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Markets: Rage against the machine

By Michael Mackenzie, Arash Massoudi and Stephen Foley in New York

While technology has made trading cheaper, investors fear the system is too complex to manage

It has been 25 years since Black Monday, when stock markets crashed around the globe and Wall Street woke up to the risks of computerised trading.

Since then, computing power has grown exponentially and so have the risks. It may not take a full trading day for the markets to lose 25 per cent today – it could happen in moments. And while traders knew trouble was brewing when they arrived for work on October 19 1987, today firms can lose hundreds of millions of dollars out of nowhere, the consequence of a badly written piece of code or the unpredictable interaction of thousands of algorithms, or “algos”, flickering across America’s fragmented markets.

This fragmentation in US markets is largely by design. Five years ago, the Securities and Exchange Commission introduced rules to encourage greater competition and break the grip of the traditional exchanges, making stock trading cheaper and more democratic. Mary Schapiro, the SEC chairman, says these goals have largely been met, to the benefit of retail investors.

But retail investors have also watched as a technological glitch stymied the Facebook flotation, and a “flash crash” inexplicably and briefly wiped \$860bn from the value of the market. These, along with a string of other trading mishaps – all of them unthinkable 25 years ago – have left investors asking if markets have become too complex and too reliant on technology to manage properly.



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“The flash crash and other events have left the impression that no one is in control and no one knows what is happening,” says Jim Paulsen, chief investment officer at Wells Capital Management. “I wish someone could get their arms around this issue.”

America’s battles with these complex trades is being closely monitored by regulators in Canada, Australia and the EU as they too seek ways to contain volatility caused by machines.

What frightens investors most is a sudden evaporation of liquidity, when everyone pulls back at once and there is no one to provide a firm price to an investor wanting to sell. In 1987, investors accused some market makers of not answering their phones so that they would not have to buy shares from panicking sellers. Today, human market makers have largely been replaced by ultra-

fast computer systems trading with high frequency. But like the human traders of yesterday, the machines can and do back away if markets are disrupted.

Canada's 'hot' traders attract regulatory heat

In Canada, regulators are clamping down on the "hot" trading firms whose computers risk gumming up equity markets. That's "hot" as in "high order-to-trade", writes *Stephen Foley*.

While the US wrestles with how to respond to a variety of trading glitches, its northern neighbour has lasered in on a small number of algorithm-driven trading firms that dominate market data traffic, piling stress on exchanges and regulators by constantly inputting and removing trading orders but rarely actually trading on them.

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When such a void in prices occurs in today's market, it is almost instantaneous. During the May 2010 flash crash, some stocks traded as low as a penny before recovering in a manic 20-minute period. There may never be agreement on the cause of the flash crash. To prevent a repeat of the episode, the SEC demanded "circuit breakers" that can pause trading across the market.

Despite this, the mishaps continued.

In March, BATS, one of the largest stock exchanges, had to cancel the flotation of its own shares on its own exchange because a computer glitch caused erratic trading in other stocks beginning with the letters A and B. In May, Nasdaq's computer systems could not keep up with message traffic at the opening of trading in Facebook shares. As a result, traders did not know if their orders had been filled, and the resulting chaos left brokers an estimated \$500m out of pocket.

Then in August, Knight Capital, one of the biggest market-making firms on Wall Street, was brought to the brink of collapse when a coding error caused it to execute many times the number of trades it planned, costing it \$440m over the 45 minutes that its computers were out of control.

"My fear is that the market has lost a whole generation of investors who experienced the financial crisis and now don't understand how the markets are built and function," says Ken Polcari, a floor trader at the New York Stock Exchange, who adds he is not against electronic trading, but makes a case for stemming its influence and rampant expansion.

"The question that must be asked is who does the market serve? Is it to focus on companies raising capital and create long-term wealth for individuals or is it to cater to guys trading for rebates and sub-pennies?"

What links this year's glitches is that they were all, in some way, the result of a technological arms race that began more than a decade ago.

The 1990s saw a rise in alternative trading venues, where investors could trade without having to give up information about their positions that sometimes moved the market against them on traditional exchanges. The SEC encouraged these new "dark pools" to challenge to the old monopolies. But the fragmentation of trading across a growing number of venues carried its own risks – not least divergent prices and fracturing of liquidity.

Knitting the system together has required layers of new rules to ensure that an investor's order gets filled quickly and at the best price, regardless of which trading venue it turns up at first. An

order might now dart across numerous venues before being filled, under strict SEC rules established in 2007 as the Regulation National Market System.

Navigating such complexity requires high-speed systems and has spawned high-frequency traders who can hop across any of more than 50 venues. In late 1980s, trade was mainly conducted on the New York Stock Exchange. But trade has flowed away at a dramatic rate. In 2003, 80 per cent of NYSE stocks were traded on the exchange itself. But that has fallen to 21 per cent today.

The amount of data flowing through computer systems has exploded, as algorithms test all the new markets. Suspicions abound this has created opportunities for widespread abuse.

“Clearly, there are some bad actors,” says Jamil Nazarali, head of execution services at Citadel, a hedge fund. “As the market has evolved, some of the surveillance, monitoring and regulations have to evolve to limit the actions of these bad actors.”

