aside much of SEBI's 2019 order. SAT held that the actions of NSE reflected negligence and lack of due diligence rather than fraudulent intent. It also noted that SEBI's disgorgement calculation lacked a clear evidentiary basis. While maintaining some findings against OPG Securities, SAT reduced NSE's penalty to ₹100 crore and remanded certain issues for reconsideration.

Subsequently, a different problem arises where algorithmic execution itself can generate repeated self-trades without necessarily reflecting a deliberate manipulative strategy.

ii. Crosseas Capital Services Pvt. Ltd (in the matter of Servalakshmi Papers Ltd.)¹²

In the case concerning Crosseas Capital Services Pvt. Ltd. (Noticee), SEBI's Adjudicating Officer, issued an order on November 27, 2013. The proceedings were initiated due to allegations that the Noticee had executed 5,201 self-trades totaling 981,186 shares of Servalakshmi Papers Limited (SPL) on the listing day of its IPO, thereby creating artificial volumes in the market.

The Noticee therefore argued that the trades resulted from the operation of its ultra-high-frequency algorithm rather than from an intention to create artificial volume. They contended that these trades were a result of its algorithmic trading system, "Crossfire," operating at ultra-high frequencies, leading to internal matching of buy and sell orders. They argued that such occurrences were incidental and not intentional.

The Adjudicating Officer ultimately accepted that the existence of the trades, by itself, did not establish manipulation. The self-trades formed only a minimal percentage of total traded volume, and the record did not provide substantial evidence of an intention to deceive. The officer also recognised that internal matching could occur because of the automated system and the latency inherent in high-frequency trading.

The Adjudicating Officer similarly found that, although the self-trades had occurred, they

¹² *In the matter of Servalakshmi Papers Limited Adjudication* Order No. EAD-2/DSR/RG/07/2013.

represented only a minimal proportion of total traded volume and the record did not establish substantial evidence of manipulation or an intention to deceive. The possibility of internal matching caused by the automated system and the latency inherent in high-frequency trading therefore remained a credible alternative explanation.

The charges under the SEBI Act and PFUTP Regulations were accordingly not substantiated and the matter was disposed of without penalty.

The author states that over the passage of time, SEBI's investigation then moved beyond execution patterns to the use of confidential exchange data in developing and commercially exploiting algorithmic trading software.

iii. In re: National Stock Exchange of India Ltd.¹³

Between 2009 and 2016, SEBI investigated the misuse of confidential NSE data to develop algorithmic trading software that was commercially exploited.

The probe focused on Dr. Ajay Shah, his wife Susan Thomas, sister-in-law Sunita Thomas, NSE officials including Suprabhat Lala, and Infotech Financial Services Pvt. Ltd. SEBI found that confidential trading data was shared with Infotech and used to create software products sold to market participants, providing them with unfair trading advantages and violating SEBI's Prevention of Fraud and Unfair Trade (PFUTP) regulations.

In the related orders concerning NSE officials and Infotech Financial Services, SEBI also identified failures to disclose conflicts of interest and to supervise the handling of sensitive information. The LIX project was criticised because its award to Infotech allegedly allowed the commercial exploitation of proprietary NSE data without adequate disclosure. The proceedings resulted in two-year restrictions on Dr. Shah and his associates and underscored that the risks of algorithmic trading extend beyond the orders placed in the market to the governance, information and institutional arrangements that make those orders possible.¹⁴

SEBI's orders highlighted failures by NSE officials to disclose conflicts of interest and to supervise the handling of sensitive data. The NSE was criticized for awarding the LIX project to Infotech without adequate disclosure, allowing commercial exploitation of proprietary data. Dr. Shah and his associates were barred from associating with market infrastructure institutions, listed companies, or registered intermediaries for a period of two years.

The orders underscored the regulatory risks of misusing algorithmic software and sensitive

¹³ *In re: National Stock Exchange of India Ltd.* WTM/SKM/EFD1-DRA-III/ 17 /2019-20.

¹⁴ *ibid.*

market information, emphasizing the importance of governance, compliance, and conflict-of-interest disclosures in algorithmic trading.

