

The financial timebomb that nobody can defuse

While researching his new thriller set on the trading floor, Robert Harris discovered how a generation of displaced atomic physicists revolutionised the financial sector – and brought us to the brink of disaster

A spectre is haunting the West: the spectre of capitalism. A vast and highly unstable mixture of debt – trillions of dollars of sovereign, corporate and private borrowing accumulated over decades – is strapped to the Western economies like a suicide bomber's gelignite vest. The task facing our politicians is somehow to defuse this bomb without inadvertently triggering the sequence of defaults and bankruptcies that would set it off. No wonder they walk around the problem scratching their heads, prodding it gingerly here and there. The horrible truth is dawning that it may not be technically solvable.

For the first time in my life – I am 54 – I get the sense of what it must have been like to have lived in my grandparents' or great-grandparents' generation: in 1913 or 1937. One feels a great smash coming ever closer, almost in slow motion, and yet there seems to be no way to avoid it. How have we got ourselves into this mess? We were supposed to be living in an era of unprecedented peace and prosperity. Communism had collapsed, and the threat of nuclear annihilation had receded. Immense advances in technology were creating new economies. Vast markets were opening up in the developing world. Above all, we were supposed to have created the necessary institutions – the World Bank, the International Monetary Fund, the G20, the OECD – to ensure we never repeated the mistakes of the 1930s. Where did it all go wrong?

Bizarrely enough, as good a place as any to start looking is a hole in the ground near the small town

of Waxahachie, Texas – or, to be more precise, 17 holes in the ground, each of them an air shaft leading down to 14 miles of abandoned tunnel dug into the hard Texan rock, which are all that remain of a grandiose scientific project called the Desertron. The Desertron – or the superconducting super-collider, to give it its proper scientific title – was supposed to be America's answer to CERN's Large Hadron Collider in Geneva, a gigantic experiment to investigate the most fundamental laws of our universe. With a circumference of 54 miles, it would have been three times as large and powerful. Unfortunately, it would also have been nearly three times as expensive. In October 1993, in order to save projected future costs of \$10bn, the U.S. Congress voted to abandon the whole scheme – writing off the work already done at a cost of \$2bn. For a generation of American academic physicists, that decision wiped out their planned careers.

One physicist with a PhD I spoke to when I was researching my new novel told me he had cried when he heard the news. What was he supposed to do now? He had to earn a living somewhere. His solution, like that of a majority of his colleagues, was to go and work on Wall Street – in his case, in the giant investment bank Merrill Lynch. The resulting collision of brilliant but unworldly scientists and aggressive financial traders turned out to



Old-style traders shouting into phones are being replaced by silent computers

be more dangerous than anything that might have been produced beneath the dusty surface of Waxahachie. For this was the deadly partnership that helped give us a whole alphabet soup of fearsomely complicated financial derivatives – loans and mortgages and investments packaged up into bundles and sold around the world – that almost no one, and certainly not the regulatory authorities, ever really understood. When these toxic “financial weapons of mass destruction”, as the

US billionaire Warren Buffett presciently called them, duly blew up in 2008, the same US Congress that had saved \$10bn shutting down the Desertron had to come up with a rescue package for the banking system that has since been estimated as costing the American taxpayer \$3.7trn. If ever there was an example of the Law of Unintended Consequences in action, this must surely be it.

Before I began my research, I subscribed to the widely held view that people in the financial sector generally had qualifications in economics or business, wore striped shirts and braces, and sat in trading rooms shouting wildly into four phones simultaneously. To my surprise, I found that this image is entirely outdated. One extremely successful hedge-fund manager I spoke to, with \$12bn

in assets under management, won't hire anyone without a top PhD in maths or physics – even economics is considered too “soft” a degree. Increasingly, the people in the dealing

rooms these days – young,

casually dressed – look as though they should be in lecture halls. They are known in the business as “quants”: short for “quantitative analysts”.

Quants analyse the market with intense mathematical precision to predict share price movements and the level of investment risk; they sit at screens and rarely talk louder than a whisper. The trading is mostly done by computer, for which the quants write the programmes. Now, 73% of shares in New York are traded by computer, either by “high-frequency strategies”, which may hold the shares for only a few milliseconds, or by algorithms devised by quants. Algorithms are sophisticated programmes designed to predict the behaviour of the markets. There is something creepy about it. In the words of Emanuel Derman, himself a leading quant: “When physicists pursue the laws of the universe, it seems selfless. But watching quants pursue sacred laws for the profane production of profit, I sometimes find myself thinking disturbingly of worshippers at a black mass.”

Increasingly, the role of the trader is like that of a pilot in a computer-controlled jumbo jet. The job is done by computers: he – quants are mostly men – sits at a screen and monitors the operation, only intervening when something goes wrong. Recently

“One feels a great smash coming closer, almost in slow motion, and we can't avoid it. How have we got ourselves into this mess?”

I watched an algorithmic system in Geneva belonging to a hedge fund trading on the New York Stock Exchange. The computer had picked the stocks it wanted to trade. It communicated with the broker's computerised system in the US which, in turn, communicated with the computerised exchange that facilitated the deal. At no point was a human involved.

In the 20 minutes I was watching, the machine made a profit of \$1.5m. This hedge fund has made a return for its investors of more than 80% in the past three years, at a time when most of us have seen the value of our pensions and tracker-funds go down in a falling market.

