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## IMPACT OF HIGH FREQUENCY TRADING ON INDIAN CAPITAL MARKETS

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### ABSTRACTS:

High frequency trading is the advanced version of stock market trading which exclude the human emotions and time taken by the manpower. It's a computerized system oriented concept with predetermined buying and selling orders at predefined price levels. The main aim of the article is examining the impact of high frequency trading on liquidity, volatility and price discovery in an emerging market (India). We chose Nifty 50 stocks listed on the National Stock Exchange of India (NSE) for our study. We use Nifty 50 stocks as they are most actively traded and are a representative sample for the various industries and sectors of the economy.

**KEY WORDS:** Stocks trading, Indian capital market, liquidity, Volatility, Price discovery

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### INTRODUCTION:

High frequency trading “is computerized rule based system responsible for executing orders to buy or sell a given asset.” It reduces and sometimes eliminates the manual interventions of a trader and comes up with efficient decisions regarding *time*, *price*, and *quantity* of orders. The decision-making is based on the information gathered by dynamically monitoring the market conditions across the securities trading venues. The idea behind this is to reduce the market impact by optimally breaking the large orders and closely tracking benchmarks over the execution intervals. As an investor or trader, everyone aims at maximizing the profits and minimizing the risks by carefully choosing different investment avenues. This is what the high frequency trading intends to do.

High frequency trading utilizes very advanced and complex mathematical models for making decisions on behalf of an investor in the financial markets. There are strict rules that determine the optimal time for an order to be placed, to be modified and to be canceled in such a way that it will cause the least amount of impact on the stock's price and also will ensure availability of liquidity for the investors.

Securities and Exchange Board of India (SEBI) defines high frequency trading, as “any order that is generated using automated execution logic shall be known as high frequency trading”

### HIGH FREQUENCY TRADING IN INDIA:

High frequency trading in India was launched by Credit Suisse's Advanced Execution Services (AES) on 22<sup>nd</sup> June 2009. The launch of high frequency trading was focused around the Indian equities. The momentum for high frequency trading in India was gained by the allowance of co-location facilities by NSE in June 2010. Co-location allows broker member servers' to be placed side by side to the exchange server in order to reduce latency. It was aimed at reducing the time taken in the transmission of data (orders) from broker terminals to exchange servers. Since speed is the key for high frequency trading, most of the brokerage firms adopted for the co-location of their server terminals.

### LITERATURE REVIEW:

The existing literature on high frequency trading is mostly with respect to the quote driven markets. There is a lack of evidence on high frequency trading in emerging order driven economies. Considering the various differences in the market structure of developed and emerging markets, our

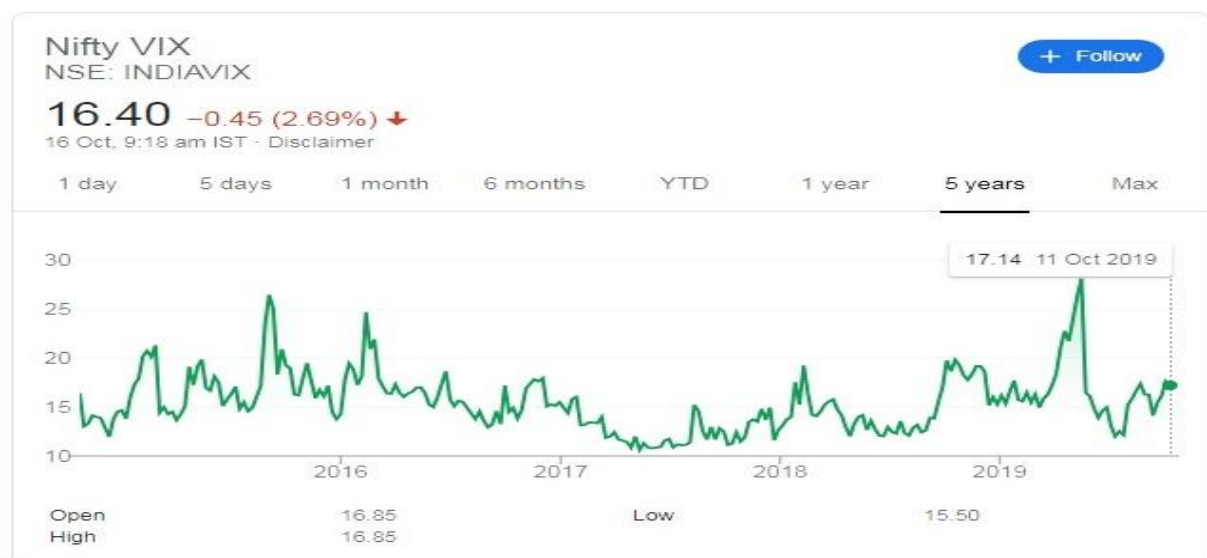
study aims at examining the impact of high frequency trading on liquidity, volatility and price discovery in an emerging market (India). We present our literature review in three sections. The first section discusses the impact of high frequency trading on liquidity; the second section presents the literature on impact of high frequency trading on volatility. And the third section will cover the literature on impact of high frequency trading on price discovery.

