

# FINANCIAL CRISIS 2: RISE OF THE MACHINES

**EXPERT OPINION SUGGESTS THAT THE TANGLED WEB OF AUTOMATED TRADES AND FEEDBACK LOOPS THAT NOW DOMINATES SHARE TRADING IS FAR FROM STABLE.**

**Rapid increases in high frequency trading (HFT) have created a dangerously unstable web of computer-driven trading that spans global stock markets, putting them at risk of a system-wide ‘flash crash’. Incredibly, as much as 77% of trading in the UK stock exchange is now computer driven with shares bought and sold hundreds of times a second. Many experts believe that HFT is a dangerous threat to market stability. A Robin Hood Tax on financial transactions could stop the machines in their tracks, as well as raising sorely needed finance to fight poverty and climate change at home and abroad. Hong Kong already applies just such a tax, but in the big European economies, regulators are playing catch-up.**

Welcome to the future. Machines, trading hundreds or even thousands of times a second, now dominate stock trading on both sides of the Atlantic<sup>1</sup>. They buy and sell according to pre-programmed algorithms that range from simple ‘if this happens, then sell’ commands to more sinister programs that attempt to deceive other machines for their own benefit<sup>2</sup>. Other malevolent algorithms flood exchange servers with information, slowing down their systems to ensure that they get their trade in before others can<sup>3</sup>. Meanwhile ‘The Disruptor’ algorithm manipulates markets to disadvantage the regular traders who don’t use high frequency technology<sup>4</sup>. This isn’t science fiction: this is how markets operate now.

On today’s stock exchanges speed is everything, and the human mind cannot compete with modern computing; nor can it control it. Expert opinion suggests that the tangled web of automated trades and feedback loops that now dominates share trading is far from stable. And experience bears this out. Every so often several algorithms unite in a spiral of selling (or buying), throwing stock prices into chaos: witness the flash crash of May 2010<sup>5</sup>. This is simply the most devastating example yet of an increasingly regular phenomenon: The Financial Times found evidence of algorithms running amok at least three times in a six month period in 2010<sup>6</sup>; and the financial press regularly report the use of malevolent algorithms which damage the market for short-term gain<sup>7</sup>. Computer driven trading is turning the stock market into a 21<sup>st</sup> Century Wild West where hold-ups occur at lightning speed, and the regulatory sheriffs have only just woken up to the new bandits in town.

### **Storming the markets**

In 2005, high frequency trading (HFT) was virtually unheard of. Computer-driven trading already existed (and was known to have played a role in the 1987 stock market crash<sup>8</sup>), but things generally happened slowly enough for human beings to intervene if necessary. This is no longer the case. According to Andrew Haldane, Executive Director for Financial Stability at the Bank of England, at the time of the 1987 crash, regulatory intervention could have forestalled the problems, but in 2010, “regulators might have blinked – literally, blinked – and missed their chance.”<sup>9</sup>

Experts now estimate that HFT firms account for more than 70% of all trading in US equities<sup>10</sup>. For UK order books, the research firm the TABB Group estimates that the figure may be as high as 77%<sup>11</sup>. Of course, exact figures are hard to come by because, as Adam Sussman, Director of Research at the TABB Group makes clear, “most HFT prop shops<sup>†</sup> choose to keep their identities and intentions secretive, operating under the radar<sup>12</sup>.” This is facilitated by the current regulatory environment where registration with the Financial Services Authority is not even necessary<sup>13</sup>.

<sup>†</sup> A reference to proprietary traders, who use their own funds rather than trading on behalf of other investors.

High frequency traders are competing in a technological arms race, rushing to execute trades faster and faster, to be the first to average away tiny differences in stock prices. At the same time they are creating an unstable mass of computerised feedback loops, that teeters on the edge of collapse when markets are under stress. The flash crash is an example of exactly this<sup>14</sup>. On 6<sup>th</sup> May 2010, several algorithms responded to traders selling a particular type of futures contract by launching a wave of selling across a range of stocks, pushing down prices. The enormous volume of sell orders slowed down data systems, creating confusion. At one point, one type of contract changed hands 27,000 times in just 14 seconds. Several high frequency traders then pulled out of the market, leaving fewer buyers in the market to match with sellers, and exacerbating the price plunge. With data systems creaking under the sheer volume of orders, it became unclear what the market price for particular stocks actually was. Shares of Accenture plunged from \$40 a share to \$0.01. At its lowest point, the Dow Jones Industrial Average (a stock market benchmark) had fallen by over 9%, with more than half of the fall occurring in just 7 minutes. To put this in context, this is more than twice the fall in the Dow that occurred the day Lehman Brothers collapsed (15<sup>th</sup> September 2008) heralding the start of the recent financial crisis<sup>15</sup>.

