The flip side: high frequency trading

HFT has its benefits but also poses potential systemic risks. **Bruno Biais** and **Paul Woolley** discuss the need for deft regulation

High frequency trading is one of the major recent innovations in financial markets and a potent source of angst. In 2010, it made up 56 per cent per cent of equity trades in the US and 38 per cent in Europe, the Tabb Group consultancy has estimated.

HFT employs sophisticated computer programs to analyse market data in the search for trading opportunities that may open up for anything from a few fractions of seconds to a few hours. Computers then map this information into trading strategies and orders. The speed of this process is mind-boggling. The "latency" between the arrival of information at the computer and the execution of the order is in the region of milliseconds, faster than people blink. High frequency traders put their foot to the floor both by having the most powerful computers, connections and programs and by paying premiums for the privilege of locating their computers as close as possible to that of the exchange. As shown in Figure 1, they flip their positions many times a day.

What about the angst side of it? Some argue that HFT increases trading volume and liquidity, lowers trading costs and helps price discovery, and is therefore a socially beneficial financial innovation. Others claim it boosts volatility and systemic risk and creates a non-level playing field. Certainly, the UK government's Foresight Project, on the future of computer trading in financial markets, concluded in August 2011 that "rules requiring trading in markets with HFT should be re-examined". As Mary Schapiro, the SEC chair, pointed out in 2010, "high frequency trading firms are subject to very little in the way of obligations either to protect stability by promoting reasonable price continuity in tough times, or to refrain from exacerbating price volatility". Unsurprisingly, the EU is currently discussing regulatory measures on HFT. The question is, what measures should it take?

One benefit of HFT is that it can help ensure that related assets remain consistently priced. Research by Chaboud, Chiquoine, Hjalmarsson and Vega in 2009 found that, in the foreign exchange market, robot traders quickly identify arbitrage opportunities between euro-dollar, dollar-yen, and euro-yen rates, bringing currencies back in line. Another benefit of HFT is helping traders cope with market fragmentation. The recent emergence of multiple trading platforms, in Europe as well as in the US, means that quotes and depth are dispersed among market venues, and market participants need to monitor prices and volumes as rapidly as possible, search for the most attractive bids and offers across venues, and split orders to reduce price. HFT technology is valuable in this context.

However, four types of problems in markets can be generated by HFT. First, there is a risk that high frequency traders engage in manipulative strategies. One such strategy, called "stuffing", involves the placement of an unwieldy number of orders generating congestion and impairing market access for slow traders, giving free rein to fast traders to execute profitable trades at the expense of the rest. Another manipulative strategy, called "smoking", involves the placement of alluring quotes, attracting slow market orders, but rapidly revised on to less generous terms, before the slow orders reach the market. Yet another strategy is nicknamed "spoofing". When the fast trader wants to buy, he first places a bid, and then large ominous limit sell orders, to scare slow traders into hitting this bid.

Second, HFT can generate adverse selection. Empirical research shows that fast orders are better informed than slow ones. See Figure 3, borrowed from Hendershott and Riordan (2009), on page 35: it shows that market orders from HFTs convey more information than human orders. The flip side of the informational edge is the adverse selection cost borne by slow traders. For example, Chaboud found that for human traders limit order executions are (to some extent) bad news, while for computers they are profitable.

Third, high frequency traders can enjoy market power. Regulators monitoring financial markets observe that a small number of high frequency traders often generate a very large proportion of the order flow. This is not only due to the large

Figure 1
Position of the high frequency trader studied by Jovanovic and Menkveld (2010), aggregated across Euronext and ChiX, during one day (30 January 2008)

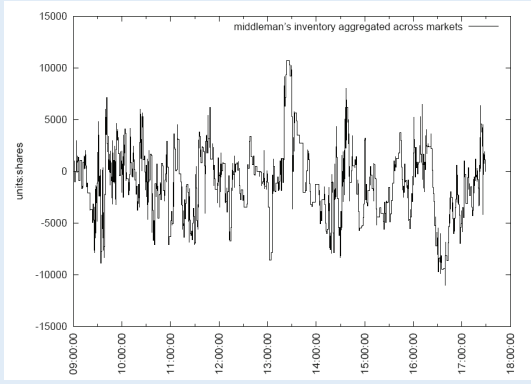
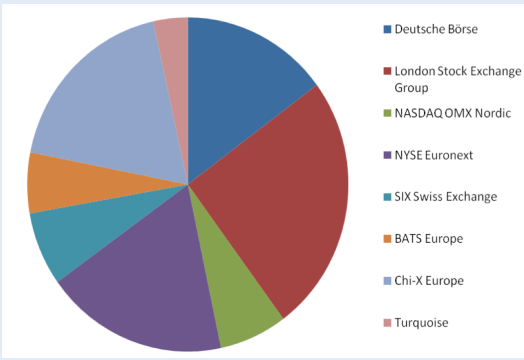


