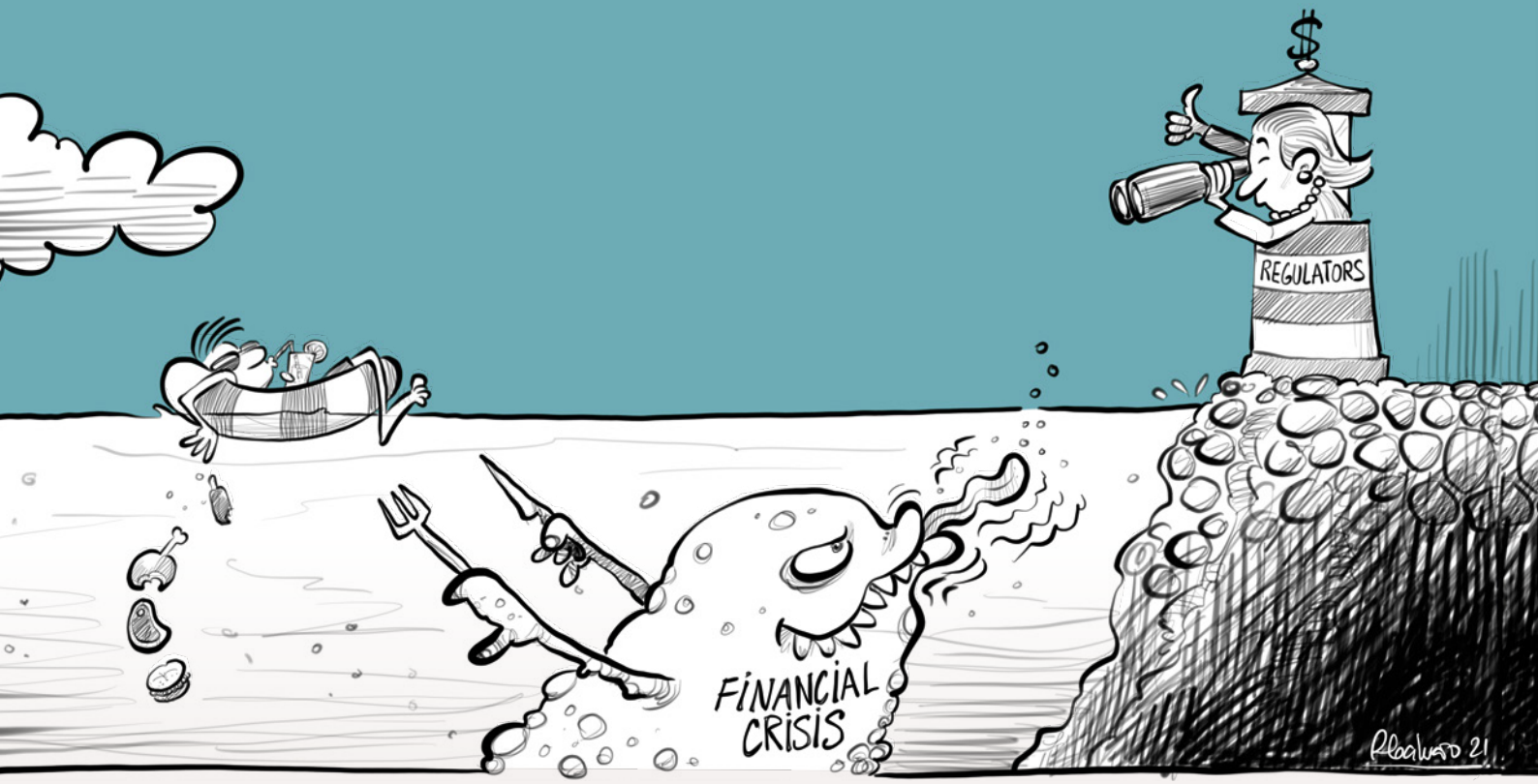
SRC
Systemic Risk Centre



Systemic Risk:
A DECADE OF DISCOVERY

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

FMG FINANCIAL MARKETS GROUP
Research at LSE

Contents

SRC
Systemic Risk Centre

Systemic Risk Centre

The London School of Economics and Political Science

Houghton Street

London WC2A 2AE

United Kingdom

+44 (0)20 7852 3557

src@lse.ac.uk

www.systemicrisk.ac.uk

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

FMG FINANCIAL MARKETS GROUP Research at LSE

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Tim Phillips

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Why did no one see it coming?

In seven decades on the throne, Queen Elizabeth II developed, in the words of Tina Brown, a journalist who studied her reign,[1] an "epic stoicism" in her determination not to be too interesting. Her public appearances were carefully choreographed so that her small talk, usually focused on dogs and how her interlocutor got to work, would never make the news.

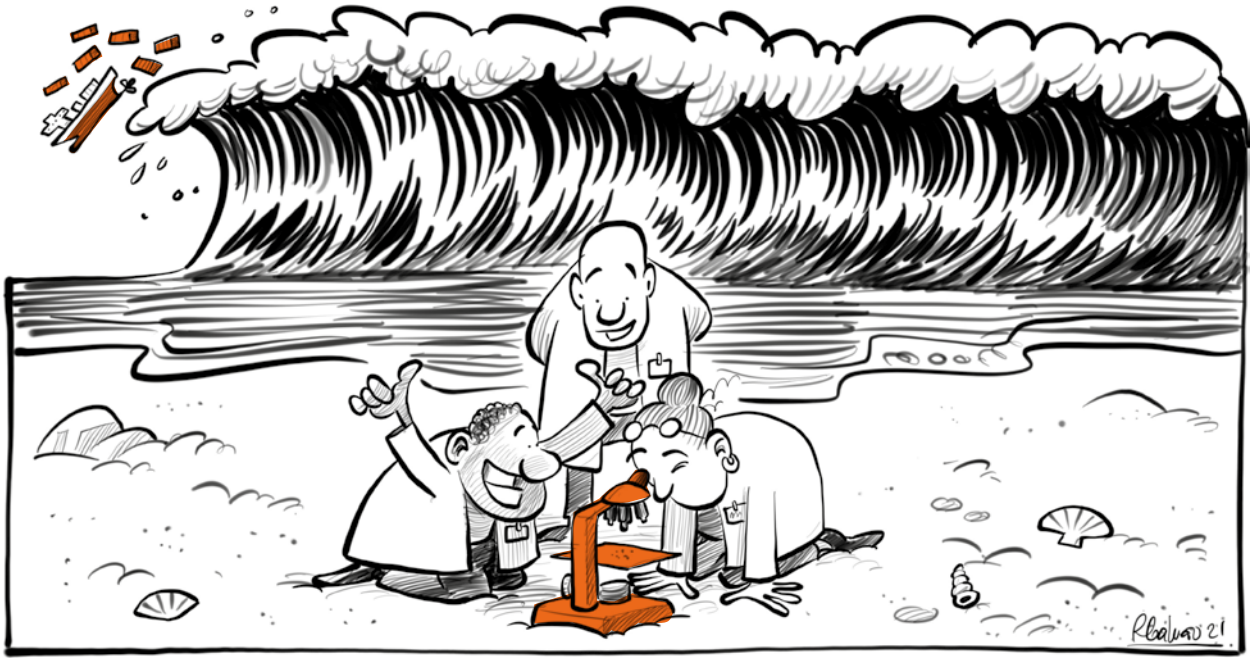
Almost never. During her visit to the London School of Economics (LSE) in November 2008 to open the New Academic Building, she described the ongoing Global Financial Crisis (GFC) to the assembled professors of economics as "awful", and asked, "Why did no one see it coming?" Her question made headlines that day, and next: an apparent failure of regulators, academics and practitioners in the financial sector to anticipate or prevent a systemic crisis that, according to the Bank of England's Financial Stability Report released on 28 October, had left the world's financial institutions nursing losses of $2.8tn.

The British Academy, representing the social sciences and humanities, was tasked with responding to the Queen's question. On 26 July 2009, it delivered the answer in a letter to her:

> "In summary, Your Majesty, the failure to foresee the timing, extent and severity of the crisis and to head it off, while it had many causes, was principally a failure of the collective imagination of many bright people … to understand the risks to the system as a whole."

Trading off risk and growth

Yet, had the Queen's question in 2008 been directed to a small group of LSE researchers working less than 100 metres away, she might have heard a more detailed reply. Founded by Mervyn King and Charles Goodhart in 1987, the Financial Markets Group (FMG) has been studying the global financial system ever since. Some members of the group had spent most of the decade leading up to 2008 investigating the weaknesses of the global financial system, its interaction with the real economy, and the seeming inevitability of crises.



1 Brown, Tina. 2022. "The Palace Papers." *Vanity Fair*.

"Every activity involves some risk," Goodhart explains, "If you try to reduce the risk to zero, there will be no activity. The question instead is, what is the optimal trade-off between risk and growth?"

Not surprisingly, Special Paper 130, titled "An Academic Response to Basel II," had not made it into the Queen's daily reading when it was published.

Endogenous risk

In 2001, several of the FMG members had written a paper that warned of the exact type of risk that apparently "no one" had seen coming.

Not surprisingly, Special Paper 130, titled "An Academic Response to Basel II,"[2] had not made it into the Queen's daily reading when it was published. Since the 1980s the world had experienced a time of apparent financial stability. In 2002 this was wittily named "The Great Moderation" by James Stock and Mark Watson, two economists, in a paper explaining that the financial system seemed to have solved many of the problems that had caused regular systemic crises for centuries.

The FMG paper was a response to a request for comment from The Basel Committee for Banking Supervision, which was drafting its proposal for banking regulations known as Basel II. This was to replace the Accord that dated from 1988, known colloquially as Basel I, which had set out to improve the stability of the global banking system by ensuring that banks had sufficient capital to survive a crisis.

Reading the proposals, the authors had the firm opinion that Basel II was set up to fail because it did not understand what would cause a crisis. Humans are wired to search for danger by looking outwards: listening for the sound of wolves howling, spying approaching ships through a telescope, or spotting a blip on the long-range radar. When risks come from outside – The SRC economists describe these as exogenous risks – banks can hunker down and use their buffers to ride them out.

But Basel II did not address the risks that come from inside the system, against which capital requirements would offer little protection. When a problem occurred, operational, market and liquidity risk would all be increased by the response of participants in the system. Thousands of responses to a problem, and the responses to those responses, could create a crisis. Systemic risk was endogenous.

This endogeneity, the group believed, was not just an interesting quirk. It had been the source of financial instability in most systemic crises for a millennium. Individual market participants were aware of it, yet regulation was being written as if it did not exist.

2 Danielsson, Jon, Paul Embrechts, Charles Goodhart, Con Keating, Felix Muennich, Olivier Renault, and Hyun Song Shin. 2001 "An Academic Response to Basel II." Financial Markets Group Special Paper, no. 130.

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Jon Danielsson

Jean-Pierre Zigrand

When there are flaws in regulation, they are exploited for gain by the organisations that are regulated. This is known as regulatory arbitrage. In this case, banks had complied with the incomplete Basel regulatory framework, but held riskier assets while still meeting capital requirements. Basel I had inadvertently encouraged the process of securitisation – the bundling and repackaging of risky loans into seemingly safe tradable securities – that would play a significant role in the propagation of the GFC.

