

GREYSPARK INDEX:

**HIGH
FREQUENCY
TRADING**

SURVEY AND RESEARCH
SUMMARY

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US markets were thrown into turmoil on May 6, 2010 when the Dow Jones Industrial Average plunged 1,000 points in just 16 minutes in an event that has since become known in the popular lexicon as a ‘flash crash.’ Fingers of blame were immediately pointed toward the prevalence of high-frequency trading (HFT) computer systems in the market, which banks and hedge funds injected with digital steroids in recent years in an effort to compete for market making or arbitrage.

Since then, the myth of HFT has made the technology a virtual bogey-man for politicians and their regulatory counterparts as well as for market observers and market participants.

At issue:

- The increasing frequency and depth of impact of flash crashes in electronic markets around the world;
- A public perception that HFT creates general liquidity and volatility problems;
- Small changes to the pricing of specific products like equities can have an amplified negative effect on the market overall;
- Risks associated with a push by HFT proponents for faster systems and lower latency that increase the potential for harmful or uncontrolled market events to occur. This is because risk management systems at the trading house or venue level are not implemented correctly.

GreySpark research discusses the widely-perceived market risks associated with HFT. The first publication – [High-Frequency Trading: The Fast and the Furious](#) – explores how, despite regulatory efforts to curb the trend, HFT and low latency trading will continue to grow in popularity. HFT systems will continue to grow in popularity because of the financial incentives and drives for efficiency in markets supporting their use. We see that the overall development of trading technology and the resulting electronification of markets are more important drivers for the growing use of HFT than the regulations.

In the second publication, [High-Frequency Trading: The Good, the Bad and the Ugly](#), risk controls for HFT are highlighted as essential elements of electronic trading. Within HFT, implementation of risk management techniques becomes increasingly important as the complexity of the systems becomes more sophisticated. As such, a holistic approach to HFT risk management in key markets is needed.

The research is underpinned by GreySpark hands-on experience from work with banks, hedge funds and with leading vendors and survey of more than 50 industry participants from across the globe, representing buy-side, sell-side, venues and vendors.

Survey Findings

An extract from the full reports

Market Events Are **Shaping** the Public View of HFT

Algorithmic trading is perceived by the capital markets community as a positive activity that improves liquidity and market efficiency (see [Figure 1](#)). Low latency trading is perceived as more harmful than algorithmic trading and less harmful than HFT (see [Figure 2](#)). Overall, the public perception of HFT is controversial. There are a similar number of proponents and opponents of the view that HFT improves market liquidity, efficiency and price discovery and that it results in tighter spreads (see [Figure 3](#)). The opposing concerns are related to the perceived systemic risks HFT poses to global markets and how those risks can negatively affect volatility. Recent flash crashes show that rogue algorithms can move the market and increase volatility very quickly.

Figure 1: Perceived Impact of Algorithmic Trading



Survey Findings: Market Events Are Shaping the Public View of HFT

Figure 2: Perceived Impact of Low Latency Trading

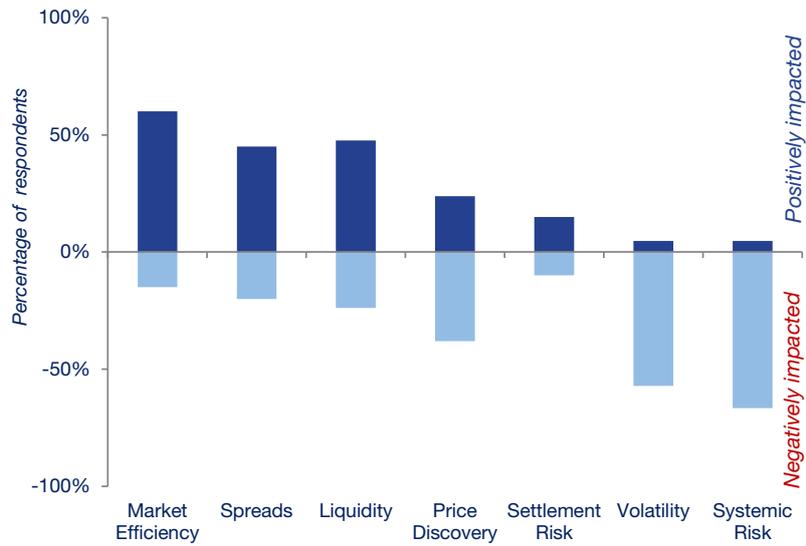
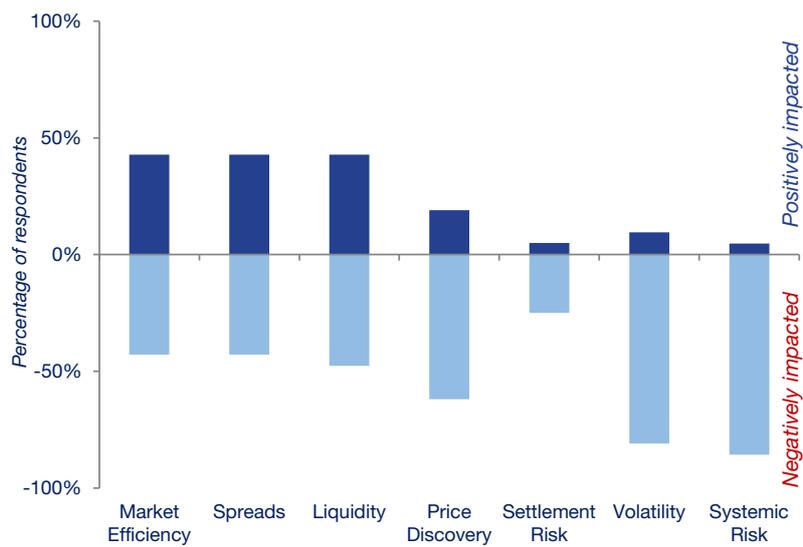