IV. JANE STREET GROUP: TESTING THE EVOLVING REGULATORY FRAMEWORK

In July 2025, SEBI issued an interim order against Jane Street Group, a prominent global trading firm, alleging market manipulation in the Indian securities market.

“Jane Street’s business model revolves around spotting price differences across financial instruments or markets and exploiting them. The firm employs high-frequency trading technology to identify and act on these inefficiencies, often holding positions for very brief periods, sometimes only a few milliseconds.”

SEBI accused Jane Street of employing manipulative strategies including: intra-day index manipulation and extended marking-the-close, on the NIFTY and BANKNIFTY indices.

The regulator directed the impounding of Jane Street's alleged unlawful gains, amounting to approximately ₹4,843 crore and barred the firm from accessing the securities market until the amount was impounded. Jane Street deposited the specified amount into an escrow account on July 14, 2025, and resumed trading in the Indian securities market on July 21, 2025.

SEBI’s case was therefore framed around two connected forms of alleged conduct.

- i. First, on 15 BANKNIFTY option-expiry days, Jane Street allegedly bought large quantities of constituent stocks in the cash market during the earlier part of the day, temporarily pushing the index upward, and later reversed those positions.*
- ii. SEBI alleged that the resulting movement benefited positions held in the related options market. The order also alleged that an Indian entity was used to undertake intraday cash-market activity in circumstances relevant to Regulation 20(4) of the SEBI (Foreign Portfolio Investors) Regulations, 2019.*

The events are explained herein below:

- i. Intra-day Index Manipulation:* SEBI alleged that on 15 BANKNIFTY option expiry days, Jane Street aggressively bought significant quantities of BANKNIFTY constituent stocks in the cash market, temporarily inflating the index.” Later in the day, the firm sold off these securities, exerting downward pressure on the index. The regulator contended that such trading activities were designed to influence the options market, benefiting Jane Street's positions.

As per Regulation 20(4) of the Securities Exchange Board of India (Foreign Portfolio

Investors) Regulations, 2019,¹⁵ the FPIs are prohibited from conducting intra-day trade and cannot buy and sell within the same day. The Group incorporated an entity in India to execute intra-day trade and to circumvent this regulation.

- ii. **Second**, SEBI alleged an extended marking-the-close strategy in which aggressive selling during the final hour reduced the index closing level and generated an alleged profit of approximately ₹560 crore. The significance of these allegations lies not simply in the volume or speed of the trades, but in the relationship between the underlying cash-market activity, the resulting index movement and the derivative positions capable of monetising that movement.

Against this factual pattern, SEBI applied the existing PFUTP framework rather than treating algorithmic trading as a separate offence.

SEBI observed that:

- a) *“Regulation 4(2)(a) considers any action manipulative or fraudulent if it creates a false or misleading impression of trading activity in the securities market.”*
- b) *“Regulation 4(2)(e) treats any act as manipulative or fraudulent if it distorts the price of a security or affects the benchmark price of securities. Since indices represent a basket of securities, any price movement in the underlying stocks automatically impacts the benchmark index.”*

The order examined the sequencing of the trading across the day: aggressive buying between 9:15 AM and 11:46 AM was followed by substantial reversal through selling from approximately 11:49 AM to the end of the trading day.

- ***During the first period, aggressive quantity buying allegedly pushed the prices of the relevant constituent securities upward.***
- ***During the second period, that position was substantially reversed through aggressive selling.***

SEBI considered the size, aggression, manner of trading and transaction costs together, observing that such activity, viewed on a standalone basis, could more often than not result in net trading losses.

On a preponderance of probabilities, SEBI therefore concluded that the pattern was consistent with an attempt to artificially move the index upward and later exploit the resulting movement through opposite-side positions.

The order further reasoned that the trading systems were capable of anticipating the later

¹⁵ *Interim Order in respect of Jane Street Group* WTM/AN/MRD/MRD-SEC-3/31516/2025-26.

reversal and treated that sequencing as evidence supporting an inference of manipulative purpose.

The interim order consequently barred Jane Street and affiliated entities from participating in the Indian securities market and directed the impounding of alleged unlawful gains of approximately ₹4,843 crore. Jane Street deposited the specified amount into an escrow account on 14 July 2025 and resumed trading on 21 July 2025, while contesting SEBI's characterization of the conduct and pursuing the matter before the Securities Appellate Tribunal.