### HIGH FREQUENCY TRADING AND LIQUIDITY:

One of the major differences between most developed and developing (emerging) markets is that the developed markets have quote driven systems whereas developing markets like India have order driven systems. In quote driven markets, market makers contribute to the liquidity of the market by continuously updating the quotes / orders. Whereas, in order driven markets, the liquidity is completely determined by demand and supply. In order driven markets, limit orders are the main source of liquidity supply. It is also known that high frequency trading has the ability to quickly assimilate any new information and incorporate the same in the prices and also utilizing the reduced order size in order to minimize impact cost. This should impact liquidity positively and help in providing liquidity instantly to a trader.

### HIGH FREQUENCY TRADING AND VOLATILITY:

It is important to improve the liquidity of the markets; similarly it is also important to keep a check on the market volatility for all the market participants, regulators and exchanges. High frequency trading has the capabilities of reviving orders in a very short span of time based on arrival of any new information or news in the market. The quick response of high frequency and numerous order cancellations and modifications may impound volatility in the stock or the market and may lead to adverse selection which in turn will hamper the liquidity and better price discovery. The other side of the argument might be that high frequency has the capability of quickly identifying opportunities and judiciously breaking large orders into smaller ones to avail liquidity at a better price. Therefore, high frequency trading may be modifying the orders but not leading to one-sided piling up of orders. And thereby reducing the order imbalance and also making prices more efficient and hence riskiness decreases and therefore, the volatility is either not much affected or it is actually reduced. We can see the last five years trend of volatility index in the below picture.



**HIGH FREQUENCY TRADING AND PRICE DISCOVERY:**

As we know that price is the point where demand and supply intersect each other.

Demand curve is always downward slopping and shows that demand of any product increases when prices comes down and demand goes down when the price for the same goes up, in short demand curve represents the nature of the consumer , on other hand supply curve presents the nature of producer. Supply curve is always upward slopping. It shows the quantity of supplied goods goes up when even price goes higher and supply comes down when even prices comes down, it's all about the profit maximization for both the sides. We can see the price point in below picture.



The capability of the high frequency trading systems to gather any new information available in the market and quickly incorporate the same into prices forms the basis for arguments that support better price discovery due to high frequency trading.

Hendershott and Riordan examine the role of high frequency trading in the price discovery process in the 30 Deutscher Aktien Index (German Stock Index, DAX) stocks on the Deutsche Boerse (DB). They suggest that the trading process is central to efficient risk sharing and price efficiency so it is important to understand how high frequency trading is used and its role in the price formation process. They study the 30 largest and most liquid stocks of DAX. They examine all high frequency orders submitted for DAX stocks from Jan 1, 2008 to Jan 18, 2008. Their findings suggest that the proportion of high frequency exceeds 68% and 57% in the 2 smallest trade-size categories (0-499 & 500-999 shares). This suggests that high frequency trading uses small trades which in-turn limits their price impact. The result also shows that if trades were randomly ordered, 37% of the transactions would be high frequency trading followed by high frequency trading, whereas in this data the frequency of such an order flow is 40.7% of the time. The order flow of Human followed by Human will be 15.3% (19.0%)<sup>8</sup> whereas high frequency trading followed by Human and Human followed by high frequency stood at 23.8% (20.1%). Findings also suggest that both high frequency and Human trade more quickly when the spreads are narrower. High frequency incorporates the past information (0-30 seconds) and high frequency trading is likely to initiate BUY market orders following positive futures return and vice-versa. They suggest that high frequency trading contributes more to the efficient price discovery process by placing more efficient (informed) quotes. They also find that high frequency trading monitors the market more actively than the humans.

