



## **Understanding High Frequency Trading (HFT)**

### **Executive Summary**

This paper is designed to cover the definitions of HFT set by regulators, the impact HFT has made on markets, the actions taken by exchange operators to maintain market integrity, and the regulatory response that are enacted or are being considered.

Among the key findings of this paper, is that HFT is not a strategy but a technology that financial firms are embracing around the world. Measuring the extent of HFT is recognized as complex, but trends are evident that HFT activity has plateaued on many of the markets where it was first introduced, and HFT continues to expand globally in new markets.

Exchanges have enacted many safeguards to ensure orderly markets. Regulators are reacting to concerns about HFT with new measures. The WFE sees the need to put the management of HFT issues as a central concern for markets, and to coordinate information and principles between market operators.

### **Introduction**

All around the world and across all markets, economic pressures and competition are pushing businesses to find the most effective ways to invest and hedge risks.

Today strategies using algorithmic trading and HFT play a central role on financial exchanges, alternative markets, and banks' internalized (over-the-counter) dealings.

Exchanges have adapted to the speed and automation of today's markets by deploying sophisticated risk mitigation and surveillance technology, and are continuing to innovate in these areas to further enhance the safety, stability and integrity of the markets.

This paper sets out the challenges faced to maintain efficient markets, and the actions that the WFE and its member exchanges support.

### **1. Understanding HFT**

Although a number of different definitions of HFT have been proffered, there is general agreement that HFT can be broadly characterized by fully automated trading that utilizes very low latency infrastructure and involves sustained high messaging frequency. For many, proprietary trading is also a characteristic. As there are continuums of latency and messaging frequency across participants, venues and asset classes, precise definitional metrics have proved challenging to apply universally.

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High frequency traders employ a diversity of strategies that primarily involve variations of market-making and statistical arbitrage strategies and which therefore tend to support liquidity provision and pricing efficiency.

The definition of HFT is more than an intellectual exercise, and has two significant features. First, as seen in the table below, regulators have made considerable progress in defining high frequency trading. Yet despite moves to standardisation of definitions there are still different approaches to regulation across markets and regions.

HFT definition criteria					
	<i>IOSCO</i>	<i>ESMA</i>	<i>SEC</i>	<i>CFTC*</i>	<i>EU Parliament</i>
Proprietary trading	✓	✓	✓	✗	✓
<b>Sophisticated use of technology</b>	✓	✓	✓	✓	✓
<b>Specific trading characteristics</b>	✓	✓	✓	✓	✓
Specific investment characteristics	✓	✓	✓	✗	✓
Specific strategies implemented	✓	✓	✓	?	✗

Source : WFE

\* The CFTC Working Group notes that its definition "emphasizes a **mechanical** description of high frequency trading that is deliberately neutral regarding types of trading strategies and how they interact with the marketplace."

This table is based on the following texts:

IOSCO: *Regulatory Issues Raised by the Impact of Technological Changes on Market Integrity and Efficiency - Final Report*, October 2011

ESMA: *Consultation paper - Guidelines on systems and controls in a highly automated trading environment -for trading platforms, investment firms and competent authorities*, 20 July 2011

SEC: *Concept Release on Equity Market Structure*, 2010

CFTC : *CFTC Technology Advisory Committee Sub-Committee on Automated and High Frequency Trading – Working Group 1*, October 2012