Figure 3: Perceived Impact of High-Frequency Trading



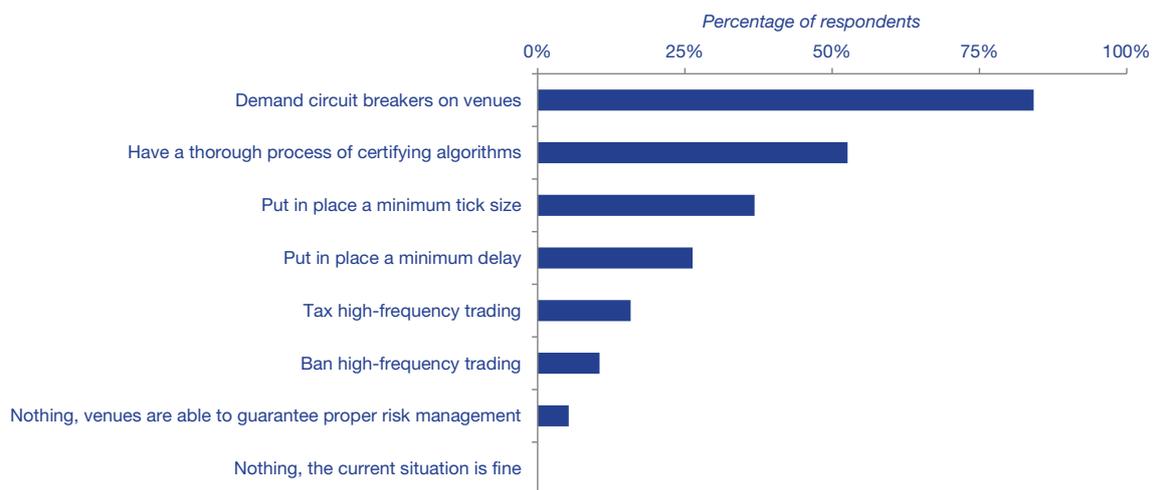
Regulatory Summary

Current regulatory practices focus on overcoming the perceived risks of HFT. The impact of current and planned regulatory proposals relate to:

- Setting up a framework for risk management in algorithmic trading
- Monitoring and analysing the activity of large and active participants
- Addressing risks related to sponsored access
- Elimination of erroneous trading procedures
- Enforcement of robust circuit breakers
- Prohibition of flash orders
- Mitigation against privileged orders

Public opinion suggests that regulators should demand best practices from HFT venues that include the implementation of circuit breakers and certification for algorithms (see [Figure 4](#)). More information on this subject can be found in report *High-Frequency Trading: the Fast and the Furious*.

Figure 4: Risk Management - What Can Regulators Do to Make Algorithmic Trading Safer?

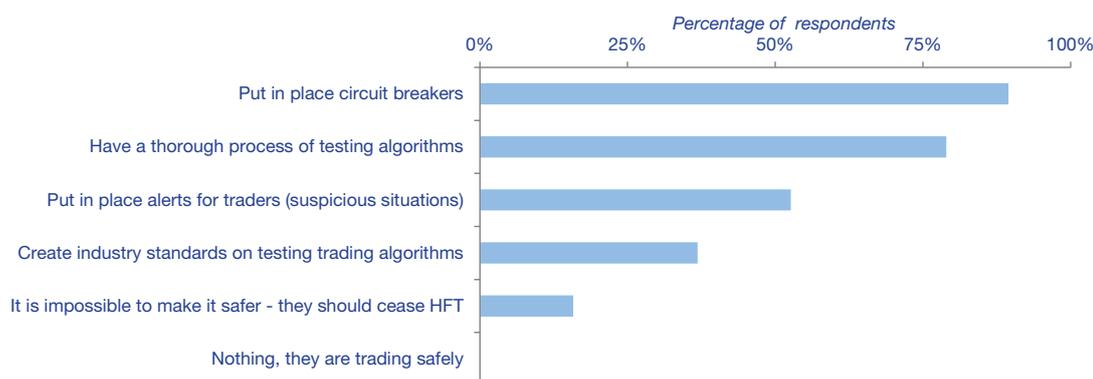


HFT Risk Management – What Can Be Done?

