

# GLOBAL SECURITIES MARKETS AND THE MICROSECOND

Automation has completely transformed trading on financial securities markets. In some ways it is an unsettling prospect: a computer error could take these markets down in less than a second. Econometrician Albert Menkveld studies the architecture of the financial system, and recommends structural improvements.



By Anita Mussche

We've all been there. You're surfing the net looking for a cheap flight and you return to the best deal after shopping around only to find the ticket price has gone up... Well, you have [Albert Menkveld](#) to thank for that! After gaining his degree in econometrics, he started at KLM and was part of a team that developed algorithms to optimize ticket prices. But after a year, the intellectual challenge began to wane and Menkveld finally opted for a career in science. He has become an internationally renowned expert in the automation of the financial markets.

One of his goals is to end a pointless arms race in the securities markets that is devouring millions of euros. It's a race that revolves around microseconds. Robots have taken over the role of human traders. In less than a second, these [high frequency traders](#) (HFTs) can decide whether to buy or sell. And, they continue to increase their action speed. Menkveld believes it potentially is a waste of economic resources. "These machines already make decisions in under a millisecond. In the time it takes our brains to even register a price, an HFT has already traded 100 times. But they want to up the speed to microseconds, millionths of a second."

## DAY OFF

HFTs are capable of handling financial transactions at lightning speed. Open the stock market for a few seconds at noon and you can take the rest of the day off. But investors are keen to know what things are worth at every moment of the day, so they can decide whether to buy or sell. Being able to check a price every minute makes sense, says Menkveld. "But whether you get that price in 10 or 20 microseconds is irrelevant. It's no longer of any

**"They want to lay a new cable that costs 300 million euros at the bottom of the Atlantic, because the old one is five milliseconds too slow"**

economic use. Yet there are plans afoot to lay a new cable that costs 300 million euros at the bottom of the Atlantic, because the old one is five milliseconds too slow."

He believes that to stop the technological arms race, the

government would have to let markets operate at 100 milliseconds, a tenth of a second, but no faster. Germany has already proposed slowing down its own exchange, and Europe is working on a similar proposal. Menkveld recently advised the British government in detail on this matter in the Foresight report, [The Future of Computer Trading in Financial Markets](#).

## FLASH CRASH

Menkveld is fascinated by the way automation has transformed trading. For one thing, it has cut the cost of trading in shares. But Menkveld also has his concerns: "We are not really part of the game anymore." And the situation can rapidly spiral out of control if something goes wrong. In May 2010, all HFTs suddenly could not resell and ended up trading with one another. In one minute, share prices dropped by four per cent. The destruction of capital equalled the cost of the Iraq war. The uncertainty generated by such a fluctuation can spark a new crisis: investors become afraid to invest, companies are starved of credit, banks collapse. Menkveld was therefore keen to know what caused this 'flash crash'. Last year, fellow researchers made a breakthrough. They discovered that, during that fateful minute, the HFTs were engaged in intensive buying and selling with each other but had not with investors. Menkveld and his colleagues believe investors misinterpreted this spike of activity. It seemed as if the disproportionate volume indicated a lot of liquidity – in other words, a lot of participation of investors – and the investor that sold the initial block might have misinterpreted this as a signal to accelerate his sales. But, HFTs could not resell and prices collapsed. In November 2012, Menkveld published [an economic model](#) with fellow researcher Bart Zhou Yueshen to encapsulate this phenomenon.

## ECONOMIC FORCES

Now he is carrying out an empirical study aimed at substantiating that descriptive model. The fact that Chicago-based data company Nanex gave him access to their data not only speaks volumes about the trust that Menkveld enjoys as an academic, but also about how urgent his research is for today's securities markets. That is why he is also involved in regular discussions with central banks and financial regulators, especially the [European Securities and Markets Authority](#) and the [French Autorité des Marchés Financiers](#).

"I think it's very important to talk to the people who prepare policies, the professionals and officials who pencil in the legislation before the politicians vote on it, and to make them aware of the key economic forces."

Menkveld saw how the plans for a European tax on financial transactions went awry. Due to the structure of the Dutch pension system, the Netherlands was faced with the prospect of paying a disproportionately high amount, yet nobody protested. He wrote a [policy brief](#) meant as a wake-up call for politicians. "Now all kinds of proposals on regulating HFTs are emerging, while we don't even know what it is they do," he sighs. "For goodness sake, let's focus on what is actually happening first. Until we know that we should do nothing at all, because we don't know what we are tampering with."

## MAJOR INSIGHT

The social relevance of his research fascinates Menkveld even more than the intellectual enjoyment he derives from it. That's why he feels at home at VU University Amsterdam: "Taking part in the public debate is considered very important here. In that respect, VU University Amsterdam is still very much at the forefront." He could also have chased the big bucks. Before he arrived at the university, he was offered a job at investment bank Goldman Sachs. But he found academic research a greater challenge: "Thinking about the architecture of the financial system, so that everyone will benefit from it as much as possible."

**"The worst scientists come up with the biggest models"**

It's a matter of simplifying things, Menkveld believes. "The worst scientists come up with the biggest models. They want to encompass everything in a large mathematical model, feed it to a computer and let the computer crunch the numbers. But, ultimately, these numbers then come from a black box. The most fascinating part of my job is reduction. You need to bring it an economic issue down to its most powerful forces; forces you can jot down with pen and paper, as it were. Even at that level you can gain a wonderful perspective on what is happening in the economy and ways to go about improving it."

## TANGO

In his spare time, Menkveld likes to do things that are entirely unrelated to his rational, computer-driven and number-driven working environment. He dances tango and has recently taken up horse riding. He reckons you need these escapes from the scientific world if you want to stay the pace as a scientist, because science requires great stamina. For instance in 2008-2009, as a visiting researcher at New York University, he looked at daily trading in US equities over a ten-year period, in order to analyse the behaviour of market makers at the New York Stock Exchange. But

the final step from data to mathematical model proved elusive. "I felt like I was going round in circles. The hardest part of this job is not knowing whether or not there is a solution. You therefore always wonder if you shouldn't just stop investing all that energy in a problem. This level of uncertainty is a terrible burden. But a new day dawns and you find yourself right back at it again." Staring out of his window one day at the skyscrapers of Manhattan, he suddenly saw the link between reality and his model. "It clicked into place! The market makers did what the model had predicted. That's a real kick. That weekend, I really tied one on!"

## TRUE PASSION FOR RESEARCH

While studying for his PhD at [Erasmus University Rotterdam](#), Albert Menkveld had the opportunity to travel to America on a prestigious [Fulbright Scholarship](#) and discovered his true passion for research at leading universities [Wharton](#) and [Stanford](#). He returned to the US several times, but since accepting an offer from VU University Amsterdam in 2002, he has been based in Amsterdam. Publications in leading financial journals earned him the 2007 [Pierson Medal](#) for leading young economists. He attracted millions of euros in research grants from VU University Amsterdam and the Netherlands Organization for Scientific Research (NWO), which he used to set up his own research group. He plays an active part in the [Duisenberg School of Finance](#), a partnership between the Dutch financial sector and universities, including VU University Amsterdam. At the [Tinbergen Institute](#), the economic research institute and graduate school of the universities in Amsterdam and Rotterdam, he coordinates the Finance programme. In October, VU University Amsterdam appointed him to the [University Research Chair](#), a professorship in recognition of prominent researchers considered to be prospective leaders in their field.