The order also considered the interaction with the takeover disclosure framework because the positions were exited intraday and the relevant derivatives were cash-settled.

Under the SEBI (Substantial Acquisition of Shares and Takeovers) Regulations, 2011, shareholding is determined with reference to the relevant holding position, the 5% threshold applies to voting rights or shares, and cash-settled instruments are excluded from the relevant calculation.¹⁶

- These features meant that the intraday and cash-settled structure did not itself trigger the disclosure requirement on the facts considered in the paper.
- The Jane Street matter therefore illustrates a broader regulatory difficulty: where positions are short-lived and distributed across related instruments, a legally relevant strategy may be visible only when the regulator reconstructs the complete economic sequence rather than examining any single trade or instrument in isolation.
- Excludes cash settled instruments.

Therefore, the author states that the Jane Street Group closely escaped the disclosure requirements due to their intra-day activities and cash settled instruments instead of other derivatives.

V. COMPARATIVE REGULATORY APPROACHES ON MANIPULATIVE TRADING USING ALGORITHMS AND HIGH FREQUENCY TRADING

The regulation of high-frequency and algorithmic trading is not a challenge only to India. Regulators around the world continue to address issues arising from increasingly electronic and fragmented markets dominated by sophisticated algorithmic traders.

The United States

In the United States, the Securities and Exchange Commission (SEC) actively regulates and

¹⁶ SEBI (Substantial Acquisition of Shares and Takeovers) Regulations, 2011.

enforces rules against fraud by high-frequency traders. The SEC has set clear limits on practices such as quote stuffing,¹⁷ layering, and spoofing, prosecuting firms engaged in these activities because they create false or misleading impressions of trading and disrupt the fair functioning of markets.

The SEC can bring civil actions against spoofing under the Commodity Exchange Act (CEA), 1936¹⁸ and the Securities Act, 1933.¹⁹ The Securities Act, 1933 prohibits deceptive sales of securities and forbids anyone from trading or offering securities or security-based swap agreements through any communication method using fraudulent schemes, tricks, or by omitting important information. Traders are also prohibited from using any facility of a national securities exchange to engage in deceptive or manipulative practices.

The SEC also monitors latency arbitrage strategies, where traders exploit tiny delays in the transmission of market data. High-frequency traders may use advanced technology or locate servers close to exchanges to gain faster access to price information and execute trades more quickly, profiting from these small-time differences. To counteract this, the SEC has approved the use of “speed bumps,” which intentionally delay information to ensure a more level playing field. The Dodd-Frank Act, 2010²⁰ amended the CEA, granting the Department of Justice (DOJ) the authority to prosecute spoofing offenses.

SEC’s first enforcement action against a high-frequency trading firm for market manipulation:

i. Case of Athena Capital Research LLC²¹ (first case against HFT firm under Section 10(b))

The SEC’s action against Athena Capital Research illustrates the same principle in the United States: the use of sophisticated technology is not itself prohibited, but an algorithmic strategy becomes unlawful where it is used deliberately to manufacture an artificial price signal.

Between June and December 2009, Athena Capital Research employed an algorithm known as “Gravy” in a marking-the-close strategy that concentrated aggressive, rapid-fire trades in the final two seconds of trading.

The volume of these last-second transactions was sufficient to overwhelm available liquidity and push the market price, and consequently the closing price, in Athena’s favour across

¹⁷ *Anand Rathi v SEBI* (2001) SCC OnLine Bom 381.

¹⁸ The Commodity Exchange Act 1936, 7 USC §§ 1–27f.

¹⁹ The Securities Act, 1933, 15 USC §§ 77a–77mm.

²⁰ Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub L No 111-203, 124 Stat 1376 (2010) s 747; CEA (n A) 7 USC § 6c(a)(5)(C).

²¹ US Securities and Exchange Commission, ‘Press Release on SEC Charges New York-Based High Frequency Trading Firm with Fraudulent Trading to Manipulate Closing Prices’ (Securities and Exchange Commission, 16 October 2024) <<https://www.sec.gov/newsroom/press-releases/2014-229>> accessed 3 October 2025.

thousands of NASDAQ-listed stocks.