Figure 2
Market share (in euros) of the major equity trading platforms in Europe in 2010 (FESE data)



number of fast orders that are quickly cancelled. Since, as explained above, slow traders are more exposed to adverse-selection than fast traders, the latter are in a better competitive position to place limit-orders, and therefore end up often setting the inside quote. Now, acquiring the technology necessary for HFT involves significant fixed costs. While for investors completing a large volume of trading, investing in this technology is profitable, it is not so for less active investors. Hence, in equilibrium there is a non-level playing field, where a small number of actively trading fast players co-exists with slower traders, conducting fewer trades.

Fourth, HFT could generate systemic risk. Chaboud found that algorithmic trades tend to be correlated, suggesting that the HFT strategies used in the market are not as diverse as those used by human traders. In this context, shocks hitting the small number of very active algorithmic traders might affect the entire market. And, because high frequency trading firms are often very lightly capitalised, this could generate failures. Handling the corresponding counterparty risk could be daunting, given that HFT firms turn over their positions many times a day, while clearing systems operate at a much lower frequency. Combined, these elements could generate systemic market disruptions.

To mitigate these problems, it would be prudent to put in place adequate regulations. Kirilenko et al (2010) concluded: "technological innovation is critical for market development. However, as markets change, appropriate safeguards must be implemented to keep pace with trading practices enabled by advances in technology."

The European Commission has included the analysis of HFTs in its review of the Markets in Financial Instruments Directive (MiFID). It considers the possibility of subjecting HFT firms to regulatory oversight and capital requirements. This would help prevent systemic risk creation by them.

First, capital buffers would reduce the likelihood that HFT firms would be destabilised by liquidity shocks and, in turn, destabilise their counterparties. Second, capital requirements could increase the "skin in the game" of the manager owners of HFT firms, and reduce the moral hazard problem associated with limited liability.

In the context of the MiFID review, it has also been suggested that HFT should be subject to market-making obligations, compelling fast traders to provide liquidity on both sides of the deal. We believe such proposals should be viewed with caution, as there is no proof such constraints would be optimal.

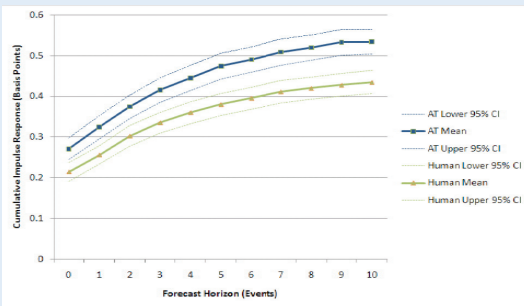
Another way to mitigate the distortions created by HFT would be to impose a minimum latency, e.g. one tenth of a second. Some oppose minimum latency requirements on the grounds that such limits are a backward and hopeless attempt to avoid technological progress. The same criticism, however, applies to speed limits on the roads. And it is hard to believe that going from a latency of a millisecond to a latency of one tenth of a second would significantly hinder the information aggregation function of the market.

Finally, while HFT can improve market efficiency, which is beneficial to all, it also generates market power and informational rents for fast traders. The larger these rents, the greater the equilibrium investment in HFT technology. This contrasts with the socially optimal level of investment in HFT, and creates the scope for excessive, rent-motivated, investment in HFT, subject to the 1975 Posner critique: "The existence of an opportunity to obtain monopoly profits will attract resources into efforts to obtain monopolies, and the opportunity costs of those resources are social costs of monopoly too."

An appropriate policy response to such excessive investment could be to levy Pigovian taxes on HFT, a Pigovian tax being one that penalises market activity that has negative external effects, such as a tax on alcohol. We do not, however, advocate a Tobin tax on all transactions. Taxes that hit slow and fast traders alike cannot solve the market failures associated with HFT.

Overall, HFT regulations could be difficult to implement. The main pitfall to avoid would be the regulation of some segments of the market (e.g. exchanges) and not others (e.g. dark pools or internalisers), or of some countries but not others. The challenge will, therefore, be to implement prudent regulations, while maintaining a level playing field.

Figure 3
Cumulative impulse response function (measuring the informational impact of trades) for HFT and human trades. Hendershott and Riordan (2009)



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