The Basel II proposal, published in 2004 and adopted by most countries in 2008, suggested more risk-sensitive capital ratios and recognised the increased importance of innovative risk mitigation techniques. It created a greater role for supervision, and emphasised market discipline. But Special Paper 130 argued that it had "failed to address many of the key deficiencies of the global financial regulatory system and even created the potential for new sources of instability". Among the shortcomings were that it had chosen poor statistical measures of risk; that the ratings agencies whose measures of risk would be relied on were inconsistent in their approach and reports; that operational risk modelling was poorly defined and not measured, and that this would enhance the procyclical nature of financial regulation – more credit, smaller buffers and higher risk during the boom times, leading to bigger busts.

But, most importantly, the charge was that Basel II did not recognise that:

> "Market volatility is, in part at least, the outcome of interaction between market players and is thus endogenous. This endogeneity may matter enormously in times of crisis. … [T]he proposed regulations would induce the harmonisation of investment decisions during crises with the consequence of destabilising rather than stabilising the global financial system."[3]

Financial instability

The FMG's academics were not the first to recognise the endogeneity of risk in the global financial system. When they fretted about feedback loops (in which the aggregated collective reaction to an unexpected event amplifies the problem) they were developing and formalising ideas that Hyman Minsky called his concept "The Financial Instability Hypothesis":[4]

> "The readily observed empirical aspect is that, from time to time, capitalist economies exhibit inflations and debt deflations which seem to have the potential to spin out of control. In such processes, the economic system's reactions to a movement of the economy amplify the movement," he wrote.

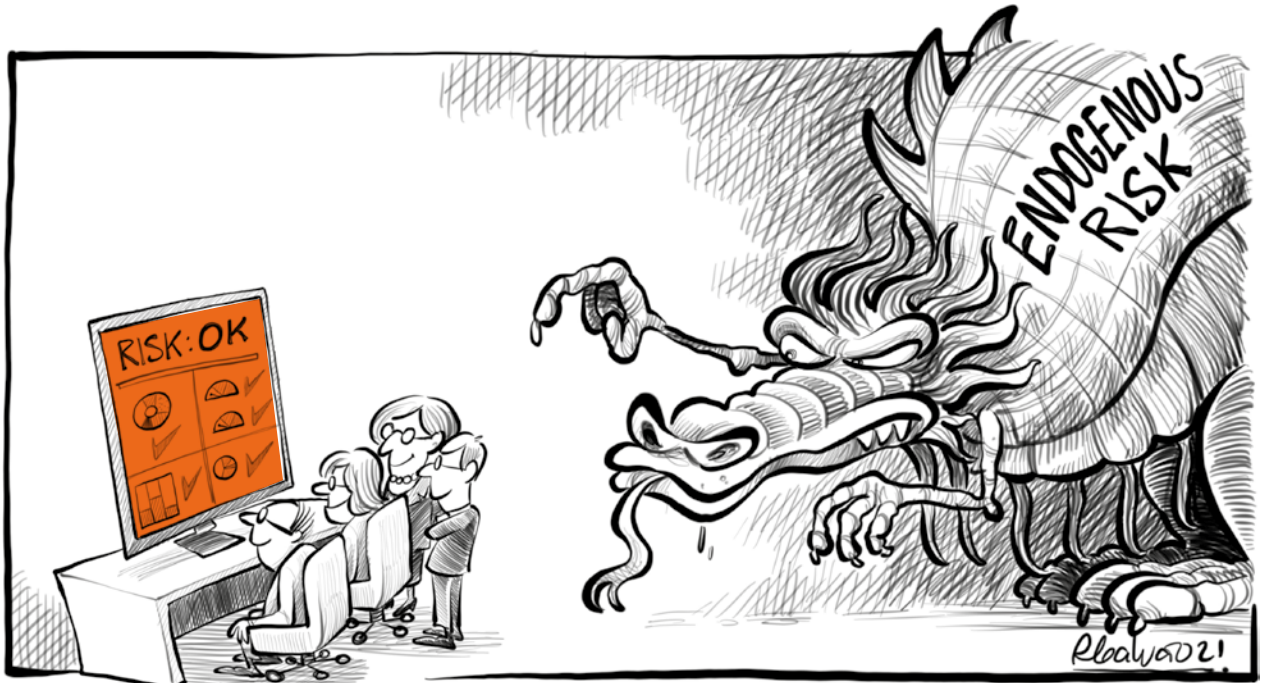
Today, the phrase "Minsky moment", coined in 1998 to describe the point at which a period of increasing debt and speculative growth culminates in a collapse of asset prices, gives Minsky overdue credit for his ideas, which are now not disputed, and certainly not ignored. But through most of the first decade of the 21st century, the prospect of one of those moments seemed remote: Basel II had been adopted, and the magic of securitisation was delivering a huge, apparently almost riskless, expansion in global credit. Between 2004 and 2006, the world's economy grew by more than 4% each year. Almost nobody saw the first systemic crisis of the 21st century coming.

Almost nobody.

> "What was written in that paper on Basel II was exactly what played out six years later. In exactly the way the 2001 paper said it would," says Jean-Pierre Zigrand, an associate professor of Finance at LSE, known to colleagues as "JP", who has expertise in asset pricing and financial intermediation. Zigrand had joined the FMG in 1998.
>
> "Either through absolute brilliance or dumb luck, we discussed many of the things that would happen in 2008, and we showed why Basel could not prevent that. It was an analysis that highlighted the precise flaws that allowed the GFC to happen," adds Jon Danielsson, at that time a reader in Finance at the LSE.

3 Ibid.

4 Minsky, Hyman. 1975. "The Financial Instability Hypothesis: A Restatement." *Journal of Economic* Issues 9(1): 57–84.



But during the relative calm of The Great Moderation, in the years before the GFC, the warning about the problem of endogenous risk fell on deaf ears.

Danielsson was one author named on the Basel II paper ("I think Jon forgot to put my name on it," Zigrand jokes). He had been inspired by an interest in risk modelling, on the one hand, and the history of financial crises and the response to them, on the other. This combination – technical economic modelling meets policy – fitted well inside the FMG, which had been set up precisely to bridge the gaps between policy, practitioners and academia. As Danielsson says:

> "All serious risk is created by the interaction of the human beings that make up the system. A lot of people look at the surface, the rules … Our view was that the real threats and the real benefits of the system were not visible. You had to go and look for them."

But during the relative calm of The Great Moderation, in the years before the GFC, the warning about the problem of endogenous risk fell on deaf ears.

Zigrand recalls:

> "For us, the idea of endogenous risk was obvious, but almost nobody else seemed to think so. After 2008, if you ask people about these ideas of feedback loops and amplification effects and domino effects, everybody will tell you that they always thought that. But in the early 2000s, almost nobody thought that."

Two days before The British Academy wrote to the Queen in 2009, Danielsson and Zigrand published a paper with Hyun Song Shin, a professor of economics at Princeton University, research associate at the FMG and later a founding member of SRC, and previously a colleague at the Finance Department of the LSE. It was called "Risk Appetite and Endogenous Risk" and modelled their ideas formally. By this time, academics, financial institutions and regulators had all begun to discuss endogenous risk, feedback mechanisms and Minsky's ideas seriously. The new paper went further, describing endogenous risk as a common catalyst in all systemic crises:

> "The distinguishing feature of crisis episodes is that they seem to gather momentum from the endogenous responses of market participants themselves. Rather like a tropical storm over a warm sea, they appear to gather more energy as they develop … The GFC of 2007–8 has served as a live laboratory for many such distress episodes."[5]

The paper also recommended a future research agenda

> "[so] that we can study the propagation of financial booms and distress, and to identify and quantify the amplification channels through which such effects operate."

This research agenda needed a home, and that home was to become the Systemic Risk Centre (SRC).

5 Danielsson, Jon, Hyun Song Shin, and Jean-Pierre Zigrand. 2009. "Risk Appetite and Endogenous Risk." FMG Discussion Paper 647.

Four pillars of research

From day one, the Systemic Risk Centre (SRC) has focused its activities in four areas:

1 Endogenous risk

Most current financial models assume an outside natural or man-made disaster creates that risk. The SRC believes that people interacting with one another create risk in the financial system. This is known as “endogenous risk”. The theory of endogenous risk is the guiding philosophy of the SRC.

It is based on the idea that almost everything that takes place in a financial system is caused by the interaction of all the players in the market. These agents continually study and react to the financial system, changing its nature in the process. Most of the time, these individual economic agents behave in a way that cancels out shocks, as the same event may prompt some to buy an asset and others to sell it.

Systemic risk occurs when this no longer happens because the agents start reacting in the same way. When this occurs, the behaviour of market participants can suddenly and unexpectedly create a vicious cycle, causing a crisis.

2 Amplification mechanisms

Within the financial system, a small event can turn into a major crisis, even a systemic event, in the presence of mechanisms that amplify or accelerate the impact through the entire financial system.

Amplification mechanisms are how endogenous risk manifests itself in the financial system and translates into concrete events. These include balance-sheet issues, such as levels of leverage and liquidity; constraints on the way institutions behave, imposed either by regulators or the institutions themselves; and how market participants react to one another in times of both relative calm and stress.

3 Policy responses

Policymakers and regulators continually strive to design laws, rules, regulations and other mechanisms to maintain financial stability, and to prevent and mitigate the impact of financial crises.

Some of these may yield real benefits to control the build-up of systemic risk. However, others may perversely increase systemic risk, particularly when policymakers fail to consider how they might interact with other rules.

Policymakers also naturally focus on past vulnerabilities while crises tend to happen in the parts of the system nobody is paying attention to.

4 Identifying and measuring risk

In a perfect world, governments, businesses and consumers would benefit much more if they could identify the build-up of risk early enough, allowing policymakers and market participants to respond.

Significant effort is currently being invested in empirical techniques to identify systemic risk. However, some of this work, which is based on studying directly observable outcomes in financial markets, may not identify systemic risk until it is too late to act, or give inaccurate forecasts about the level of systemic risk. The reason is it focuses on the past, missing out on new threats of a type never seen before.

Opening doors

On 16 January 2013, the Systemic Risk Centre (SRC) opened its doors in the Lionel Robbins Building at the London School of Economics (LSE).

The Centre would "allow researchers affiliated to the Centre to investigate how risk is created through feedback loops within and between the financial, economic, legal, and political systems," said the press release from the LSE.

During 2012, **Jon Danielsson** and **JP Zigrand** were persuaded by staff at the LSE to apply to the Economic and Social Research Council (ESRC) for a grant to establish a centre that was linked to, but distinct from the Financial Markets Group (FMG). The ESRC granted £3,757,475 of public funds, topped up to £5 million by the LSE, to last until October 2017.

The model in the FMG's paper, "Risk Appetite and Endogenous Risk", had described the problem. But what were the implications for how the financial system created and managed risk, the impact on welfare, and the message to financial regulators and the other institutions that make up the financial system?