Experience demonstrates that the May 2010 crash wasn't simply a flash in the pan, but simply the most serious example of a regular phenomenon. The Financial Times has documented the rise of the 'mini flash crash' with several incidents occurring over the last two years<sup>16</sup>. Newly-installed automatic circuit breakers aren't always fast enough to intervene in time. On Monday 27<sup>th</sup> September 2010, shares in Progress Energy were trading at \$44.57. A circuit breaker should have kicked in when they fell to \$40.08, but instead, they were allowed to reach \$4.57, losing more than 90% of their value, before trading was suspended<sup>17</sup>.

HFT makes a mockery of any concept of shareholder democracy or thoughtful investment. When people think of stock exchanges, they think of investors choosing to back particular stocks on the basis of a company's fundamentals: its management team, its business plan and long-term prospects. Instead in this new science-fiction capitalism, equity changes hands multiple times a second with no reference whatsoever to investment potential or activity in the real world.

Furthermore, HFT can massively amplify the impact of human error in trading strategies. A malfunctioning algorithm can place orders worth hundreds of millions of dollars in just a couple of minutes. A similar error in leveraged futures or options could result in losses many times larger. This often means bankruptcy for the trader and, more seriously, jeopardises the clearing house and the integrity of the market itself. For example, on 3<sup>rd</sup> February 2010, Infinium switched on its brand new oil markets HFT algorithm. By the time they shut it down, five seconds later, it had placed 4,612 buy orders on oil markets, which generated a loss of over \$1 million dollars for Infinium as well as rocking the oil price<sup>18</sup>, which initially spiked and then lost 5% of its value.<sup>19</sup>

HFT threatens to create systemic risks. As on-exchange trading speeds reach the point where they simply can't get any faster, HFT firms are looking towards cross-asset and cross-regional arbitrage opportunities – in other words selling and buying products across different markets at lightning speeds. This raises the spectre of a system-wide, multi-asset flash crash.<sup>20</sup>

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**RESPECTED ECONOMISTS ARE LINING UP TO CONDEMN THE PRACTICE. NOBEL PRIZE WINNER, PROFESSOR MICHAEL SPENCE, SAYS HE WOULD BAN HFT. ADAIR TURNER, HEAD OF THE FSA, SAID THAT IF IT CREATES RISKS, REGULATORS WOULD BE HAPPY TO “SAY GOODBYE” TO IT.**

All of this weakens stock markets' primary function – the efficient allocation of resources – by increasing volatility and distorting price signals<sup>21</sup>. And simultaneously, it makes it difficult for regulators to police markets by pushing the speed of trading to the point where human beings are too slow to intervene<sup>22</sup>. Responding to a system-wide flash crash in a timely and coordinated way would be almost impossible given the number of nations and regulatory bodies that could be involved.

To what benefit? Proponents of HFT argue that it provides necessary liquidity to markets, but, as the flash crash illustrates, this liquidity source shuts down in times of crisis. Algorithms line up on one side of the market: 'sell, sell, sell!' or shutdown, sapping liquidity when it matters most. There is also evidence to suggest that HFT crowds out conventional providers of market depth, making the market even more dependent on their own, unstable, liquidity provision. For example, a recent report from research outfit Nanex suggests that a malevolent HFT algorithm has prompted huge numbers of other traders to leave the market for electronic S&P 500 futures contracts, dramatically reducing liquidity<sup>23</sup>. (And of course, other more reliable sources of liquidity are available - as Romnesh Lamba, Head of Market Development at HKEx in Hong Kong says, “You tell me: if you want to increase velocity, would you prefer to have computers come into the market, or would you rather have mainland Chinese traders participate?”<sup>24</sup>)

All this means that respected economists are lining up to condemn the practice. Nobel Prize winner, Professor Michael Spence, says he would ban HFT<sup>25</sup>. Adair Turner, Head of the Financial Services Authority has said that if it creates risks, regulators would be happy to “say goodbye” to it<sup>26</sup>. The Financial Times describes mounting concerns that “markets may be morphing into little more than a playground for a specialised type of trading that has minimal economic benefit and contributes little, if anything, to capital formation – the traditional function of stock exchanges.”<sup>27</sup>

Despite these concerns, the practice is spreading to new markets – bonds, currencies and even commodities. An investigation by The Financial Times blog Alphaville suggests that at least one company is now dedicated to employing HFT exclusively in commodities markets<sup>28</sup>. They also describe the disruptive effects of an algorithm in the natural gas market, which saw prices plunge 8% and then rebound<sup>29</sup>. Reuters describes a similar phenomenon in the oil market<sup>30</sup>.