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Constant system upgrades required to deal with all the new message traffic have tested trading firms and exchanges to the limit. Even the biggest of them have proved wanting, as Nasdaq and BATS and Knight have shown this year. The lesson some draw is that Wall Street simply needs to improve at technology.

“Technology is the solution for technological problems,” says Maureen O’Hara, professor of finance at Cornell University. “The first minute is a technology problem, after that it becomes a risk-management problem. I think every firm understands they have technology risk.”

Mr Nazarali, who ran Knight’s electronic trading division until last year, watched in horror as his old firm kept sending more and more orders to the New York Stock Exchange on August 1, with no one seemingly able to turn off the errant program.

“We knew that there was a problem that morning – and everyone knew there was a big issue,” Mr Nazarali says, explaining his shock.

The industry came together quickly with another proposed patch to prevent a repeat of the Knight debacle: a “kill switch” that could be used *in extremis* to cut a trading firm off from the exchanges. Ms Schapiro has said that the recent computer glitches showed that Wall Street was just suffering from “technology 101 issues”.

David Shillman, associate director in the Division of Trading and Markets at the SEC, says: “Advances in technology have allowed for more complex and dispersed markets to develop, but at the same time have provided market participants [with] tools to efficiently monitor market prices and implement routing strategies to address that complexity.”

But Laszlo Birinyi, a market analyst, says: “Ultimately, we submit, that the SEC’s ambitious intent of creating a level trading field and ‘democraticising’ investing has been overwhelmed by the world of dark pools, high-frequency trading, trading mischief and self-serving instruments.”

A crucial question on Wall Street is how much of Main Street's stampede out of stocks can be blamed on the technological glitches. More than \$500bn has been pulled out of US equity mutual funds since 2007, according to the Investment Company Institute. Not even a doubling in the main share indices from their nadir in 2009 has lured investors back.

"The trader world has changed, but the investor market has not," says Mr Paulsen of Wells. "I can still focus on fundamentals and lay down a long-term strategy that builds wealth over time. I just have to hold my nose against the daily volatility."

Alternative explanations for the outflows are not hard to find, from baby boomers switching to fixed-income investments, to investors scarred by the financial crisis and recession. Nonetheless, it suggests the perception across Main Street is that today's market now favours sophisticated traders and their algorithms.

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There has been plenty of soul-searching about the fragmented way US equities trade. At the same time, other countries have acted to restrict high-speed trading or change market structure, in many cases viewing the US as a cautionary tale.

Even some US exchange officials express concern at the way the market is developing and place the blame with the main regulator.

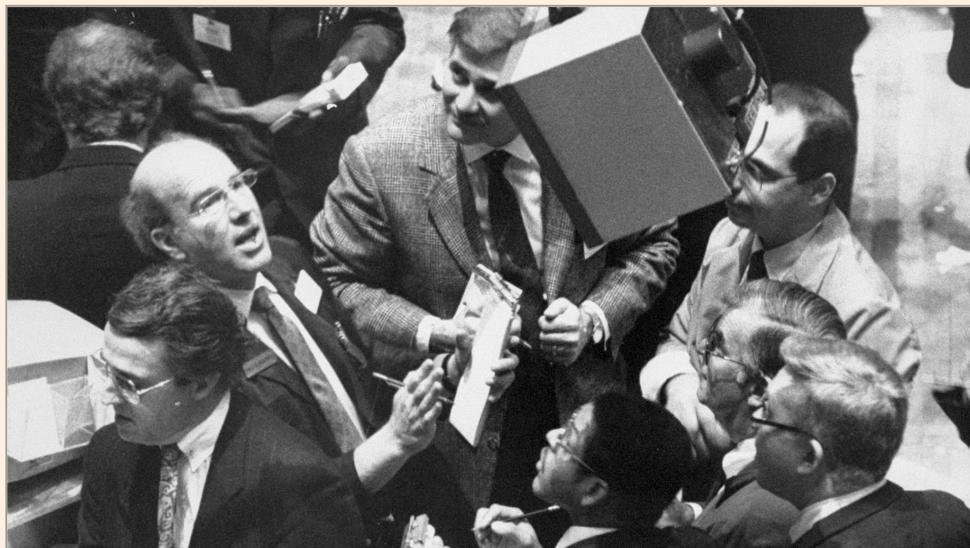
"The SEC has a deer-in-the-headlights view of the world," says one senior exchange official. "The problem at the SEC is there was too much pride of authorship in what was developed and that has unfortunately been a pervasive theme."

While the industry talks, investors worry. Andrew Brooks, head of US equity trading at T Rowe Price, the mutual funds firm, calls the software problems of 2012 "another nail in the coffin [of] investor confidence".

"Investors sense there is a lack of stability. I worry [it is only a matter of time until] something big happens and the market [has to be] closed in order to work out what happened. Change often results in unintended consequences. These have not been properly addressed over the years, and as a result we speed along until there is an accident and we run off the road."

Black Monday

The 25th anniversary of the October stock market crash in 1987 - the first time that computers went wild in US equities - calls for nostalgia. Today, crashes can come and go in moments, and trading firms can be taken to the brink of collapse by errant code. The technological transformation of the US equity market has delivered cheaper trading costs, but it has also delivered dizzying volatility. Investors are worried that the world's largest equity market is just one software glitch away from a maelstrom.



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