The regulator's case was reinforced by internal communications describing the strategy as "owning the game", which supported the inference that the trading pattern was not simply a by-product of automated execution.

- The volume of Athena's last-second trades allowed the firm to overwhelm the market's available liquidity and artificially push the market price, and therefore the closing price in its favor.

The conduct was prosecuted under Section 10(b) of the Securities Exchange Act of 1934 and Rule 10b-5 because the strategy artificially influenced closing prices and therefore interfered with market integrity.

The matter ended with an SEC order finding a violation. Although Athena neither admitted nor denied the findings, it agreed to pay a \$1 million civil monetary penalty and to cease and desist from future violations, making the action an important early example of enforcement against an HFT firm for manipulative trading.

The SEC charged Athena Capital Research with violating Section 10(b) of the Securities Exchange Act of 1934 and Rule 10b-5, which prohibit fraudulent practices and market manipulation. The firm's actions were found to have artificially influenced the closing prices of securities, undermining the integrity of the securities markets.

The SEC's order reprimands Athena and concludes that the firm breached Section 10(b) of the Securities Exchange Act of 1934 and Rule 10b-5. While neither admitting nor denying the SEC's findings, Athena Capital Research agreed to pay a \$1 million civil monetary penalty and cease and desist from committing or causing any future violations of the securities laws.

ii. *Case of Optiver Holding BC, Commodity Futures Trading Commission*²²

In March 2007, Optiver traders executed a series of trades in U.S. oil futures, including crude oil, heating oil and gasoline contracts, in a strategy directed at influencing settlement prices. The firm accumulated substantial positions before the market close and then offset those positions before the close in what became known as "banging the close".

- The CFTC alleged that the strategy produced artificial price movements and generated approximately \$1 million in profit. Its complaint described 19 attempted instances across 11 trading days, including successful attempts to move futures prices both

²² Commodity Futures Trading Commission, *Press Release: CFTC Charges Optiver Holding BV, Two Subsidiaries, and High-Ranking Employees with Manipulation of NYMEX Crude Oil, Heating Oil, and Gasoline Futures Contracts* (Commodity Futures Trading Commission, 24 July 2008) <<https://www.cftc.gov/PressRoom/PressReleases/5521-08>> accessed 1 October 2025.

upward and downward, and also alleged false statements to NYMEX officials to conceal the conduct.

- The enforcement response demonstrates the seriousness with which regulators treat repeated price-setting strategies around benchmark periods.
- The matter was ultimately resolved by a federal-court-approved settlement in April 2012 under which Optiver paid \$14 million in civil monetary penalties and disgorgement and accepted a two-year prohibition on trading U.S. oil futures during the final three minutes before the close. Individual traders also received trading bans of varying duration.

The CFTC's complaint detailed 19 instances of attempted manipulation on 11 different days in March 2007, with at least five instances where manipulation was successful. In three cases, Optiver forced futures prices lower, and in two cases, they forced prices higher. The CFTC also charged Optiver and van Kempen with making false statements to NYMEX officials to conceal their manipulative scheme.

- In April 2012, a federal court approved a settlement requiring Optiver to pay a total of \$14 million in civil monetary penalties and disgorgement.
- The settlement also imposed a two-year ban on Optiver from trading U.S. oil futures in the three minutes prior to market close. Individual traders involved were barred from trading commodities for varying periods: eight years for Christopher Dowson, four years for Randal Meijer, and two years for Bastiaan van Kempen.

Moving further, Michael Coscia's case provides a more direct example of algorithmically generated spoofing. He was convicted on counts of commodities fraud and spoofing after using algorithms to place large orders that he intended to cancel before execution, thereby creating a misleading impression of market depth and influencing prices to his advantage.

iii. *Coscia v United States*²³

Michael Coscia, a high-frequency trader, was convicted by a jury on six counts of commodities fraud under 18 U.S.C. § 1348 and six counts of spoofing under 7 U.S.C. §§ 6c(a)(5)(C) and 13(a)(2). Spoofing involves placing orders with the intent to cancel them before execution, creating a false impression of market activity. This practice was made illegal in 2010 under the Dodd-Frank Act. Coscia's trading strategy involved using algorithms to place large orders that he intended to cancel before execution, influencing market prices to his advantage.