At the launch of the SRC, Danielsson pointed out that the clock was ticking: "There will be another crisis and we won't be able to predict it because the world is too complex. We hope through our work that we will understand how to build a more resilient financial system and prevent the worst impacts of any eventual crisis."

A meeting place without a hierarchy

The press release also promised that the SRC would "bring together experts from finance, economics, computer science, political science, law and the natural and mathematical sciences". It helped that the SRC had a ready-made constituency of researchers from most of these disciplines, who had worked with Danielsson and Zigrand, the co-directors, in their ground-breaking research at the FMG.

Ron Anderson

Julia Black

Bob Hancké

The programme directors included **Ron Anderson**, an emeritus professor of finance; **Julia Black**, a regulatory law professor and pro-director of research at the time; **Bob Hancké**, a specialist in European political economy at the European Institute, LSE; **Christian Julliard**, a specialist in financial networks at LSE·, **Philip Treleaven**, professor of computing and the head of the Financial Computing Centre at University College London, who helped to crunch financial data acquired through a partnership with Markit, a provider of financial data; and **Kathy Yuan**, professor of finance, also from LSE. There was a long (and growing) list of senior researchers and research assistants, plus PhD scholars.

"There will be another crisis and we won't be able to predict it because the world is too complex."

Christian Julliard

Philip Treleaven

Kathy Yuan

Markit's data was essential to help create the early avalanche of papers based on the movements of prices in the financial system. Formed in 2003, Markit's 3,000 employees called themselves "plumbers in suits": it pooled proprietary bank price data so that participating financial institutions could price their products appropriately. The usefulness of complete, detailed, timely pricing information was obvious. **Lance Uggla**, founder and CEO of Markit, was a supporter of the SRC and attended some of the events.

Lance Uggla, left

"On my second day, JP came to me and said: 'We're having a conference. Can you help organise it?' It was on ecology."

Katja Neugebauer

The lack of hierarchy also meant that the core team had some unusual assignments. **Katja Neugebauer**, now a senior economist at the Bank of Portugal but in 2014 a researcher in the SRC, fresh from her PhD, joined in part to broaden her experience. "On my second day, JP came to me and said: 'We're having a conference. Can you help organise it?' It was on ecology."

The successful conference (you can read about it later) was just one of a series of collaborations with external visitors. "While I was there, all my papers were with external co-authors," Neugebauer recalls, "We were small, and that meant we welcomed input from the outside. We had all the freedom we wanted and need for our research."

One of the early beneficiaries of the SRC's open-door policy was **Jeff Chwieroth**, a professor in political economy who had an office around the corner at LSE. In May 2013 he published a blog linking political survival to banking crises,[6] which Danielsson read. "He said, 'this is awesome stuff. I'd like you to have a chat with me and my colleague JP'," Chwieroth recalls, "They told me what they were doing at the SRC: 'We've got lawyers and we've got finance people and econ people. We've even got computer scientists!'." They were also curious about the contribution that political science could make to understanding risk.

"Would you like to come and hang out with us and learn a bit more about what's going on? We'd like to learn more from you," they asked. Chwieroth, by that time eight years into his career at LSE, was looking for a challenge. "They invigorated me, made me enjoy work a lot more, and think about things in a way that I hadn't been able to do until then. Suddenly you're in this different world of people who are at the cutting edge of a lot of important stuff, particularly after the financial crisis when everybody wanted to know about finance. They're operating in a world that's similar to you, sharing their views, but at a high level."

"They pushed us to develop our argument fully. Not just, 'Can you explain bailouts and political punishment?', but 'Can you tell us about moral hazard? Can you tell us about systemic risk? Why do voter demands create greater risk of future financial fragility?' I'm grateful for that. And the SRC was unwavering in its financial support."

"They pushed us to develop our argument fully. Not just, 'Can you explain bailouts and political punishment?', but 'Can you tell us about moral hazard? Can you tell us about systemic risk?'"

Jeff Chwieroth

6 Walter, Andrew, and Jeffrey Chwieroth. 2013. "Banking crises and political survival over the long run – why Great Expectations matter." VoxEU.org, 10 May.

Eva Micheler

"I enjoy the SRC because it's interdisciplinary and was at the cutting edge of what was going to happen. A lot of the things that we discussed, became part of the public discourse years later."

"I got involved when Jon and JP came to the law department to introduce the SRC," recalls **Eva Micheler**, a professor in the Law School at the LSE. Julia Black, a colleague, was also working with the SRC and they had asked her to join the management committee, "and I got really interested in this because there's an aspect to my own work that connects to systemic risk. I write about security settlement systems and digital assets,[7] that we know have significant implications for risk and financial stability."

Micheler has since co-authored research with SRC members on the capital markets union, Brexit and regulatory technology, among others. "I enjoy the SRC because it's interdisciplinary and was at the cutting edge of what was going to happen. A lot of the things that we discussed, became part of the public discourse years later. At events, we were talking about the things years ago that you read in the *Financial Times* now.

"Very early on, I was talking about my work, and JP said, 'Why don't you look into Bitcoin?' And that was in 2014. The SRC forces you to adopt a perspective outside of your own space. They were looking at cryptocurrencies, thinking, 'What is this? Is this money?', and maybe didn't think that there could be something called a digital asset. But of course, I was doing work on those assets, and so when we spoke, that connection was made. And so, there's a lot of academic return from just talking to people at a high level, with a very different perspective, although nobody's trying to push any view of the world on you."

Ann Law, Oana Crenicean-Tudoran

A catalyst for this increasing momentum was **Ann Law**, the SRC manager, who joined in September 2013 to organise and direct this rapidly expanding and diverse group of researchers. Chwieroth says: "She had been central in terms of the support she provided. She still makes the whole thing hang together. She's the organisational glue."

Law's function was to help channel the energy, making sure the staff and visitors had what they needed for their work. Sometimes this meant helping to frame grant applications, other times to help pull together an increasingly crowded schedule of events, seminars, presentations and meetings that the indefatigable SRC researchers wanted to launch.

In a small and tightly defined community, these events quickly became must-see shows, pulling in regulators, bankers, politicians and academics.

"I could feel the excitement. They could talk to people outside academia," Law remembers, "The directors were just driven. They still are. They had a particular energy, but there were also so many things that they needed to set up. Governance, for example: when I arrived, I had to finish setting up the advisory board." This board would be chaired by **Prof Robert (Bob) May, Lord May of Oxford**, who was succeeded by **Sir John Beddington**.

Were any of the characters difficult to manage?

"How much time do you have? But people treat other people with respect. In the academic world, administrative staff are often thought of as different to the people who do the research. But we were always treated with respect."

Sir John Beddington

"The directors were just driven. They still are. They had a particular energy, but there were also so many things that they needed to set up."

7 A digital asset exists only in digital form and comes with a distinct usage right, or distinct permission for use. So, cryptocurrencies and non-fungible tokens (NFTs) are digital assets, but so are some data, art and even software.

"They were aware of the limitations of academics, and the directors thought you should complement them with practitioners that bring fresh air and new ideas from outside."

Practitioners welcome

In 2015, a move to premises at 95 Aldwych, facing the Strand in central London, seemed to reinforce the eclecticism of the SRC's researchers: offices on the edge of the LSE estate, facing outward, on a direct route to the City of London and the Bank of England. Visitors at this time could bump into author and journalist **Sebastian Mallaby**, Paul A. Volcker senior fellow for international economics at the Council on Foreign Relations, who was making use of the offices to research his book on Alan Greenspan,[8] or even **Michael Piwowar**, commissioner of the US Securities and Exchange Commission, and himself a former academic researcher in market microstructure, who visited during his trip to London in December 2013 to discuss the systemic risks hidden in forthcoming regulations and changes to the market structure.

Or **Brunello Rosa**, who JP had taught when he was a master's student at LSE, and had gone on to become managing director and head of research at Roubini Global Economics and CEO and head of research at Rosa and Roubini Associates.

After a lunch meeting with JP, Rosa was invited to be a part of the SRC community in 2013, and he is still part of it a decade later. The SRC publishes on shorter timescale, closer to what he is accustomed to at this firm, rather than an academic schedule that might be measured in years rather than weeks.

"The thing I have always liked about the SRC was that they really wanted input from practitioners. They were aware of the limitations of academics, and the directors thought you should complement them with practitioners that bring fresh air and new ideas from outside."

Yves Mersch

"We often had good discussions, not always concurring ideas – but I value people who do not automatically say the same as I say."

Kevin James

Another link to the world of policy was **Kevin James**, involved as a researcher from day one, while he continued to work in the Policy, Risk and Research Division at the Financial Conduct Authority. "I thought it would be useful to have the SRC to help make financial markets work better. The FMG is a fantastic place for finance in general, but a lot of their focus isn't really on the regulatory aspects of financial markets … the SRC is much more focused on making financial markets work well."

The SRC is also a place where James has benefited from the rapid turnaround of research, featuring in conferences and distributed to practitioners in working papers as soon as it is written. "A lot of financial research is basically R&D for hedge funds. It is useful in a sense, but it's not central to what finance is about. You see eight zillion papers on finding new factors for predicting asset pricing, which is extremely valuable for some people because they can beat the market and make a ton of money and stuff. From the sense of making the world a better place, it's pretty second order compared to making financial markets work better."

When the SRC opened for business, **Yves Mersch** was a member of the Executive Board at the European Central Bank, where he remained until 2020. He knew Danielsson from discussions on the Icelandic banking crisis, and Zigrand from his earlier research, that led him – as the then governor of the Central Bank of Luxembourg – to ask JP to become a board member of the Luxembourgish Central Bank Foundation, and accepted an invitation to join the scientific advisory board of the SRC.

He values the independence and commitment of the SRC, for which he remains a board member, 10 years on. "I always interacted with Jon and JP when I came to London. We often had good discussions, not always concurring ideas – but I value people who do not automatically say the same as I say. Their contribution is to have to be ready to make a *tabula rasa* of the past, to try to have a new approach."

8 Mallaby, Sebastian. 2016. *The Man Who Knew: The Life and Times of Alan Greenspan*. New York: Penguin Press. ("A masterful biography" – *The Wall Street Journal*)

The flash crash

At 14:32 EDT on 6 May 2010, Waddell & Reed Financial, a Mutual Fund company, attempted to execute a sell order of S&P 500 futures contracts. The automated order was worth $4.1 bn, which absorbed all the buyers in the market, triggering a sharp drop in prices. This triggered automated selling by other funds, and caused others to stop trading altogether, removing liquidity. By 14:49, the Dow Jones Industrial Average (DJIA) had lost 9% of its value. Although it rebounded to limit losses to 3.2% by the end of the day, the "flash crash" spooked regulators and governments to investigate whether automated trading, and high-frequency trading (HFT) in particular, were a risk to financial stability.

