



MODULE 2 UNIT 3

Understanding high-frequency trading

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Learning outcomes:

LO5: Identify the difference between large systematic trading organisations and smaller players.

LO6: Interpret the historical and current opportunities and challenges of the systematic trading industry.

1. Introduction

This set of notes will cover what high-frequency trading (HFT) is, how it is defined, what strategies can be developed using this mechanism, and what impact it has on the market. You will hear from Stefan Zohren, an associate professor at the Oxford-Man Institute of Quantitative Finance, on HFT firms and the concept of market microstructure, a crucial component for any entity engaging, or wishing to engage, in HFT.

2. High-frequency trading

HFT is not a trading strategy in itself; rather it is a mechanism that allows the implementation of short-term trading strategies. It is a form of algorithmic trading that is made up of the frequent turnover of many small positions of a security (Agarwal, 2012). The US Securities and Exchanges Commission (SEC, 2010) identifies several characteristics relating to HFT:

- “Use of extraordinarily high speed and sophisticated programs for generating, routing, and executing orders.
- Use of co-location services and individual data feeds offered by exchanges and others to minimize network and other latencies.
- Very short time frames for establishing and liquidating positions.
- Submission of numerous orders that are cancelled shortly after submission.
- Ending the trading day in as close to a flat position as possible (that is, not carrying significant, unhedged positions overnight). ”

The SEC (2010) describes those who engage in HFT as “professional traders acting in a proprietary capacity that generate a large number of trades on a daily basis”.

2.1 HFT strategies

Some of the most prevalent HFT strategies, with accompanying simplified definitions, include the following:

- **Leveraging structural differences:** Firms wishing to engage in this strategy would attempt to take advantage of pricing inefficiencies that arise from structural issues within the market. One way this could be achieved is for the firm to obtain data significantly sooner than other market participants, and execute trades based on this information (Agarwal, 2012).
- **Liquidity rebate trading:** Some exchanges offer a rebate – essentially a reward – for those that provide the market with liquidity when required. Firms attempting to take advantage of this would seek out large orders, fill them partially, then immediately put them up for sale in the market, making them eligible for rebate (Agarwal, 2012).
- **Market-making:** Firms attempt to take advantage of the bid-ask spread. This is the difference between what people are willing to sell the stock for, and what people are willing to buy it for. This is certainly one of the easier strategies to understand. An example would be if a firm purchased stock for £50 (the asking price) and then sold it for £50.05 (the bidding price). The difference in price is very small, and for this strategy to be effective, millions of trades would need to be conducted daily (Thapar & Paradkar, 2017).
- **Statistical arbitrage:** Traders attempt to exploit fleeting inconsistencies in certain market metrics, such as rates or prices that arise between different exchanges or asset classes. An example would be the purchase of an underpriced security on one exchange and its immediate (within seconds) sale on another exchange (Agarwal, 2012).

2.2 The impact of HFT on the market

HFT has had several fundamental effects on our financial markets. It has drastically increased liquidity, and high-frequency traders are credited with providing more than 50% of equity turnover in certain markets. Trading spreads have been reduced significantly as a result of the use of computerised trading in financial markets; think of the aptly named “market maker strategy”. Efficiency has also been improved; HFT helps to quickly incorporate information into the market, as demonstrated by the strategy of leveraging structural differences (Agarwal, 2012).

In the following video, Zohren gives a presentation on key considerations around HFT, as well as some of its challenges.



Video 1: HFT considerations. (Access this set of notes on the Online Campus to engage with this video and download its transcript.)

The impact of HFT on the market is not all positive. In his book *Flash Boys: A Wall Street Revolt*, Michael Lewis says high-frequency traders are separating investors from their money bit by bit – a few cents at a time. While this may not be strictly correct, some of these traders' strategies (such as leveraging structural differences) are considered by some to be a form of front-running. The core of this strategy is the ability to exploit market information seconds before it is available to the market in general (German & Zhitnitsky, 2014). Front-running is when traders place orders on their own company's stock to take advantage of orders that come from their own clients; this is a prohibited practice.

High-frequency traders have also been said to increase the volatility of financial markets. The nature of HFT involves multiple trading actions occurring over short periods of time, with positions held for only a few minutes, or even seconds. This, combined with the high volume of trades that high-frequency traders undertake, can lead to increased volatility in the overall market (Agarwal, 2012).

Explore further:

Learn more about [High-Frequency Trading and how it works](#).

There is contention within the finance community about whether HFT is an acceptable practice. What are your thoughts on this? Do you think HFT should be more heavily regulated to further protect other investors?

3. Low-frequency trading

Low-frequency trading is when investors take a position on a security, and hold this position for an extended period of time. The creation of basic low-frequency strategies requires the use of technical analysis – looking at charts that cover large time periods, such as months or years (PaxForex, 2016). A simple example of a low-frequency forex trading strategy is a carry trade. This is when an investor takes out a loan in a low-interest-rate currency and uses it to purchase (go long) on a high-interest-rate currency (Russell, 2018). For example, if the British pound had an interest rate of 6% and the Japanese yen was at a low of 1%, the investor would take out a loan denominated in yen and use it to purchase the pound with the intention of holding it to profit from the interest rate differential. There would be certain exposure concerns here, such as currency risk (a concept that is covered in Unit 1's lesson). The key takeaway here is the major difference in time frames when engaging in high- versus low-frequency trading.

4. Conclusion

You have covered the core aspects of HFT and how it can be applied in the market. The infrastructure, strength of the internet connection, and even physical proximity to an exchange are extremely important factors for high-frequency firms. Zohren provided a breakdown of market microstructure to demonstrate how this relates to HFT. All these aspects must be fully understood for the implementation of any successful HFT strategy.

5. Bibliography

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