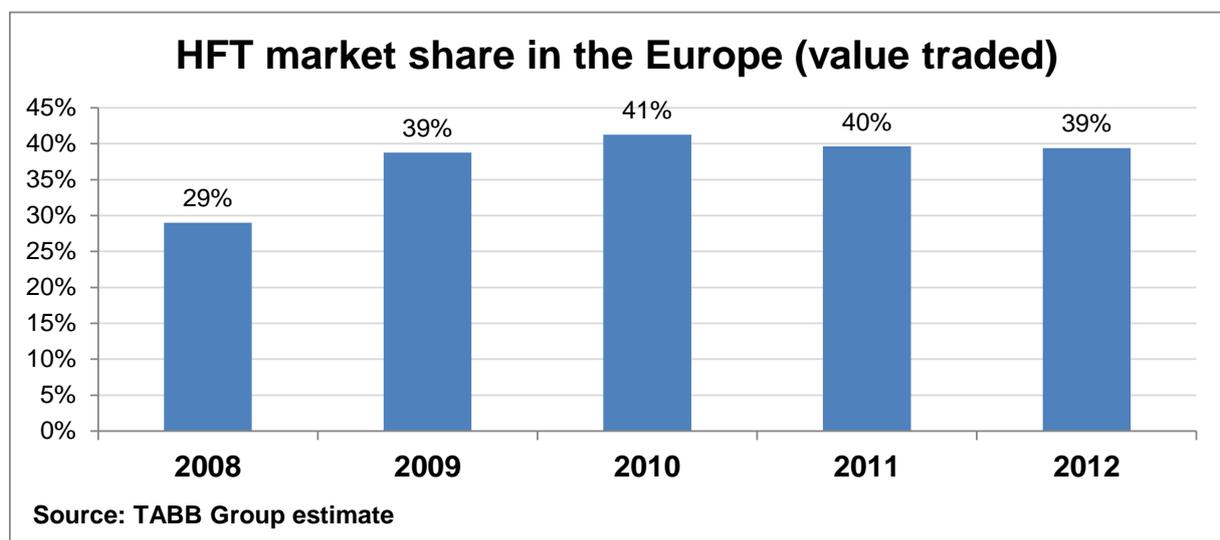
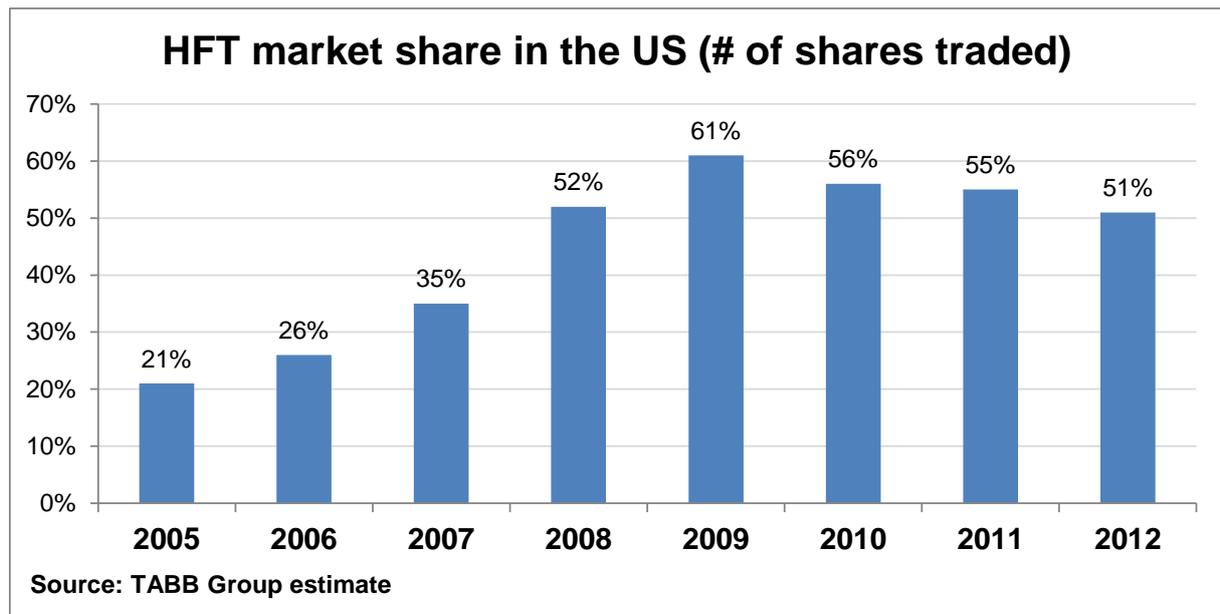
EU Parliament: *MIFID review - Amendments adopted by the European Parliament on 26 October 2012*

Second, given the ambiguity of the definitional metrics, as well as the difficulty of obtaining verifiable data from dark execution venues, estimates of the penetration of HFT in financial markets vary and are different for different asset classes as well as for products within an asset class.

However, it is clear that trade execution has broadly become more automated, and in markets where automated trading and highly advanced technology infrastructures have been prevalent for some time, HFT, while still forming a large part of market activity, appears to have largely plateaued.

HFT was estimated in 2012 by consultancy Tabb Group<sup>1</sup> to make up 51% of equity trades in the US and 39% of traded value in the European cash markets. While different analysts may prefer different methodologies, these figures do clearly indicate that HFT is a major component of regulated markets. Furthermore, looking at comparable figures over recent years, it is evident that the trend is flat to down among the earliest markets to adopt HFT. HFT activity on the Tokyo Stock Exchange has grown quickly over the past three years to similar levels.

<sup>1</sup> TABB Group uses a combination of proprietary and public information to derive its estimate. For more details, please contact [asussman@tabbgroup.com](mailto:asussman@tabbgroup.com)"



In developing markets, HFT still appears to be growing relatively rapidly, albeit from a smaller base, in correspondence with advances in the technology environment.

Today's exchange markets are unquestionably faster, more transparent and more efficient than the market structures that preceded them. HFT, however defined, like automated trading more generally, represents the rational evolution of electronic markets as participants adapted to new market structures and leveraged advancements in technology and telecommunications to optimize the quality, speed and operational efficiency of trade execution. Exchanges have likewise adapted to the dynamic changes in financial markets by significantly investing in technology, not only to support more highly efficient and scalable markets, but also to enhance the reliability, stability and integrity of the markets in this high technology environment.