After conviction, Coscia relied on additional evidence and arguments concerning the trial

²³ *Coscia v United States* No. 20-1032 (7th Cir. 2021).

record, including alleged errors in the data presented to the jury and later cases involving other traders. The Seventh Circuit nevertheless affirmed the district court's denial of his post-conviction motions.

The court's reasoning is important for HFT regulation because it distinguished speed from illegality: high-frequency and algorithmic trading are not unlawful per se, but the deliberate use of large, misleading orders with an intention to cancel them can constitute criminal spoofing. The case therefore reinforces the importance of identifying the purpose and structure of the algorithmic strategy rather than treating automation itself as the prohibited conduct.

The Seventh Circuit affirmed the district court's denial of both motions.

The court acknowledged that Coscia's strategy involved high-frequency and algorithmic trading. It confirmed that spoofing is illegal under the Dodd-Frank Act, which forbids placing orders with the intention of cancelling them to give a false impression of trading activity. Coscia's conviction on six counts of spoofing was upheld because the evidence showed he deliberately used large, misleading orders to influence market prices. It clarified that using algorithms to trade at high speed is not illegal per se, but when combined with intentional spoofing, it constitutes a criminal offense.

Lastly, the 2010 Flash Crash provides another illustration of how algorithmic order placement can create artificial signals. On 6 May 2010, the Dow Jones Industrial Average fell by nearly 1,000 points within minutes before recovering rapidly. Navinder Singh Sarao was subsequently identified as a significant contributor to the episode after using a modified trading platform to place large sell orders for E-mini S&P 500 futures that he intended to cancel before execution.

iv. The U.S. Flash Crash case (Spoofing)²⁴

- The 2010 Flash Crash, occurring on May 6, 2010, was a sudden and severe stock market downturn in the United States, where the Dow Jones Industrial Average plunged nearly 1,000 points within minutes before recovering just as quickly. This event wiped out approximately \$1 trillion in market value, though most of the losses were reversed within the same trading day.
- These orders created a false impression of available market depth and encouraged other traders to react to the apparent supply. The subsequent investigation by the CFTC and DOJ resulted in criminal charges in 2015, including wire fraud, commodities fraud and

²⁴ *U.S. Commodity Futures Trading Commission v Nav Sarao Futures Ltd. PLC and Navinder Singh Sarao* (2015) Civil Action No. 1:15-cv-03398, U.S. District Court for the Northern District of Illinois.

spoofing. Sarao ultimately pleaded guilty in November 2016 to wire fraud and spoofing and was ordered to pay more than \$38 million in monetary sanctions.

The Sarao matter thus complements Coscia:

- i. Both cases demonstrate that the legal concern is not the use of an algorithm or trading speed in isolation,
- ii. but the deliberate deployment of automated orders to create a market signal that the trader does not genuinely intend to stand behind.

Between 2009 and 2015, Sarao's trading activities were investigated by the U.S. Commodity Futures Trading Commission (CFTC) and the Department of Justice (DOJ).

- In April 2015, the DOJ filed 22 criminal charges against him, including wire fraud, commodities fraud, and spoofing. Sarao was accused of placing orders amounting to about \$200 million worth of bets that the market would fall, which were replaced or modified 19,000 times before being cancelled.
- In November 2016, Sarao pleaded guilty to one count of wire fraud and one count of spoofing. He was ordered to pay over \$38 million in monetary sanctions for price manipulation and spoofing. In January 2020, he was sentenced to one year of home confinement, with no jail time, partly due to his cooperation with authorities and his diagnosis of Asperger syndrome.

The European Union

Similarly, the European Securities and Markets Authority (ESMA) has introduced rules under MiFID II to regulate algorithmic and high-frequency trading.²⁵ Like SEBI, both European and US regulators aim to balance the efficiency benefits of technological advancements with the need to maintain market integrity and fairness.²⁶

Japan

Japan's Financial Services Agency (FSA) is intensifying efforts to combat manipulative high-frequency trading (HFT) practices. The FSA plans to increase fines for firms engaging in illicit HFT activities, such as quote stuffing and layering, which can distort market prices and

²⁵ Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments [2014] OJ L173/349, arts 17 and 48.; Regulation (EU) No 600/2014 of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments [2014] OJ L173/84.