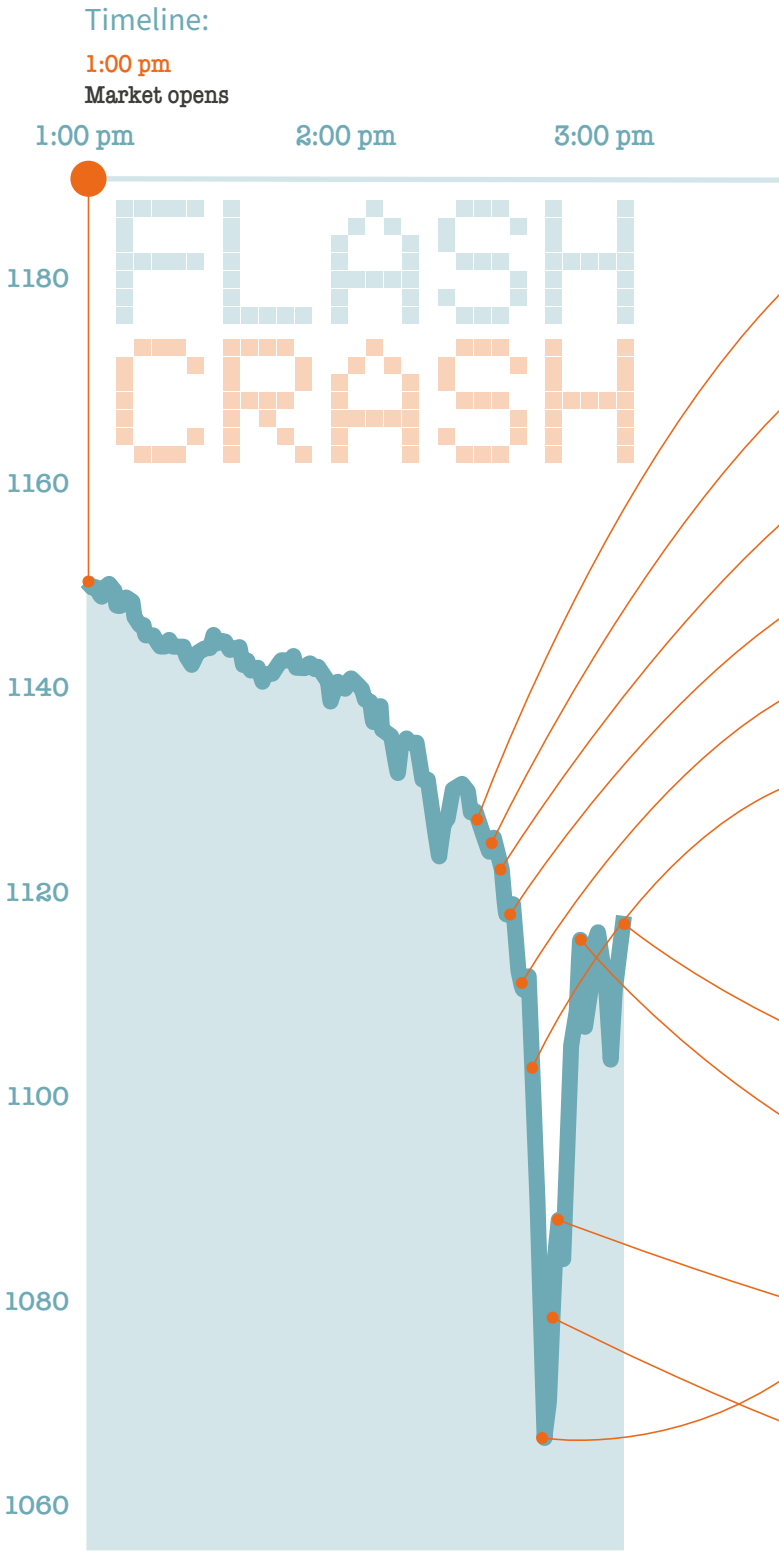
HFT was considered a particular risk because it employed algorithms to react immediately to tiny market movements, making large trades without human intervention (at the time, data centres located close to stock exchanges could charge a premium for use of their servers by traders, as the buy and sell messages from them would arrive – at the speed of light – fractionally before those sent from other locations).

The UK government, worried that similar flash crashes would destabilise London's financial sector, launched an investigation in 2010. Jean-Pierre Zigrand and Charles Goodhart, before the establishment of the Systemic Risk Centre (SRC), were two of the investigators who helped to write its Foresight Report in 2012.[9]

The report was led by Sir John Beddington, at that time, the chief scientific advisor to the UK government. "Zigrand was one of the most analytical people there, and he wrote one of the key chapters in the report," he recalls. The admiration was mutual: Sir John would later succeed Bob May as chair of the SRC scientific advisory board.

HFT was another potential source of systemic risk that many of the soon-to-be staff of the SRC did not think was getting sufficient attention. "It is a systemic crisis in the sense that the system of investing and allocating resources in the stock market breaks and could be broken for a while. And if the flash crash had happened on Friday evening at 5pm, who knows what would have happened?", Zigrand warns.

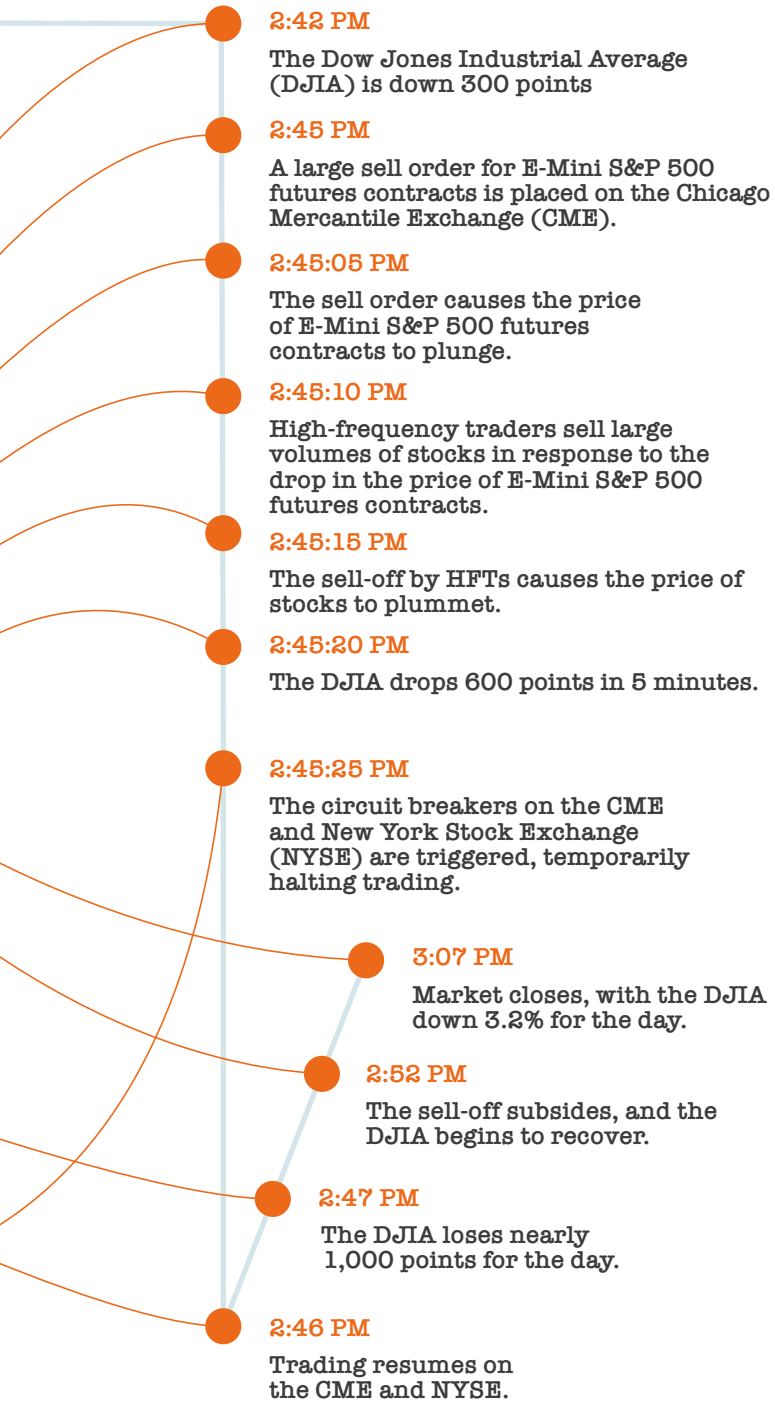
Given this, why does HFT exist at all? "When banks had their own trading desks, they could hold positions that were imbalanced for a while because they had the resources to



Source: Financial Crisis Inquiry Commission (FCIC)

9 The Government Office for Science. 2012. *Foresight: The Future of Computer Trading in Financial Markets. Final Project Report: Executive Summary. London.*

The possibility that an extreme event caused by HFT will integrate with trading algorithms to create a potentially systemic event exists and is not measured well.



do that. Now banks can't be in that business. They don't have the balance sheets to hold those positions. So the problem is that speed has replaced capital. Furthermore, regulations in both Europe and the US were introduced to create competition between exchanges. This gave rise to a multitude of competing trading venues trading the same assets, creating the possibility of momentarily misaligned prices across venues that fast players could exploit."

The Foresight Report accepted that computer-based trading (CBT) made prices more responsive, increased liquidity and reduced transaction costs – and that algorithmic trading did not seem to have increased volatility. But it warned of the risks that a lack of market transparency could pose. In short: speed was not a perfect substitute for capital, but policies that tried to constrain speed in the name of risk management may have been worse.

At that time, the EU was drafting an update to its Markets in Financial Instruments Directive (MiFID). MiFID II increased transparency in financial markets, protect investors and reduce systemic risk. But by December 2016, when the European Parliament was due to vote on it, Zigrand and the other researchers in the SRC knew there were flaws in the way the regulation was to treat HFT – by slowing trades down – that might destabilise financial markets. "We spoke to the Economics Committee of the European Parliament on the eve of the vote," he says, "and the text that was voted on the next day, it was different."

Is CBT a systemic risk? The review also considered whether computer-based trading created a risk to the financial system, rather than to the profits of firms. The question depended on whether, adding together all CBT activities, the outcome resembled random noise, or not. If it did, then sudden movements would have little impact on systemic risk. If not, then this was a possibility.[10]

On the one hand, the flash crash was over inside a day, as algorithms used dips in prices to buy, reining in prices again. There was no extreme outcome, though there was extreme volatility for a short time. Jon Danielsson and Ilknur Zer made the argument that this could imply that HFT made crises less likely, as extreme events are self-healing.

On the other hand, CBT may add liquidity to markets only in good times, and reduce it when there are sudden movements, amplifying shocks and reducing the capacity for self-healing. The feedback loops from algorithmic trading by many firms may also act extremely fast, increasing herd behaviour and perhaps leading to knock-on effects such as forced selling.

The final problem: most measures of systemic risk used by market participants are not looking in the right direction. They focus on daily price dynamics and on the risk of events in the 1% range – events that happen several times a year. These risks, while bad for profits, are not systemic. The possibility that an extreme event caused by HFT will integrate with trading algorithms to create a potentially systemic event exists and is not measured well.

10 Danielsson, Jon, and Ilknur Zer. 2010. "Systemic risk arising from computer-based trading and connections to the empirical literature on systemic risk." Review commissioned as part of the UK Government's Foresight Project.