## 2. HFT: Research on the impact

There is now a considerable library of academic literature on HFT, and it will probably remain a topic of interest for researchers in the near future.

To date, the substantial majority of the empirical research has concluded that HFT has had measurable beneficial impacts on a variety of core market quality metrics<sup>2</sup>, including tighter spreads, increased liquidity, more efficient price formation, reduced transaction costs for market users and lower market volatility in most circumstances. To the extent that these outcomes are positive, HFT is seemed to improve market conditions for retail clients as was institutional.

Nevertheless, critics have focused on qualitative issues concerning fairness and systemic risk. While the rules concerning HFT are clearly defined on transparent or 'lit markets' such as exchanges, it is difficult to find rules or statistics about the ways that HFT is used in some dark pools, over-the-counter markets, and by brokers who internalize their order flow. These questions, though harder to measure, have pushed both exchanges and regulators to ever greater vigilance.

## 3. Exchanges' leadership in promoting fair and stable markets

Although there have always been occasional trading errors and episodic volatility spikes in markets, the speed, automation and interconnectedness of today's markets create a different scale of risk. These risks demand that exchanges and market participants employ effective quality management systems and sophisticated risk mitigation controls adapted to these new dynamics in order to protect against potential threats to market stability arising from technology malfunctions or episodic illiquidity.

Exchanges are committed to protecting market stability and promoting orderly markets, and understand that a robust and resilient risk control framework adapted to today's high speed markets, is a cornerstone of enhancing investor confidence.

WFE exchanges have developed an array of sophisticated systems, tools and capabilities to prevent or mitigate risks to market stability, and also provide capabilities to market participants to facilitate effective risk management. These capabilities continue to evolve with changes in the dynamics of markets, innovations in technology and lessons learned from risk incidents.

Exchange initiatives include circuit breakers, enhanced surveillance tools, credit controls, volatility controls, messaging controls, kill switches, and other risk management tools.

Exchanges are committed to ensuring a level playing field for all market participants. Electronic exchange markets have enhanced transparency of markets and broadened market access, and ensure that bids and offers are available to all participants and matched pursuant to transparent matching algorithms. Some market participants may choose to

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<sup>2</sup> December 2012 - Joel Hasbrouck and Gideon Saar "*Low-Latency Trading*"  
[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1695460##](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1695460##)

July 2012 – Jonathan Brogaard, Terrence Hendershott and Ryan Riordan "*High Frequency Trading and Price Discovery*"  
<http://faculty.haas.berkeley.edu/hender/HFT-PD.pdf>

February 2011 - Terrence Hendershott, Charles Jones, and Albert Menkveld "*Does Algorithmic Trading Improve Liquidity?*"  
<http://faculty.haas.berkeley.edu/hender/Algo.pdf>

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employ more sophisticated technology to support their specific trading strategies and investment or risk management needs, but this has always been the case and should not be construed as undermining the fairness of markets.

Lit markets allow for comprehensive, highly granular, real-time audit trails that have substantially advanced the transparency, as well as advancing real-time risk management capabilities. Growth in volumes and messaging, in part attributable to HFT, have required advances in exchanges' surveillance technology infrastructure and capabilities, and substantial advances have been and continue to be made to adapt surveillance techniques to evolving market dynamics.

Exchanges and regulators have a common interest in working together to ensure strong oversight to protect market integrity and accountability for misconduct that undermines confidence.

### **4. Regulatory Responses to HFT**

Regulators are now considering various measures intended to help further promote market stability and integrity. There are certainly opportunities to enhance the regulatory framework to improve market safety and for regulators to improve surveillance capabilities to advance market integrity.

Exchanges are strongly supportive of these goals, but it is important that regulators base any new regulation of automated trading on sound empirical analysis, and appropriately consider the impact of any new regulation on market quality and market efficiency.

WFE encourages regulators to continue to work with the industry to identify the critical risks and effective, balanced solutions that will enhance the safety of markets without compromising the quality of markets.

Markets around the world are at different stages of development with respect to HFT. International cooperation among market operators is important to accelerating shared learning and promoting high standards for enhancing the safety and integrity of markets.

WFE and its member exchanges will continue to work with IOSCO and other regulators to ensure that policies are not imposed which would damage market liquidity or limit other market quality benefits provided by automated trading and HFT.

WFE recognizes the growing importance of automated trading and HFT to markets around the world. WFE will work with its members to share information and develop appropriate principles and guidelines on exchange oversight and risk mitigation in ways that preserve the benefits of HFT and elevate the safety of markets.