"Our computers love it when the markets panic, because when people panic they behave in very predictable ways," I was told. In other words, the machines thrive on fear. There is even a way of estimating this human weakness: the Standard & Poor's 500 Volatility Index (VIX) measures the expected volatility on the Chicago Stock Exchange over the coming month, based on a hugely complicated mathematical formula devised by quants. It is popularly known as the "Fear Index".

In 1965 Gordon Moore, founder of the computer firm Intel, propounded what's known as Moore's Law: that computers would double in power and halve in cost every 18 months. His forecast has proved amazingly accurate. To take one example: as recently as the 1990s, CERN's experimental data was all analysed by a Cray X-MP/48 supercomputer which cost the scientists \$15m. Yet that machine had less than half the computing power of a modern Microsoft Xbox, which costs \$200. When something continues to double in size – in this case computer power – it's called exponential growth. But as Moore himself observed a few years ago, exponential growth can't continue for ever. It can be pushed to its limit, he said, "but eventually disaster happens". We have been warned.

Computers have become so powerful in the world of financial trading that human involvement has been reduced to the quants and their obsessive statistical analyses. But computer programmes based on statistics, however brilliantly analysed, do not allow for common sense. Computers predicted the US property market would rise forever because statistics showed the country's house prices had never fallen in history – and every financial institution worldwide piled into America's mortgage market. We all know what happened next: the housing market crashed, US mortgages were worthless and the sub-prime loan crisis sent the world's financial markets into meltdown.

On 6 May last year, at around 2.30pm on the American East Coast, the US financial markets experienced the "Flash Crash". The events of those few minutes provide a snapshot of what the modern markets have become. First, there is their scale:



The Charging Bull of Wall Street: heading for calamity

19.4 billion shares were traded on that day, more than were traded in the entirety of the 1960s. But the figure is misleading. Hundreds of millions of these shares were never actually sold: they were merely held for a few thousandths of a second as computerised high-frequency traders tested the market. They "sniped" and "sniffed" (in their jargon), making bogus offers to buy or sell shares so that they could find out the price, but the traders never went through with the sale. The trouble is that the computers registered these bogus offers as real sales, and so much of this activity took place that the online trading section of the New York Stock Exchange

temporarily froze. In the ensuing panic, the Dow Jones Industrial index dropped by roughly 700 points in the space of 20 minutes, wiping out nearly \$1trn of investors' money.

This, then, is the financial world in which we now live: a world of extreme volatility, with lurches of 3% or 4% a day on the markets no longer uncommon. A world of complicated financial instruments which are designed to spread risk but which have, instead, spread a lack of confidence. A world of instant communications, in which tremors of panic spread across the globe in the time it takes ripples to spread across a lake. A world in which thousands of the most brilliant minds on the planet are paid not to pursue scientific progress, but to devise financial strategies that are mostly non-productive and sometimes highly dangerous.

Novelist and physicist C.P. Snow delivered a lecture in 1959 about the "two cultures", the humanities and the sciences, and the failure of the one to understand the other. We now have to add a third: the financial markets. How many of us have the least idea of what the latest financial instrument – an exchange-traded fund – actually is? Yet the quants are now busy turning exchange-traded funds into a trillion-dollar industry, up 40% in Europe alone in the past year. How many of us even know what short-selling is? I certainly didn't, before I started researching my book.

As the current sense of sleepwalking towards calamity continues, my worry is that the financial system itself has somehow slipped all human control – that it has become the preserve of a profoundly anti-democratic, super-rich elite, and that it girdles the planet like some alien entity from an H.G. Wells novel. The digitised financial machine doesn't work for us: we work for the machine. And I don't believe that our political leaders have the faintest idea how to bring it under control.

A longer version of this article first appeared in the Daily Mail. Robert Harris's new novel, The Fear Index, published by Hutchinson at £18.99, is out now. To buy from The Week bookshop for £15.99, call 0843-060 0020 or visit www.theweek.co.uk/books.

WEATHER

Coldest:
4°C (39°F) at
Stornoway (Isle
of Lewis) on Sun
2nd

Sunniest:
11.3hrs at
Lyneham
(Wiltshire),
Wed 28th



Wettest:
55mm (2.17in)
at Prestwick
(Ayrshire) on Fri/
Sat 30th/1st

Driest:
No measurable
rain fell over
much of
eastern, central
and southern
England

Warmest:
30°C (86°F) at
Swanscombe
(Kent) on Sat 1st

For the week that was:

An exceptional spell of Indian Summer weather lasted until Mon over most of England and Wales, although it was much shorter in Scotland and Northern Ireland. Even so, 23.5°C was reached at Ballykelly, NI last Wed, 26°C at Charterhall in the Scottish Borders on Fri, 28.2°C at Hawarden, north Wales on Sat, and 29.9°C at Swanscombe, Kent, also on Sat. This last is a new all-time October record for the UK, though this weather station did not exist during previous October heatwaves. Heavy rain affected much of Scotland and NI on Fri, Sat and Tue.

The hot spell also hit much of Europe, with highs of 34°C at Bilbao and Jerez (Spain), 32°C at Mont-de-Marsan (France) and Florence (Italy), and 30°C at Mostar and Podgorica in the Balkans. Tropical Storm Ophelia brushed Newfoundland on Mon, and is set to bring wind and rain to the UK on Wed/Thur, while Tropical Storm Philippe continues to wander aimlessly around the tropical Atlantic south of Bermuda.