²⁶ European Securities and Markets Authority, 'Algorithmic trading' (ESMA) <<https://www.esma.europa.eu/esmas-activities/markets-and-infrastructure/algorithmic-trading>> accessed 7 October 2026.

undermine investor confidence.²⁷ An advisory council is expected to begin discussions by the end of this year, aiming to revise the Financial Instruments and Exchange Act by 2026.

Currently, Japan imposes surcharges based on illicit profits from such violations. The FSA is moving to close a loophole that allows high-frequency traders (HFTs) to escape penalties for small but repeated illicit trade.²⁸

This initiative is part of Japan's broader efforts to strengthen its financial regulatory framework and ensure fair trading practices. While the move has been welcomed by those advocating for market fairness, some industry stakeholders' express concerns about potential impacts on liquidity and trading costs.

VI. 2025 SEBI CIRCULAR TO REGULATE ALGORITHMIC TRADING

The regulatory framework for algorithmic trading in India has evolved through a series of SEBI measures, beginning with the 2012 guidelines and extending to the recent SEBI circular dated 4 February 2025.²⁹ The 2025 circular seeks to facilitate safer participation in algorithmic trading by retail investors while strengthening accountability and risk controls for algorithmic trading activities.

The following changes have been introduced through the circular:

1. SEBI has mandated the use of a unique client identifier for all trades, ensuring every order can be traced to a specific user. This enhances transparency and deters market manipulators or insiders from exploiting algorithmic anonymity for fraudulent activities.
2. The circular also requires that algorithms developed by investors for personal use be registered if they exceed a SEBI-specified order-per-second threshold, limiting excessive or manipulative trading activity.
3. To improve security and traceability, SEBI has prohibited open APIs and introduced a key-based API system with OAuth authentication, reducing the risk of unauthorized trades.
4. Additionally, algorithms are now classified into two types. "White-box" algorithms are fully transparent and available to any registered trader, while "black-box" algorithms

²⁷ MT Newswires Live, 'Market Chatter: Japan to Toughen Penalties for High-Frequency Trading Abuse' (*Tiger Trade*, 14 August 2025) <<https://www.itiger.com/news/2559935816>> accessed 7 October 2026.

²⁸ *ibid.*

²⁹ SEBI Circular SEBI/HO/MIRSD/MIRSD-PoD/P/CIR/2025/0000013 of February 2025 on Safer participation of retail investors in Algorithmic trading <https://www.sebi.gov.in/legal/circulars/feb-2025/safer-participation-of-retail-investors-in-algorithmic-trading_91614.html> accessed 7 October 2026.

retain hidden logic and require providers to register as Research Analysts and maintain detailed research documentation.

While these measures democratize algorithmic trading and allow broader participation, they also highlight the risks of automation. Minor technical glitches or coding errors can trigger unintended trades and potentially destabilize the market, making robust risk management and fail-safe mechanisms essential for maintaining market integrity.

VII. STRATEGY LEVEL REGULATORY FRAMEWORK FOR INDIA

A. Why a New Offence Is Not the First Solution

There is a legitimate argument for a dedicated statutory offence dealing with algorithmic manipulation. Yet creating a new offence before clarifying how the existing provisions are to be applied risks duplicating broad prohibitions already found in Sections 12A and Regulation 4. The immediate problem revealed by Jane Street is not a simple textual gap. It is the difficulty of translating complex machine-speed behaviour into legally reliable proof.

A new offence may ultimately become necessary if future technologies produce manipulative conduct outside the effective reach of existing rules. At present, however, a more proportionate response would be a dedicated SEBI guidance framework under the existing PFUTP Regulations, supported by surveillance standards and record-keeping requirements. This approach preserves statutory flexibility while reducing uncertainty for market participants.

B. Proposed Algorithmic Manipulation Assessment Framework

SEBI should issue interpretive guidance identifying non-exclusive factors relevant to algorithmic manipulation. The following factors can be grouped into a four-stage analytical sequence: exposure, capacity, conduct and benefit.

