

# High Frequency Trading

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A number of readers have asked for a better explanation of High Frequency Trading (HFT). This terminology is being encountered more and more often in the financial media. In addition HFT is now a part of everyday life on the Australian stock market and therefore affects us all. It therefore behoves us to understand what HFT is and how it affects us.

HFT involves the use of very fast computers, which are often situated in the same physical area as the stock exchange servers on which market trading takes place. This enables HFTs to shave transaction times by milliseconds (thousandths of a second) and even microseconds (millionths of a second) on some exchanges. Stock markets around the world are expanding the space they rent to HFTs and are upgrading the speed of their servers to cater for HFTs. HFT is very lucrative business for stock markets and what high speed traders are doing is not illegal. Increasingly, we will find that the other side of our transaction is a high frequency trader.

HFT firms do not employ many traders. Instead they employ computer programmers who are charged with developing and running software, also sometimes called algorithms, that seeks to make many transactions that each make fractions of a cent. They use programmers and scientists because it is easier to teach them how markets work and set them doing sophisticated research, than it is to teach traders how to develop and write software. Therefore we should appreciate that HFT is run by very smart people who are using well researched and tested systems.

How do they do this? Well, one thing they do not do is to use traditional fundamental analysis or track news announcements. This approach is totally unsuited to their timeframe. They are completely disinterested in the value of a company's shares, whatever that might be. Instead they use powerful computers to scan the public and private (dark pool) markets at incredible speed looking for price discrepancies that they can exploit. Probably before most of us are even aware that a bid or offer has been made, the high frequency trader's computer has capitalised on it or withdrawn it. Most of the time we will not even see it happen. Thus in this area of the market, it is an arms race, the prizes going to the high frequency trader with the fastest computer.

HFT is not just a whole lot of very fast computers doing exactly the same thing. HFT can take many forms, depending on just which price discrepancies they are trying to exploit and how they go about doing it and in part this will vary depending the way each stock market operates. Because they are private companies and do not disclose what they are actually doing with their algorithms, we only have a general idea of how HFT works

One group of high frequency traders may have come to our attention, although we may not have appreciated what we were seeing on our depth screen. There are those that operate like market makers. They place buy and sell orders and profit in much the same way as a traditional market maker, local floor trader or scalper.

Nevertheless, what we are seeing could be another kind of activity, which depends a bit on who is doing it. Large institutions break their orders up into small parcels of varying sizes so that other market participants do not know what they are trying to do and can therefore take advantage of big buyers and sellers. We might see all these small orders on our depth screens, but most of them will

be hidden. Recently I sold two smaller (\$50-60,000) parcels of a stock by offering them at a price that was within the spread and they were done without ever appearing on the depth screen. This was probably HFT.

However, high frequency traders are countering this with sophisticated algorithms that try to detect these orders. They unleash thousands of small orders trying to pick where the hidden institutional order chunks are. Now we have one sort of market participant using high frequency techniques to disguise what they are doing while another group of high frequency traders are busy trying to pick them up and take advantage of the first group. There is a battle out there between groups of high frequency traders with different motives, but the result is the same.

HFT can also be focused on price discrepancies between stocks and between markets. These methodologies are often sophisticated versions of arbitrage, a time honoured activity in markets. Their prevalence is more likely when there are multiple stock markets that quote the same stocks as happens widely in the US, among others and will soon happen in Australia.

Although HFT is not against any laws at present there are many who feel that they should be limited in some ways. One complaint against them is that they care nothing for the intrinsic value of a stock and just rip profits out of the way genuine investors make their investments. However, this is a weak argument because there have always been traders, scalpers, speculators and so on who care nought for the value of a stock, yet perform an important role in providing liquidity.

However, one of the more egregious aspects of HFT that regulators are starting to be concerned about is called quote stuffing. This is when high frequency traders place thousands of orders a second to buy and sell a stock, but withdraw them again in microseconds. This can jam up the stock market server as well as confusing genuine investors who see a bid or an offer, but before they can hit on it, it has been withdrawn.

Nevertheless, it is a problem that is not easily tackled when HFT now accounts for over half the number of trades on an average day in the US. Some proposals are:

- Force high frequency traders to leave orders in the market for a minimum time to cut down on cancellations.
- Force high frequency traders to leave orders in the market in crises situations in order to maintain liquidity.
- Enforce a limit on the number of orders that may be cancelled in a period.
- Monitor any traders placing more than a given number of orders per day.
- Institute a charge for placing an order of any kind, which is paid even if it is withdrawn.

Naturally, each of these proposals has both an upside and a downside, so no early regulatory response is likely. However, the problems are under active consideration, not the least prompted by the so called flash crash in the US on May 16 last year. Already some circuit breakers are in place in

the US and are proposed for Australia once Chi-X starts operating. These are aimed at reducing the kind of HFT activity that can create self-reinforcing price cascades or crashes.

One thing that is important to realise is that there are not as many high frequency traders as we might imagine, compared to the number of hedge funds and institutions out there in the market (although some of them are using HFT methods). However, they generate enormous volumes of business. In 2010 HFT was estimated to account for 60% of stock trading and 40% of futures and foreign exchange trading in the US.

There has also been an explosion of public (traditional stock exchanges) and private markets or dark pools (operated by banks and brokerages) in the US. In 2005 the New York Stock Exchange handled 80% of stock trades in the US. It has now fallen to 29%.

Another thing to consider carefully is that HFT provides some benefits as well. Clearly, HFT provides more liquidity in the market. It also has a distinct tendency to narrow the spreads. These are both big advantages for other market participants. Without liquidity, there is no real market. Tighter spreads reduce the real cost of transactions through the mitigation of slippage. It is estimated that transaction costs in the US have fallen by 50% over the last decade, mostly due to tighter spreads created by HFT.

So, the problem for the future is how to regulate trading by the high frequency traders in such a way that the advantages and benefits of HFT are not lost for everyone else. HFT is here to stay. The question is how to keep it under control.

## Algorithmic versus High Frequency Trading

I was recently asked to define the difference between Algorithmic and High Frequency trading. Of course, this question arises out of the frequent confusion or inter-changeability of usage in the media. As best as I can determine, the difference in definition is as follows:

**Algorithmic Trading** is activity aimed at breaking up large, often institutional, orders into small numbers of shares in order to disguise the presence of large orders that, if known, could distort the market to their disadvantage. Thus, most algorithmic trading is conducted by traditional institutional or professional investors.

**High Frequency Trading** is activity aimed at bombarding the market with high volumes of small orders in order to profit from small, often fleeting, price discrepancies in the prices quoted for single stocks (perhaps on multiple stock exchanges) or between pairs or groups of stocks. Indices may also be traded as derivatives. Some high frequency trading may also be aimed at detecting and profiting from the presence of large institutional orders whether they are undisclosed or disguised in algorithmic strategies. High frequency traders tend to be private proprietary traders.

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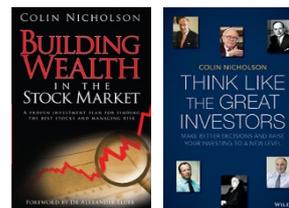
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