Bob May
1936–2020

When the Systemic Risk Centre (SRC) was looking for a chair for its advisory board, it could not have chosen a more inspirational figure than Lord May of Oxford or, as his colleagues knew him, Bob May, who died in April 2020.

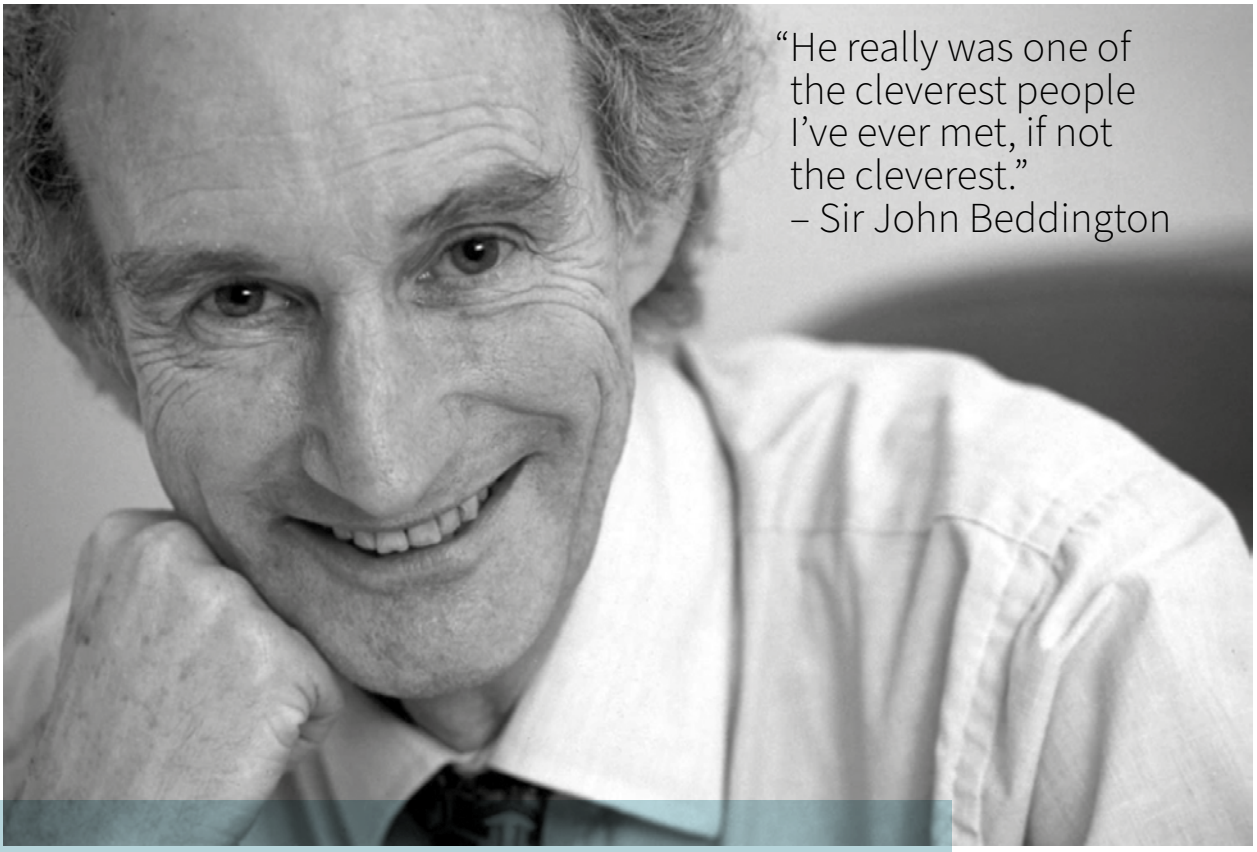
May had dedicated his academic life to analysing complex systems, inspiring him to innovative work in modelling topics such as biodiversity and the spread of infection. His imagination knew few limits: he had originally studied pure maths, applied maths, physics and chemistry in Sydney and later at Harvard. Despite a well-known impatience with bureaucracy, May served as a successful chief scientific advisor to the UK government between 1995 and 2000. Afterwards, he also became the president of the Royal Academy and is the only person to have held both posts.

By 2008, his restless mind had begun to apply his insights to financial systems. In 2008, as the global financial crisis hit the world's financial markets, he co-authored "Ecology for bankers",[11] arguing that:

"'Tipping points', 'thresholds and breakpoints', 'regime shifts' – all are terms that describe the flip of a complex dynamical system from one state to another … These days, the increasingly complicated and globally interlinked financial markets are no less immune to such system-wide (systemic) threats."

May's ability to think creatively in many disciplines, his intellectual rigour, and a willingness to speak truth to power made him the perfect choice as the Chair of the advisory board for the first three years of the SRC's existence. He was also credited as being the first person to say "bullshit" in the Cabinet Office.

"Bob was certainly the leading ecologist and mathematical biologist of his generation," says Sir John Beddington, a former colleague who also served as chief scientific advisor to the UK government before taking over from May as the SRC board chair. "He really was one of the cleverest people I've ever met, if not the cleverest."

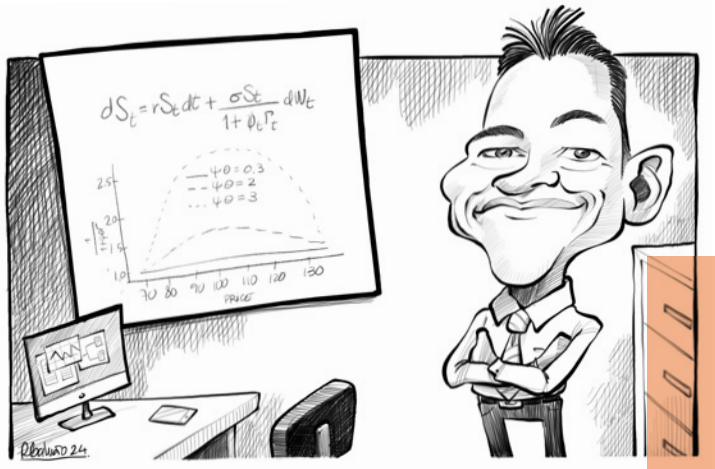


Lord May of Oxford or, as his colleagues knew him, Bob May

11 Robert M. May, Simon A. Levin, and George Sugihara. 2008. "Ecology for bankers." *Nature 451: 893–894.*

The directors of the SRC
Jon Danielsson and Jean-Pierre Zigrand

Jon Danielsson



Jean-Pierre Zigrand

"I became an economist at the age of 16," Jon Danielsson remembers. As a teenager, he would go to his local library in Iceland and read every book about how society worked that he could get his hands on. Unconvinced by *The Communist Manifesto* by Friedrich Engels and Karl Marx, he found *The Road to Serfdom* by Friedrich Hayek (1944), newly translated into Icelandic in 1979, much more interesting. Hayek's argument was that affluent democracies had mistakenly tried to ensure prosperity by adopting centralised planning, which inevitably leads to totalitarianism. Hayek argued that a single agent, even a powerful planner, could know only a small fraction of the knowledge held by all the members of society, and that markets were a way to pool that knowledge.

The Nobel Laureate, then aged 81, was invited to visit Iceland in April 1980. And so the teenage Danielsson got to meet the author of *The Road to Serfdom* over lunch. "That set me on my road," he says.

Danielsson became a member of the faculty at the London School of Economics (LSE), where Hayek had spent most of his professional life. Hayek's ideas on the limits of central planning have continued to influence Danielsson's thinking about the complexities of understanding and regulating the financial sector. "I realised it is the most complex of all human constructs," he recalls.

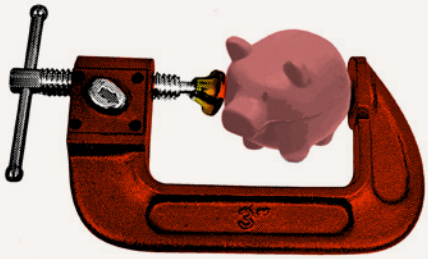
"Astonishingly, the very financial regulations and risk management practices that are meant to keep banks safe, protect our pensions, and prevent crises are so often based on nothing more than day-to-day price fluctuations."

A decade after Danielsson's lunch with Hayek, Paul Mandy, one of Zigrand's undergraduate teachers at UCLouvain in Belgium, set him on his personal road. "He wasn't a famous academic. He didn't often publish in the great journals, but he taught a course on economic systems. And that course is the one that opened my eyes to the fact that I didn't truly understand economics. I was just very good at solving those little problems. When Herakles Polemarchakis then taught me General Equilibrium Theory in my undergraduate degree, things fell into place and I knew that rigour and beauty could be brought to the understanding of economic systems.

"And that has become my bugbear with economics: we're working a lot on small, often irrelevant problems, which are well posed," he says, "But the world isn't like that. Most teachers don't allow you to step back to see how all the things fit together, how they combine to create the system."

His PhD research at the University of Chicago under the guidance of creative thinkers such as José Scheinkman, Milton Friedman, Gary Becker, Robert Lucas Jr, Thomas Sargent, Merton Miller, Lars Hansen, Pierre-André Chiappori, Tano Santos and Raaj Sah, among others, taught him to be suspicious of neat macroeconomic equilibria driven by a representative agent, and that interesting and real-world systems have outcomes that are unexpected and – in Friedman's words – often opposite to what is true at an individual level.

"You have to consider all the feedback loops, and the banks' influence on firms and real estate, and firms' influence on the banks, and on taxes, and on interest rates and the exchange rate, and in turn on banks … we need to accept that the world is big, and it's messy."



Year by year

2013

2013
Does risk management amplify business cycles?
SRC Discussion Paper 1 and journal article

The paper highlights the role of using the common bank measure of Value-at-Risk (VaR), which determines how risky its lending is. VaR fluctuates significantly over the financial cycle, but the VaR-to-equity ratio shows more modest fluctuations, suggesting that there is risk shedding during market stress.

This implies that intermediaries withdraw credit precisely when the financial system is most stressed. The way they are measuring risk and responding to it potentially amplifies economic downturns.

Adrian, Tobias, and Hyun Song Shin. 2014. "Procyclical leverage and Value-at-Risk." *The Review of Financial Studies* 27(2): 373–403.

Hyun Song Shin

2013
What are the political challenges of the macroprudential agenda?
VoxEU opinion piece

Central banks are now tasked with developing and deploying macroprudential policy tools.

When the Bank fights inflation, it has a single statistic, and (overwhelmingly) one tool with which to do it – interest rates. The same isn't true of macroprudential policy. There are other institutions involved, leading to political intervention, which then leads to poor policy choices.

Danielsson, Jon, and Jeffrey Chwieroth. 2013. "Political challenges of the macroprudential agenda." VoxEU.org, 6 September.

2013
Is it a problem that different banks measure risk differently?
VoxEU opinion piece

In 2013, both the European Banking Authority and the Bank for International Settlements[12] worried that banks had risk models, that gave different risk assessments. Both wanted to harmonise models across the industry.

Based on earlier insights of SRC researchers,[13] Jon Danielsson argued that this was "plainly wrong … Moves towards model harmonisation further destabilise the financial system by making it more procyclical and increasing moral hazard."