STAGE	REGULATORY QUESTION
1. Economic exposure	Identify positions across cash, futures, options and other linked instruments; determine whether the participant benefits from a particular direction of price movement.
2. Price-impact capacity	Measure the participant's share of depth, executed volume and short-window price movement relative to prevailing liquidity and other market activity.
3. Conduct and sequencing	Examine order timing, aggression, repetition,

	clustering around expiry or benchmark windows, cancellations, reversals and cross-segment coordination.
4. Benefit and alternative explanation	Compare the realised or expected benefit with the cost of the allegedly price-moving leg and test whether a credible non-manipulative explanation survives the complete record.

The framework should not operate as a mechanical checklist. Large trades should not trigger liability merely because they cause price movement, and high cancellation ratios should not be treated as proof of spoofing without context. Each factor should instead operate as cumulative evidence. The stronger the convergence between economic exposure, measurable price impact, suspicious sequencing and derivative benefit, the stronger the inference of manipulation.

C. Strategy-Level Auditability and Signal Provenance

Current algorithmic controls increasingly focus on tagging the order and identifying the broker or algo provider. For enforcement against sophisticated institutional strategies, that is necessary but not sufficient. SEBI should move toward strategy-level auditability: regulated entities using material algorithmic strategies should maintain records of strategy identifiers, relevant model versions, parameter changes, material risk-limit changes, human overrides, and the systems responsible for order generation. SEBI need not demand source code or commercially sensitive mathematical models in routine supervision. The objective is traceability of decision-making, not disclosure of proprietary intellectual property.

This recommendation is consistent with the direction of recent scholarship on “signal provenance”, which argues that an order trail can show what was sent to the market without necessarily showing what information or signal caused the order to be generated. The distinction is important for regulatory design. A regulator investigating manipulation needs to reconstruct not only what the algorithm did, but which strategy or decision-rule produced the sequence and whether that sequence was materially altered during the relevant period.³⁰

D. Cross-Market and Cross-Entity Surveillance

Jane Street demonstrates why surveillance cannot remain instrument-specific. A manipulation strategy can operate in the cash market, influence an index, and monetise the movement

³⁰Lokesh Gupta, ‘Signal Provenance in Retail Algorithmic Trading: An Architectural Gap in SEBI’s 2026 Framework and its General Form’ (SSRN, July 2026).

through options. SEBI and market infrastructure institutions should therefore develop consolidated surveillance views that connect related positions across segments and affiliated entities, subject to appropriate legal and privacy controls. Surveillance alerts should be capable of detecting combinations such as concentrated constituent purchases plus directional index-option exposure plus subsequent reversal during a reference-price window.

The objective is not to prohibit cross-market strategies. It is to ensure that the regulator can see them as a single economic strategy when the evidence indicates that they operate as one. This is also an area where data science can assist without deciding liability. Machine-learning or rule-based models can flag abnormal sequences, but a legal finding should remain grounded in explainable evidence and an opportunity to respond.

E. Calibrated Pre-Trade Controls

India should extend proportionate pre-trade controls for participants whose algorithmic activity can materially influence market benchmarks. These controls can include hard limits on order size relative to displayed depth, concentration alerts, dynamic participation caps around sensitive benchmark windows, automatic escalation when the same entity simultaneously builds substantial exposure in a related derivative, and kill-switch mechanisms where risk limits are breached. Such tools should be calibrated by market impact and strategy type, not by a blanket distinction between “manual” and “algorithmic” trading.

F. A Safe Harbour for Bona Fide Market-Making and Arbitrage

A regulatory framework must avoid chilling beneficial liquidity. SEBI should clarify that a strategy is not presumptively manipulative merely because it is algorithmic, high-frequency, cross-market, profitable, or capable of moving prices. Firms that can demonstrate objective market-making or arbitrage criteria, documented risk limits, tested algorithms, and consistent hedging behaviour should benefit from a rebuttable presumption that reduces enforcement uncertainty. The presumption should disappear where the trading pattern materially diverges from the stated strategy, uses artificial orders, or is concentrated around a benchmark in a way that generates a disproportionate directional benefit.