This is a trend that looks likely to accelerate along with the very rapid growth in the number of Exchange Traded Funds (ETFs) in commodities and other asset classes now attracting huge amounts of investment. The prospect of a computer-driven crash in stock prices is bad enough, but wild gyrations in oil prices or food prices would have an even more damaging impact on the global economy and would directly impact on people's lives.

#### **A Robin Hood Tax on financial transactions could control the machines**

In the West, regulators are playing catch-up. The UK has recently launched a research study examining the future of computer trading in financial markets<sup>31</sup>, for example. Meanwhile the G20 have commissioned the International Organisation of Securities Commissions (IOSCO) to examine this issue, and they are currently consulting on the topic<sup>32</sup>.

However, in Hong Kong regulators already have the problem under control. According to Charles Li, the Chief Executive of Hong Kong's exchange, "Hong Kong's current market framework, which includes stamp duty (a tax on transactions), effectively limits high frequency trading, just like a highway with toll booths discourages speeding."<sup>33</sup>

By applying a very small tax every time a stock is traded, the Hong Kong Authorities dramatically reduce the incentive to use computers to trade stocks at lightning speeds, because the tax outweighs the wafer thin profit margins that these trades rely on. However, for longer-term investors the tax is small enough to be barely noticeable compared with the other costs and benefits associated with share ownership. A clever solution, first suggested by Nobel Prize winning economist James Tobin in the 1970s which would "throw some sand in the wheels" of international finance<sup>34</sup>. A tax on financial transactions has also been backed as a way of tackling high frequency trading by a number of key figures in the financial world, including Martin Wheatley, Chief Executive Designate of the Financial Conduct Authority, suggesting "this financial 'grit' would... limit the scope for HFT"<sup>35</sup>.

Only one of the main European financial centres currently applies such a tax – the UK – but even here HFT is able to escape. A significant proportion of the turnover in UK equity markets is made up of trading related to derivatives called 'contracts-for-difference' (CFD). These are exempt from stamp duty and are thought to contribute to the high and rising level of HFT in UK markets.<sup>36</sup> In fact CFD trading is already so widespread in the UK that if all the CFD-related turnover (€1.3 trillion<sup>37</sup> (£1.1 trillion)) were directed through stamp duty eligible trades, it would generate as much as €6.5 billion (£6 billion) in revenue. (Although one of the aims of applying stamp duty would of course be to reduce the extent of HFT). Furthermore, a recently released IMF paper suggests that extending taxes like stamp duty to capture Over The Counter (OTC) derivatives like CFDs is both practicable and would reduce tax avoidance<sup>38</sup>.

A number of other possible solutions are also being discussed: an outright ban; enforcement of a minimum time limit on trades or the use of automatic circuit-breakers when the market goes awry. However, the financial transaction tax has one huge advantage over these regulatory solutions: as well as solving the problem, it would also raise a large amount of money at a very convenient time for taxpayers the world over. In fact, the financial transactions tax is expected to feature in another G20 report this year: Bill Gates' report identifying new sources of finance for international development, which will be presented to G20 leaders in November.

Europe already has one example of a successful financial transactions tax (FTT), with stamp duty raising approximately £4bn in the UK each year. A similar tax could solve the HFT problem in Europe, if policymakers were to extend its scope across countries and asset classes. It would also raise billions, helping reduce budget cuts, unlock climate change negotiations this autumn by financing the Green Climate Fund, and fight poverty.

The FTT is a fantastic opportunity. Economists at the Bank of England can see the benefits: witness Andrew Haldane's suggestion that "grit in the wheels, like grit on the roads, could help forestall the next crash"<sup>39</sup>. The question is, can European politicians stand up to the powerful lobby of the financial sector and do what is in the best interests of society as a whole.

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### Endnotes

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