**OBJECTIVES OF THE STUDY:**

Based on the gaps in the existing literature, we identify the following objectives for our study:

1. To examine the impact of high frequency on Liquidity of Nifty 50 stocks
2. To examine the impact of high frequency on Volatility of Nifty 50 stocks
3. To examine the impact of high frequency on Price Discovery of Nifty 50 stocks

**RESEARCH METHODOLOGY:**

**DATA:**

We chose Nifty 50 stocks listed on the National Stock Exchange of India (NSE) for our study. We use Nifty 50 stocks as they are most actively traded and are a representative sample for the various industries and sectors of the economy. We chose NSE as our market as NSE topped the world exchanges in terms of equity shares traded (36.6 Crore Trades in the first quarter of 2013). In August 2013, with 137.6 Million electronic order book trades NSE stood first, whereas NYSE and NASDAQ stood 4<sup>th</sup> and 6<sup>th</sup> respectively. NSE stands 12<sup>th</sup> among the world exchanges and 4<sup>th</sup> in the Asia-Pacific region in terms of market capitalization (1443 Trillion USD, August 2015).

We use NSE DOTEX Order Level Historical Data for Sep, 2012 to Aug, 2013 (12 Months, 248 trading days). The dataset contains historical data containing standard details of tick by tick order level data, trade level data pertaining to Cash / Capital Market segment for all stocks listed on exchange (NSE).

The NSE order and trade level data provides data of orders being placed at NSE and trades being carried out on NSE. It captures the information up to the 65536<sup>th</sup> fraction of a second. The order level data provides information on 17 different variables and the trade level data provides information on 14 different variables. The dataset comprises of 49 NSE Nifty Stocks (We had to remove Vedanta Ltd. from our analysis due to missing observations. The removal will not impact our analysis as we are analyzing both at the stock level and aggregate level and we also have another company JP Associates representing the Metal Products industry.) spanning over 248 trading days (12152 Stock-Days) from 1<sup>st</sup> Sep 2012 to 31<sup>st</sup> August 2013.

**FINDINGS:**

Liquidity, volatility and price discovery are important aspects of any market and regulatory authorities and exchanges have always attempted to improve upon them in order to move towards an efficient market. Rapid technological advancements have been adopted by the markets and the market participants in order to improve upon the liquidity, volatility and price discovery aspect of the markets. High frequency trading was one such tool which got wide acceptance across the markets and participants in recent years. High frequency trading do impact the liquidity, volatility and price impact. Our findings pertaining to high frequency trading efficiency will also help policy makers decide on reaching out for optimal level of orders to trade ratio

**REFERENCES**

1. Aggarwal, N., & Thomas, S. (2014). The causal impact of algorithmic trading on market quality. *Working paper, IGIDR Mumbai – WP-2014-23*
2. Angel, J. J., Harris, L. E., & Spatt, C. S. (2011). Equity trading in the 21st century. *The Quarterly Journal of Finance*, 1(01), 1-53.
3. Bennett, P., & Wei, L. (2006). Market structure, fragmentation, and market quality. *Journal of Financial Markets*, 9(1), 49-78.
4. Bertsimas, D., & Lo, A. W. (1998). Optimal control of execution costs. *Journal of Financial Markets*, 1(1), 1-50.
5. Bessembinder, H., & Venkataraman, K. (2004). Does an electronic stock exchange need an upstairs market?. *Journal of Financial Economics*, 73(1), 3-36.