Risk management is important in HFT as money can be lost very quickly. All surveyed participants feel that some measures must be taken to mitigate risks related to the whole of algorithmic trading, not only HFT, and that the implementation of circuit breakers is the most appropriate solution (see [Figure 5](#)). It would be an illusion to believe that circuit breakers are a sufficient risk measure. GreySpark believes that the most effective strategy for mitigation of the risks associated with HFT is a multi-faceted approach.

In the High-Frequency Trading: the Good, the Bad and the Ugly report, we break down that approach into two parts: business-centric and technology-centric risk management. In doing so, we argue that risk management techniques are essential in e-trading in general, and that – when considering HFT – they should create important processes for firms to adhere to in an effort to ensure money is not lost and markets are not destabilised. In most cases, a single point of risk management will not suffice. Instead, trading risks must be managed from many points in order to be effective. Trading venues and trading participants, should be required, as a best practice or by regulators, to implement risk management measures. Those measures should be designed to protect the venue’s operations from malfunctioning trading algorithms or HFT systems as well as errors in the venue’s systems that may disrupt the market. Risk management on each trading venue should be spread across three categories, which are detailed in the report.

Figure 5: Risk Management - What Can Traders Do to Make Algorithmic Trading Safer



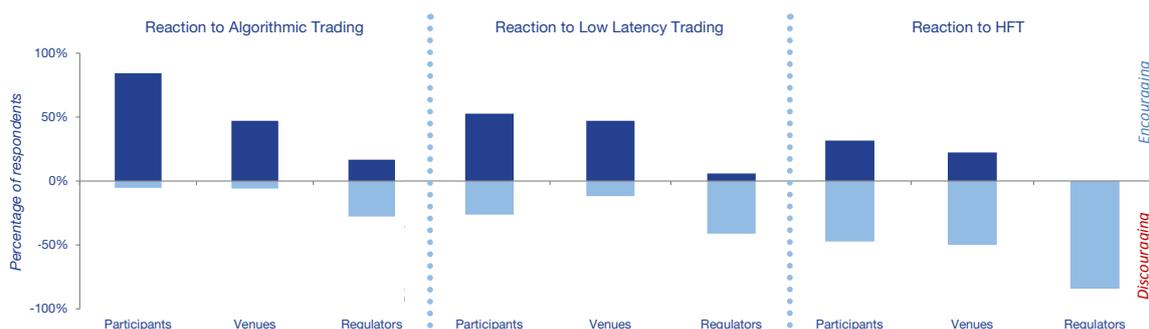
HFT and Low Latency Trading Systems Are Here to Stay

The fundamental driver for the growing popularity of HFT systems among hedge funds and banks is a market environment that incentivises the provision of liquidity as the financial products across a number of asset classes become more complex. Advances in the speed and technical complexity of HFT systems designed to find arbitrage opportunities are daunting to many market observers. As a result, the exact nature of HFT and how it differs from specialised algorithmic trading or general e-trading creates misunderstandings when negative market events occur, caricaturing the public perception of HFT systems.

Our analysis of the forces driving the future of e-trading finds that:

- HFT and low latency trading systems are here to stay, as long as a profit motive exists for their use and services and technologies that enable HFT continue to proliferate.
- Market participants and trading venues will continue to support the development of algorithmic trading as long as regulatory oversight of the practice does not become prohibitive (see [Figure 6](#)).
- Trading venues will support measures to further develop low latency trading because of the profitability available from offering colocation services, and the opportunity to attract HFT firms, and therefore more liquidity. However, the high costs associated with infrastructure measures designed to reduce latency means market participants are less enthusiastic about competing in markets ruled by low latency structures and players.
- Regulators will continue to attempt to limit bank and hedge fund efforts to develop market structures that favour HFT.

Figure 6: Forces Shaping Algorithmic, Low Latency and High-Frequency Trading



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PART 1 of 2 – High-Frequency Trading: The Fast and the Furious Defining HFT Activity and its Regulatory Landscape

GreySpark Partners presents the first report of a two-part research paper examining the state of play in HFT. The research covers the current practice of HFT, the related risks, the regulations affecting high-frequency traders and prescribes how to manage risks related to HFT.