"What causes bubbles and crashes is herd behaviour," Danielsson says, "Everybody doing the same thing, everybody buying at the same time, and then everybody's selling at the same time … regulators are telling banks to think about risk in the same way and react to it in the same way. Let banks think about risk in their own way and react to it in their own way."

Danielsson, Jon. 2013. "Towards a more procyclical financial system." VoxEU.org, 6 March.

12 Bank for International Settlements. 2013. "Report on the regulatory consistency of risk-weighted assets for market risk issued by the Basel Committee." www.bis.org, 31 January.
13 Danielsson, Jon, Hyun Song Shin, and Jean-Pierre Zigrand. 2010. "Risk Appetite and Endogenous Risk." FMG Discussion Paper 647, Financial Markets Group.

2014

2014
How do we define systemic risk?
SRC Special Paper 1

Before defining systemic risk, one ought to understand what a system is. A price system is different from a population of prices; a banking system distinct from a collection of banks; and an international monetary system different from a set of local monetary arrangements because of a central concept, relationships between elements, and an identity that is preserved when evolving.

One problem with systemic risk was that there was no universally accepted definition. The first special paper from the SRC established a rigorous definition of what systemic risk is. This definition captures the everyday meaning of the risk to the proper functioning of the system, possibly altering and damaging the structure of the system; and the risk created endogenously by the system through forces that drive the build-up of the systemic event, or forces that are responsible for the destructive transitions in the damaged system once the systemic event is realised. These include positive feedback loops and/or cascades within the system that cannot be adequately kept in check.

Zigrand, Jean-Pierre. 2014. "Systems and Systemic Risk in Finance and Economics." SRC Special Paper 1.

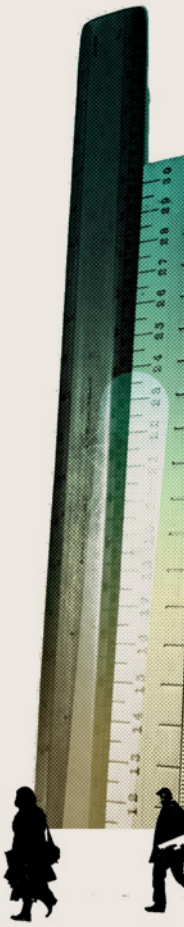
EVENT
What will cause the next crisis?
28 January 2014

"I'm going to give you the date of the next crisis," promised Charles Goodhart at the first SRC event of 2014.

"I have lived through three major financial crises in the UK, and all of them were driven by standard bad retail banking: lending excessively on property with massive credit expansion behind that. What would cause it? Behaviour: after a bust, it takes five years to recover. Then you have eight years of recovery. By that time, the leaders of financial institutions have made money in the period on property and then are put in charge.

"We've understood crises for at least 150 years. But regulators look at what happened in the past, while banks are forward looking," Danielsson added. "Banks look at regulation as a manual for where the regulators are not looking, and so where to take risk."

What is that date? "Mark down in your calendars that the next crisis is going to occur in 2025–26," Goodhart warned us in 2014, "It may be a very nasty one altogether."



The Next Crisis, 28 January 2014

EVENT

What does ecology teach economics about modelling existential threats?

8 August 2014

This conference, exploring the links between the two sciences of interactions – economics and ecology – was an immediate validation of the SRC's approach to systemic risk. The speakers sought useful ideas in ecology to apply in economics, and vice versa. Economics could, for example, learn about how ecological systems sustain themselves.

Among the presenters, Bob May, at that time part of the Zoology Department at the University of Oxford discussed the relationship between food networks in ecological systems, and interbank relationships. Derivative markets are complex, with unobservable structures. Ecological science tells us that, in the natural world, structures like those are prone to become unstable.

Eco**2 exploring the fundamental links between ecology and economics, 8-10 September 2014

2015

2015
Is there excessive marking to market?

SRC Discussion Paper 51 and journal article

There are two ways to decide value: marking to market by basing the value on public data or basing the value on its realisation value through a costly resale to an informed buyer (taking to market).

Noisier market data leads to cost accounting and gains trading (selling winners/keeping losers), whereas accurate data naturally favour market-value accounting. The authors found that there is excessive use of market-value accounting. This dries up market liquidity and makes price signals less informative.

Plantin, Guillaume, and Jean Tirole. 2018. "Marking to market versus taking to market." *American Economic Review* 108(8): 2246–76.

2015
How does financially constrained arbitrage affect portfolio risk?

SRC Discussion Paper 32 and journal article

The authors develop a model in which arbitrageurs' limited access to capital affects the functioning of financial markets and where the mobility of the arbitrageurs' capital creates contagion.

Gromb, Denis, and Dimitri Vayanos. 2018. "The dynamics of financially constrained arbitrage." *The Journal of Finance* 73(4): 1713–50.

Dimitri Vayanos

EVENT
Would a European Capital Markets Union (CMU) reduce systemic risk?

23 February 2015

On 18 February 2015, the European Commission published the green paper "Building a Capital Markets Union"[14]. "To strengthen investment for the long term, we need to build a true single market for capital – a Capital Markets Union for all 28 Member States," it explained.

Five days later, an SRC event organised jointly with Goldman Sachs brought together the worlds of finance, academia and politics. On the stage at the "Dialogue on creating an EU Capital Markets Union" were: Andrea Leadsom, UK Economic Secretary to the Treasury, MP and Parliamentary State Secretary; Steffen Kampeter from the German Federal Ministry of Finance – plus, among others, Sir Jon Cunliffe, Deputy Governor, Bank of England; Yves Mersch, Member of the Executive Board, European Central Bank; Jim Esposito, Co-Head of the Global Financing Group, Goldman Sachs International; and Jonathan Faull, Director General, Financial Stability, Financial Services and Capital Markets Union, European Commission.

And to mark the occasion, the SRC published a cautious welcome to the CMU.[15]

"A well-functioning CMU will be a valuable addition to the existing banking-based regime, increasing the resilience of the system, provided that capital flows are monitored, and the rules are robust while discouraging pro-cyclicality. By expanding the range of different financing routes and decreasing dependence on banks, a CMU ought to reduce systemic risk for any given level of debt."

Dialogue on creating an EU Capital Markets Union, 23 February 2015

14 European Commission. 2015. *Building a Capital Markets Union*. 18 February.

15 Danielsson, Jon, Eva Micheler, Katja Neugebauer, Andreas Uthemann, and Jean-Pierre Zigrand. 2015. "Europe's proposed capital markets union: Disruption will drive investment and innovation." VoxEU.org, 23 February.

2016

2016
Does it make sense to hold bonds?
VoxEU opinion piece

In 2016, investor demand for bonds was very high.

Its analysis shows that holding bonds would have a negative real return in any scenario, but the low-inflation, low-interest-rate environment that holders were betting would persist. In the words of this prescient opinion article, "Some commentators argue that low interest rates are here to stay, but we see no convincing reason to agree."

Jon Danielsson, Robert Macrae, and Balazs Csullag. 2016. "Why it doesn't make sense to hold bonds." VoxEU.org, 27 June.

2016
Does non-resaleable debt increase systemic risk?
SRC Discussion Paper 53 and journal article

Debt claims, such as bonds, are resaleable. Some, such as repos, are not. There was a fivefold increase in repo borrowing before 2008. Did this help create the crisis?

The authors show that, when credit market frictions decrease, there is an increase in borrowing using non-resaleable debt. This causes credit chains to form, because if a bank makes a loan via non-resaleable debt and needs liquidity, it cannot sell the loan. It must borrow via a new contract.

These credit chains are a source of systemic risk.

Donaldson, Jason, and Eva Micheler. 2018. "Resaleable debt and systemic risk." *Journal of Financial Economics* 127(3): 485–504.

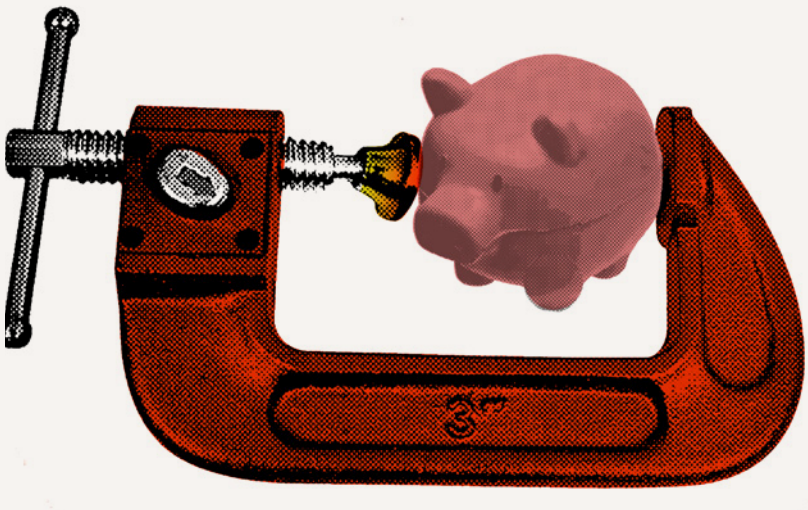
EVENT
Do bank stress tests capture endogenous risk?
15-16 December 2016

In 2009, the Federal Reserve Board of Governors and the Federal Deposit Insurance Corporation (FDIC) introduced the Supervisory Capital Assessment Program (SCAP).

In 2016, the Monetary and Capital Markets Department (MCM) of the International Monetary Fund (IMF) and the SRC launched a collaborative research programme into macroprudential stress testing. In December 2016, the SRC and IMF presented their work in progress in Washington DC, at the symposium titled "Macroprudential Stress Test and Policies: A Framework".

"The practice worldwide in the past few years since the global financial crisis has told us that stress tests are an effective way to understand the dynamics of the crisis," said Tao Zhang, IMF Deputy Managing Director, "But first we need a good framework for stress tests." The report on that framework would follow in 2018.

Tao Zhang



2016
Is cyber risk a systemic risk for the financial system?
VoxEU opinion piece

"Cyber resilience is an essential component of the overall risk management framework of a financial market infrastructure," warned the Bank for International Settlements (BIS) Committee on Payments and Market Infrastructure in 2014.

Does the SRC's work imply that cyber risk really is systemic? In a word: no.

Clearly, if systems fail because of a cyber-attack, the consequence would be a loss of confidence, disappearance of liquidity, and hence, ultimately, a systemic crisis. But is this likely? We must believe that the financial edifice is at genuine risk of collapsing for a crisis to really turn systemic. A cyber-attack is an exogenous risk. There is no direct connection between the failure of computer systems, no matter how severe, and the behaviour of those economic agents that ultimately culminates in a systemic crisis. A massive, successful cyber-attack might undermine confidence, but would not be systemic unless the underlying conditions – excessive risk-taking in the system – were likely to amplify the impact. The only agents likely to launch an attack of that scale, and time it to create systemic impact, would probably be nation states.

This is possible, but those states could more easily create systemic crises through other means, for example by refusing the repudiation of international liabilities. This could be accompanied by a cyber-attack, but it is not clear whether that would be necessary.[16]

Fouche, Morgane, Robert Macrae, and Jon Danielsson. 2016. "Cyber risk as systemic risk." VoxEU.org, 10 June.