G. Due Process and Evidentiary Disclosure

Finally, stronger surveillance should be matched by stronger evidentiary discipline. When SEBI relies on high-frequency order data to allege manipulation, an enforcement notice should identify, to the extent legally permissible, the relevant trading windows, the reference price, the positions that allegedly benefited, the price-impact methodology, and the principal data categories used to reach the inference. A respondent cannot meaningfully explain a strategy if the alleged price effect, data inputs or counterfactual assumptions remain opaque. The ongoing

Jane Street document-access dispute demonstrates why disclosure is part of the substantive regulatory architecture, not an afterthought.

VIII. POLICY IMPLICATIONS FOR SEBI AND MARKET INFRASTRUCTURE INSTITUTIONS

A. The regulatory objective should be market integrity, not equalisation of technology
The policy objective should not be to eliminate technological advantages. Securities markets compete partly through infrastructure, execution quality and information processing. A rule that attempts to make all participants equally slow could impair liquidity and price discovery. The appropriate objective is narrower: prevent technological capability from being used to manufacture false prices or artificial market signals.

B. Retail-protection and institutional-market-conduct rules should remain distinct
The full implementation of the 2025 retail algorithmic-trading framework on 1 April 2026 is a significant regulatory milestone, but it should not be described as a complete answer to institutional HFT manipulation. Retail algorithmic access raises questions of broker responsibility, algo-provider registration and client protection. Institutional manipulation raises questions of strategy governance, cross-market exposure, benchmark influence and evidentiary attribution. Conflating the two risks either over-regulating retail access or under-regulating institutional strategies.³¹

C. OTR should remain a risk signal, not a proxy for manipulation
The order-to-trade ratio is useful for identifying excessive messaging, but it cannot become a proxy for manipulation. Legitimate market-making can generate large numbers of cancellations, while some manipulative strategies may have modest cancellation rates. SEBI's 2026 OTR revision, which excludes designated market-maker orders and creates specific exemptions for certain equity-option orders, reflects this principle of calibration. OTR should therefore function as one surveillance indicator among several, not as a standalone legal test.³²

³¹ SEBI, 'Safer participation of retail investors in Algorithmic trading', Circular No SEBI/HO/MIRSD/MIRSD-PoD/P/CIR/2025/0000013 (4 February 2025), read with the September 2025 implementation extension; the framework became applicable to all stock brokers from 1 April 2026.

³² SEBI, 'Revision of Order-to-Trade Ratio (OTR) framework', Circular No HO/47/11/16(2)2025-MRD-POD2/I/4113/2026 (4 February 2026).

IX. CONCLUSION AND SUGGESTIONS

The Algorithmic and high-frequency trading have changed the speed, scale and architecture of securities markets, but they have not displaced the basic legal concept of market manipulation. The central regulatory task remains identifying conduct that creates artificial conditions in the market or distorts prices for an unlawful advantage. What has changed is the evidentiary environment in which that task must be performed.

India already possesses a broad and technologically neutral foundation in Section 12A of the SEBI Act and the PFUTP Regulations. The Supreme Court's jurisprudence on artificial and non-genuine trading provides a foundation for inference from trading patterns, while the 2018 amendment to Regulation 4(2)(a) requires post-amendment enforcement to address knowledge explicitly. The result is not a legal vacuum. It is a system in transition from order-level supervision to strategy-level oversight.

The Jane Street proceedings illustrate the transition. The alleged conduct, as framed by SEBI, is not a conventional spoofing scheme in which false orders alone create a misleading order book. It is an alleged cross-market strategy in which trading in underlying securities influences an index and the resulting movement is monetised through related options positions. The legal challenge is therefore to distinguish legitimate arbitrage from self-created price movement, and to do so using evidence that remains intelligible and contestable.

The best regulatory response is consequently neither technological prohibition nor immediate statutory over-expansion. SEBI should strengthen strategy-level auditability, cross-segment surveillance, benchmark-sensitive risk controls, interpretive guidance on evidentiary factors, and procedural disclosure. At the same time, it should preserve room for legitimate market-making and arbitrage through a calibrated safe harbour. Such a framework would better align Indian securities regulation with the realities of machine-speed markets while retaining the central principle that markets must reflect genuine supply, demand and information rather than manufactured signals.