A progression in computer processing capability since the late 1980s created a broad sphere of capital markets trading methods, allowing for an increase in process efficiencies and the expansion of trade execution methods. Now capital markets regulators are putting pressure on algorithmic trading and HFT practitioners as part of a wider effort to bring stability back to financial markets.

Part one of this GreySpark research explores how, despite regulatory efforts to curb the trend, HFT and low latency trading continue to grow in popularity. The financial incentives and drives for efficiency in markets support the use of HFT enabled by developments in low latency technology. Meanwhile, new financial markets regulations could assist in making the trading environment safer rather than hinder the natural development of trading practices, which is a topic addressed in this report.

The research is based on our hands-on experience, working with Tier I and Tier II banks, hedge funds and leading technology vendors. The analysis of market trends is based on a survey of more than 50 industry participants.

GreySpark Partners is a Capital Markets consultancy headquartered in London with operations in Hong Kong, delivering Business, Management and Technology Consulting with particular expertise in Trading, Risk and Data Management across all asset classes.

Business Consulting covers all areas that require a particular industry-aligned expertise, including front-office, operations, risk and regulatory.

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This 32 page report contains 19 figures and tables.

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PART 2 of 2 – High-Frequency Trading: The Good, the Bad and the Ugly How Appropriate Risk Management Practices Can Offset HFT Risks

GreySpark Partners presents the second report of a two-part research examining the state of play in HFT. The research covers current HFT practices, related risks and regulations affecting high-frequency traders. It prescribes practical steps to manage risks related to HFT.

Algorithmic trading creates a set of risks; this report recommends making risk management an essential element of the whole electronic trading. Within HFT, implementation of risk management techniques becomes increasingly important as the complexity of the systems being used becomes more sophisticated. With increasing fragmentation, electronification and interdependence of the markets, as well as the complexity of trading systems, the emerging trading environment will require a continuous improvement of its management.

Part two of this GreySpark research recommends that, in all cases, HFT players in capital markets must take a holistic approach to risk management. It should include business measures – a set of five checks in the process – and technology measures – such as high standards of design, implementation, monitoring and management. On top of recommendations for traders, the report highlights the importance of risk management by trading venues.

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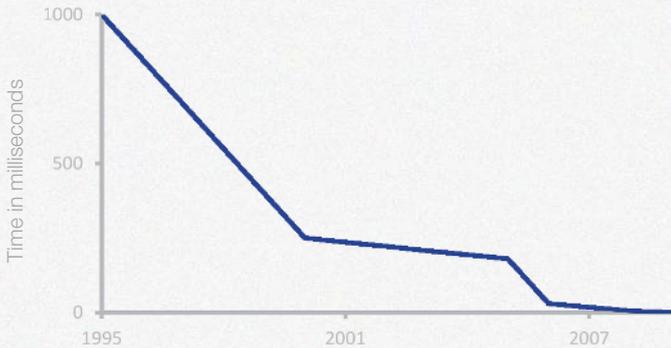
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This 32 page report contains 15 figures and tables.

HIGH FREQUENCY TRADING A TWO PART SERIES

The percentage of total trading volume from high-frequency trading has risen considerably since 2007...



...meanwhile, order processing times on the NYSE have decreased from **1,000 milliseconds** to **<1 millisecond** since 1995

Fingers were pointed at High-Frequency Trading in May 2010 when the Dow Jones Industrial Average **plunged 1,000 points in just 16 minutes**

Part 1 discusses widely-perceived **market risks** associated with HFT and the related **risk management approaches**. Part 2 aims to **dispel the myths** surrounding the **widely-perceived market risks** associated with HFT.

PART 1

The Fast and the Furious

Defining HFT Activity and Its Regulatory Landscape



The Electronic Trading Environment

- Distinguishing Between HFT and Algorithmic Trading
- Defining HFT
- The Myth of HFT
- The Public View of HFT
- Research on HFT



Algorithmic Trading and HFT in Practice

- HFT Strategies
- Magnitude of HFT
- HFT across Asset Classes
- HFT across Geographies
- HFT Magnitude



A Brief History of HFT

- A History of Arbitrage Trading
- Take Off – High Volumes at Low Speed



Regulatory summary

- Current Regulatory Landscape
- Future Developments

PART 2

The Good, the Bad and the Ugly

Technology, Risks and Risk Management for HFT



Technology for Effective HFT

- Low Latency
- Direct Data Feeds
- Direct Access
- Reliability



The Market Impact of HFT

- Increased Liquidity
- Reduced Volatility
- Improved Pricing



Risks of Algorithmic Trading

- Systems Sensitivity
- Feedback Loops



Risk Management for HFT Systems

- Business-centric Risk Management
- Technology-centric Risk Management
- Risk Management for Trading Venues

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