Marcela Valenzuela and Ilknur Zer

16 Fouche, Morgane, Robert Macrae, and Jon Danielsson. 2016. "Cyber risk as systemic risk." VoxEU.org, 10 June.

2016
Do we know which banks are creating systemic risk?
Journal article

In the film *Minority Report*, the PreCrime Unit of the DC Police uses psychics to detect people who are about to commit crimes and then locks them up before they do so. This is tempting to the making of macroprudential policy: regulators punish banks whose behaviour would cause a crisis by making them improve their stability.

The device that the PreCrime Unit of the regulator uses is a type of riskometer – a single model for measuring the risk of a system, and reporting it. Four years before the SRC existed, Danielsson was already warning that these devices (all banks and regulators have some models for measuring risk, usually focused on the short term and on external events) were not suited to capturing systemic risk, which builds slowly and is driven by endogenous events.[17]

"Attempting to forecast prices or risk using past observations is impossible … When complicated models are used to create financial products, the designer looks at historical prices for guidance. If in history prices are increasing and risk is apparently low, that will become the prediction for the future. Thus, a bubble is created. Increasing prices feed into the models, inflating valuations, inflating prices more. This is how most models work, and this is why models are often so wrong," he wrote.

Seven years later, research[18] by Danielsson, Kevin James, Marcela Valenzuela and Ilknur Zer showed that this problem was an inherent flaw in bank regulation.

Their calculations indicated that, to have a lower cost to society than simply imposing high capital requirements on all banks, the reliability of the reading would have to be higher than 75%, far more than what bank risk models could achieve in their tests.

Danielsson, Jon, Kevin R. James, Marcela Valenzuela, and Ilknur Zer. 2016. "Can we prove a bank guilty of creating systemic risk? A minority report." *Journal of Money, Credit and Banking* 48 (4): 795–812.

17 Danielsson, Jon. 2009. "The myth of the riskometer." VoxEU.org, 5 January.

18 Danielsson, Jon, Kevin R. James, Marcela Valenzuela, and Ilknur Zer. 2016. "Can we prove a bank guilty of creating systemic risk? A minority report." *Journal of Money, Credit and Banking* 48 (4): 795–812.

2017

2017
Can AI regulate the financial system?

SRC Special Paper 13 and journal article

"Considering financial stability from the perspective of artificial intelligence (AI) really forces us to tackle two important questions," the authors explain. "First, how does it measure systemic risk? Second, if our objective is financial stability, what are the AI objectives?"

AI is rapidly changing how financial institutions operate and regulate themselves. It might appear that AI is perfect for managing the financial system. AI could potentially improve financial stability. In the future, the financial sector might not even need people to operate and regulate it. But is this realistic? Would AI mitigate systemic risk, or create it?

The more confined a problem is, the better AI is at solving it. And so, at the microprudential level, we have some answers: compliance with regulations and internal risk management focuses on day-to-day risk. But is it equally clear how AI, either in the hands of a regulator or a bank, would affect financial stability at the macrolevel? In at least four dimensions, it is not.

Procyclicality. "Price data tends to be calmer in upturns than in downturns, and any backward-looking, data-driven process, including the machine learning that feeds AI, will identify risk as being low in quiet times and high after a crisis," Danielsson explains. Every bank's AI has access to the same data, has broadly the same risk management objectives and works within the same regulatory structure. AI-driven decision-making will inevitably become more similar at institutions. Markets will become more volatile as trades become crowded.

Unknown unknowns. An AI-based regulator would optimally be trained using data from previous crises, but those crises have been rare and unique. Unforeseen contingencies – "unknown unknowns" – are precisely the reason that crises are dangerous and hard to predict.

The need for trust. To be efficient, AI must have some autonomy. Even if this is selectively and slowly granted, it's the endgame. We trust the computer. But is this wise when the stability of the financial system is at stake? It is impossible to tell AI what is "right" in all situations.

Optimisation against the system. "AI-based regulation might become more fragile," Uthemann warns, "because other market participants now know exactly how you measure risk and will change their behaviour accordingly. It's not the fact that you measure, it's the fact that you measure and regulate. When a central bank regulates, it changes the behaviour of financial market systems." Agents may view an AI-based regulator as an opponent to overcome if they seek to maximise their gains only subject to regulation and their internal risk limits.

In 1974, Charles Goodhart predicted this problem in what has become known as Goodhart's Law:[19] "Any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes."

With AI-based regulation, the long term is no better than the short term, SRC warns: "The longer we leave a macro-AI in charge, the harder it will be to switch it off. Its knowledge of the financial system and internal representation of data will become unintelligible to humans."

Danielsson, Jon, Robert Macrae, and Andreas Uthemann. 2022. "Artificial intelligence, financial risk management and systemic risk." *Journal of Banking & Finance* 140(106290).

19 Goodhart, Charles. 1974. Public lecture at the Reserve Bank of Australia.

2017
Can we do a better job of forecasting exchange rates?
SRC Discussion Paper 75 and journal article

The principle of uncovered interest parity (UIP) predicts that expected exchange rate movements offset interest rate differentials and equalise expected returns across currencies. But, in the real world, this prediction fails.

Using data licensed to the SRC from Markit, the authors present a new forecasting variable for exchange rates that is based on the prices of quanto index contracts.

The quanto forecast is a statistically and economically significant predictor of currency appreciation and of excess returns on currency trades. When used to test differential currency appreciation out of sample, it outperforms predictions based on UIP, on purchasing power parity, and on a random walk.

Kremens, Lukas, and Ian Martin. 2019. "The quanto theory of exchange rates." *American Economic Review* 109(3): 810–43.

2018

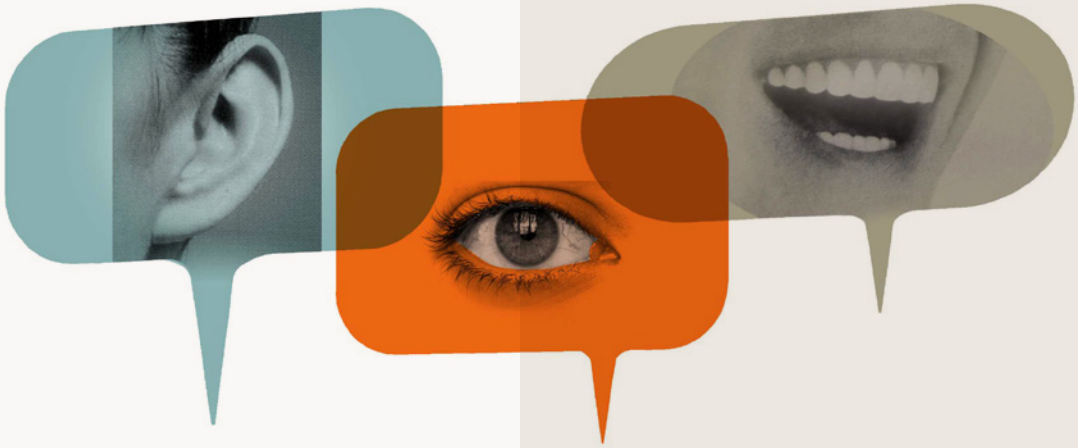
Miguel Segoviano

2018
Can regulators improve stress test regimes?
SRC Special Paper

In 2016, the Monetary and Capital Markets Department of the International Monetary Fund (IMF) and the SRC launched its collaborative research programme into macroprudential stress testing. The report was published in 2018.

In the introduction, Tobias Adrian, Director of the Monetary and Capital Markets Department at the IMF, explained that "We must remain mindful of the speed and magnitude at which contagion could spread, and how relatively small initial losses could get amplified to systemic proportions with severe socio-economic consequences … Well-designed stress tests can generate valuable information for policy makers to identify macro financial vulnerabilities that can form the basis of prudential policies."

Anderson, Ron, Chikako Baba, Jon Danielsson, Udaibir S. Das, Heedon Kang, and Miguel Segoviano. 2018. *Macroprudential stress tests and policies: A framework*. SRC/IMF report.



2018
Is stability destabilising?
SRC Discussion Paper 57 and journal article

In his work that so influenced the SRC, Hyman Minsky observed that "stability is destabilising".[20]

This means that one of the best predictors of a financial crisis being around the corner should be when we think conditions are safe and risk is low. But Minsky did not have detailed data. In 2018, a paper published by the SRC demonstrated for the first time that stability is indeed destabilising.

When volatility is low, we cannot directly measure risk, but we can infer that it is also low. And so, we are likely to be over-optimistic in our risk-taking behaviour.

To find out if low volatility predicts a crisis, the authors took a long view. The sample covers 60 countries and 211 years, resulting in 3,700 country and year observations. They found that the level of volatility does not predict a crisis: when markets are turbulent; it doesn't mean something terrible is about to happen.

But long periods of low volatility, especially of five years or more, predict a crisis. The signal is strong enough to be used as a predictive indicator by regulators.

The conclusion for regulators: do not track volatility as an early warning indicator of a crisis. Track its absence.

Danielsson, Jon, Marcela Valenzuela, and Ilknur Zer. 2018. "Learning from history: Volatility and financial crises." *Review of Financial Studies* 31(7): 2774–2805.

20 Minsky, Hyman. 1975. "The financial instability hypothesis: A restatement." *Journal of Economic Issues* 9(1), 57–84.

EVENT
Should regulators be more accountable to the public?
23 May 2018

"Our societies [are] not being careful enough about what should be delegated to unelected officials … Central bankers are now the poster boys and girls of unelected power," warned Paul Tucker of Harvard Kennedy School, and a former Deputy Governor of the Bank of England, at an SRC hosted book launch for *Unelected Power: The Quest for Legitimacy in Central Banking and the Regulatory State*.[21]

Tucker proposed principles for the delegation of power to unelected authorities, including clear statutory purpose, monitorable objectives, committee decision-making, constraints on life after leaving office, fair decision-making, and effective public accountability. This would put limits on the problems of technocratic over-reach.

For this reason, Tucker predicted a crisis in the governance of securities regulation. "I've got no idea whether it will be 20 years away," he warned, "or three years away."

21 Tucker, Paul. 2018. *Unelected Power: The Quest for Legitimacy in Central Banking and the Regulatory State*. Oxford: Princeton University Press.

2019

2019
How should national regulators deal with banks that are too big to fail?

FMG Discussion Paper 778 and journal article

The authors discuss resolution strategies for global banks by national regulators. There is a fundamental link between efficient bank resolution (single point of entry vs multiple point of entry), the operational structures, risks and incentives of global banks.

Bolton, Patrick, and Martin Oehmke. 2019. "Bank resolution and the structure of global banks." *The Review of Financial Studies* 32(6): 2384–2421.

EVENT
Engineering Financial Instability

2 December 2019

The Systemic Risk Centre joined forces with the Defence Science and Technology Laboratory (DSTL) to run an event titled Engineering Financial Instability. In a rapidly changing world which is increasingly interdependent and relies on evolving financial systems to underpin its economy, it is important to understand what threats or opportunities might exist for the UK and her allies across the globe. By considering the changing economic landscape, the UK can look to prepare against "future shock"; considering what threats it should be aware of, alongside what opportunities could be exploited to improve both the security and stability of the UK and her allies.

Engineering Financial Instability

2019
Do the middle classes increase systemic risk?

Book and journal article

"The middle classes have strong and intense preferences for government to provide them with wealth protection," Jeffrey Chwieroth, co-investigator at the Systemic Risk Centre (SRC) argues.

Wealth has been reshaping politics for decades: we can point to the impact of lobbying, the capture of politicians by billionaire CEOs – but we can also trace the influence of the middle classes, what Chwieroth calls "mass financialised wealth" in making financial sector bailouts more likely, creating rising financial instability – and contributing to political instability and polarisation.

"In democracies, incumbent politicians who fail to respond to voter demands or preferences will be voted out of office, so there are clearly incentives for politicians to respond to middle-class demands or preferences," Chwieroth says, "We're arguing that financial elite influence and power have always been there. What's changed is this decisive voting bloc of mass middle-class voters."

This has consequences for financial stability: rising political support for bailouts has increased moral hazard, because it has raised the incentives for financial institutions to insure against failure by acquiring increasingly complex and large balance sheets that are deeply connected to middle-class wealth. It has encouraged the government to intervene in a crisis, because it will be punished by voters if it sits on its hands.

Chwieroth, Jeffrey, and Alan Walter. 2019. *The Wealth Effect: How the Great Expectations of the Middle Class Have Changed the Politics of Banking Crises*. Cambridge: Cambridge University Press.

Chwieroth, Jeffrey, and Alan Walter. 2019. "The financialization of mass wealth, banking crises and politics over the long run", *European Journal of International Relations* 25(4): 1007-1034.

2020

2020
Do consensus pricing services reduce uncertainty?
SRC Discussion Paper 98

Trading is not the only mechanism that generates prices. A popular type of mechanism in financial markets is consensus pricing. Consensus pricing reduces its subscribers' uncertainty about competitors' valuations.

The authors used data from the over-the-counter market for S&P500 index options, sourced from SRC partner IHS Markit (now S&P Global), to find empirical evidence of the ability of consensus prices to reduce valuation uncertainty. The research shows that consensus price feedback is important for reducing strategic uncertainty, particularly for extreme option contracts, for which there isn't much shared valuation information.

This shared understanding can be valuable during episodes of market stress where high levels of strategic uncertainty might otherwise cause derivatives markets to freeze.

Ergun, Lerby, and Andreas Uthemann. 2020. "Higher-order uncertainty in financial markets: Evidence from a consensus pricing service." SRC Discussion Paper 98.

2020
Is the wisdom of crowds a useful indicator of risk?
SRC Discussion Paper 99 and journal article

By the middle of 2020, predicting the severity and spread of COVID-19 was the focus of many research teams. Like all crises, it was extremely hard to measure its seriousness and extent while it was happening.

"Reliable prediction of contagion, growth and fatalities within countries and the regions in each country, before data is available and widely openly distributed, is essentially impossible," explained the authors.

The researchers took openly available geolocated data from Twitter activity for Italian, Spanish and US regions to estimate the crowd's perception of the severity of the pandemic. Important for the analysis, the actual infection data wasn't available until after the social media reaction. Comparing tweet intensity with recorded COVID-19 deaths one month later, they found that this could correctly predict the intensity of the pandemic one month ahead. The intensity of COVID-19-related Twitter activity correctly identified the localities most affected by the pandemic in each country: Lombardy, Madrid and New York.

Turiel, Jeremy, Delmiro Fernandez-Reyes, and Tomaso Aste. 2021. "Wisdom of crowds detects COVID-19 severity ahead of officially available data." *Scientific Reports* 11(1): 13678.

2020

2020
Did lockdown slow the spread of COVID-19?

SRC Discussion Paper 104

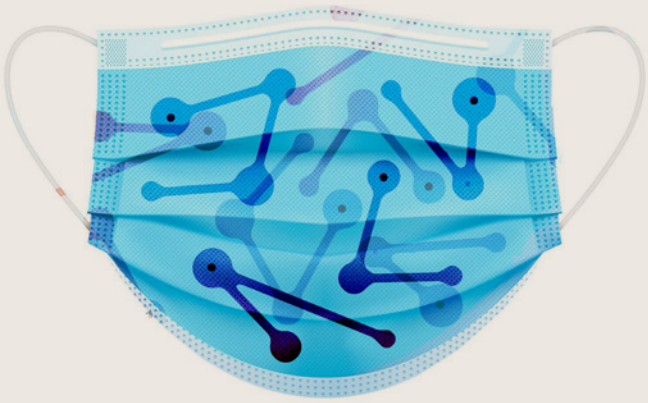
On 23 March 2020, the UK was placed in a national lockdown to slow the spread of COVID-19. The UK GDP fell in the second quarter of 2020, when the UK was in lockdown, by 20.4% compared with the previous three months. It was the largest quarterly decline since the record began in 1955. Was this economic disaster effective at slowing the progress of the virus?

The authors use a standard epidemiological model to simulate transmission within and between the populations of the 32 London boroughs that are connected via the commuting network.

Commuter network externalities accounted for about 42% of the propagation of COVID-19. The UK lockdown reduced total propagation by 57%, and more than a third of the effect was from the reduction in network externalities. The analysis suggests that, although the lockdown was late, further delay would have had more extreme consequences.

A targeted lockdown of a few highly connected geographic regions would have been equally effective, arguably with significantly lower economic costs. Targeted lockdowns based on the threshold number of cases are not effective, since they cannot account for network externalities.

Julliard, Christian, Ran Shi, and Kathy Yuan. 2023. "The spread of COVID-19 in London: Network effects and optimal lockdowns." *Journal of Econometrics* 235(2): 2125–54.



2021

2021
Are bigger banks better?

FMG Discussion Paper 821

Is the greater risk that banks become too big, or stay too small? Some policymakers argue that limits on bank size would reduce financial instability and excessive risk-taking. But if larger banks have economies of scale, then stopping banks from growing bigger could decrease the quality of financial services and reduce economic growth.

Post-war German bank reforms bank reforms determined when state-level banks could become national banks. Because relationships between banks and borrowers were strong in Germany, customers overwhelmingly remained in place after any changes, creating a quasi-experiment in which some banks became larger, and other similar banks did not.

The author shows that larger bank size does not always generate improvements in bank efficiency or profitability, nor in the growth of borrower firms. The news is worse for young, small firms – the type of firm about which it is hard for a large bank to find useful information, because much of it is gathered as part of the customer relationship. After their relationship banks got bigger, these firms grew more slowly.

Huber, Kilian. 2021. "Are bigger banks better? Firm-level evidence from Germany." *Journal of Political Economy* 129(7).

2021
Under what conditions are bank liquidity shocks amplified?

FMG Discussion Paper 734 and journal article

The colossal volume of bank payment inflows and outflows can cause intraday imbalances of enormous magnitude. To manage these, banks hold reserves, which can be lent to other banks.

If other banks also hold reserves, the interbank network will amplify a liquidity shock. A shock that depletes one bank's reserves negatively affects other banks, and there is a large reduction in the aggregate liquidity. In this case, bank reserve holding decisions are not strategic substitutes.

Using data from the UK payment system between January 2006 and September 2010, the authors find that the network multiplier was procyclical: before the financial crisis, the interbank network amplified shocks. A £1 shock equally spread across banks would cause a £5.37 shock to the aggregate liquidity. This shock declined to £1.43 during the crisis.

After introducing quantitative easing (QE) in the UK, the network became a buffer. A £1 shock to a bank generated a shock of £0.85 to aggregate liquidity.

Denbee, Edward, Christian Julliard, Ye Li, and Kathy Yuan. 2021. "Network risk and key players: A structural analysis of interbank liquidity." *Journal of Financial Economics* 141(3): 831–59.

2021
Is limited liability a moral hazard?

FMG Discussion Paper 835, VoxEU opinion piece and journal article

"The most extreme form of moral hazard is the limited liability of senior managers in the finance industry who have the power to control important decisions," Charles Goodhart says, "A CEO should have unlimited liability."

How do we eliminate the moral hazard without scaring senior management away from the financial sector? Goodhart and Rosa Lastra, of Queen Mary University School of Law, suggest creating a class of "inside" shareholders who are subject to multiple liability – that is, they are on the hook for a multiple of the initial book value of their shares if the company fails. These inside shareholders will be shareholders capable of monitoring and controlling management. The authors suggest that any shareholder with a holding of more than 5% is automatically an insider, for example.

There is historical evidence that making shareholders liable for losses can create different outcomes. The SRC research on banks in the Great Depression found that the distress rate of limited liability banks was 29% higher than that of banks with enhanced liability, suggesting that exposing shareholders to more downside risk can successfully reduce bank failure.

Goodhart, Charles, and Rosa Lastra. 2020. "Equity finance: Matching liability to power." *Journal of Financial Regulation* 6(1): 1–40.

Goodhart, Charles. 2021. "The moral hazard of limited liability." VoxEU.org, 30 July.

Aldunate, Felipe, Dirk Jenter, Arthur G. Korteweg, and Peter Koudijs. 2021. "Shareholder liability and bank failure." FMG Discussion Paper 835.

Rosa Lastra

2022

2022
Do we suffer from an "illusion of control"?

Book

"A systemic financial crisis is now more likely than ever," Danielsson argues, "Regulation has made us much better at managing fluctuations in today's measured risk driven by external events, but at the expense of undervaluing the endogenous risk in the system that may lead to systemic crises. The false sense of security that results is an illusion of control."

This *Illusion of Control* is the title of Danielsson's book. It brings together much of the SRC's work since 2013 (and the preparatory work beforehand).

Why is a crisis now more likely?

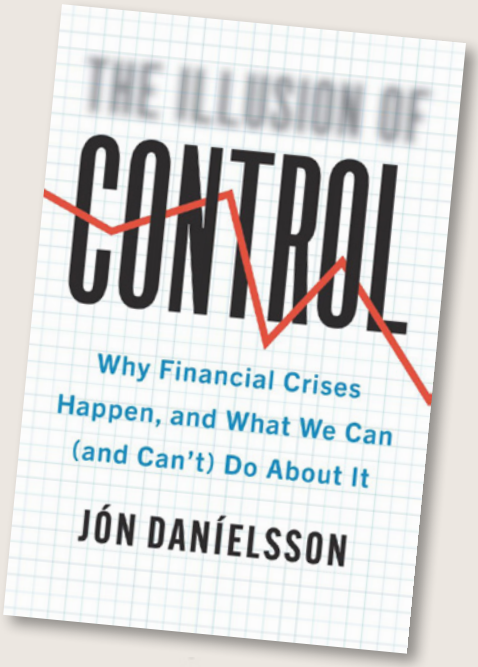
We don't agree on what risk is. When markets perceive risk to be high a reduction in capital flows and investment will slow growth in that year and the next. When we perceive risk as low, capital flows and investment will boost growth in that year and the next. But that is a perception of risk – we cannot observe risk directly – and so we need to know where that comes from.

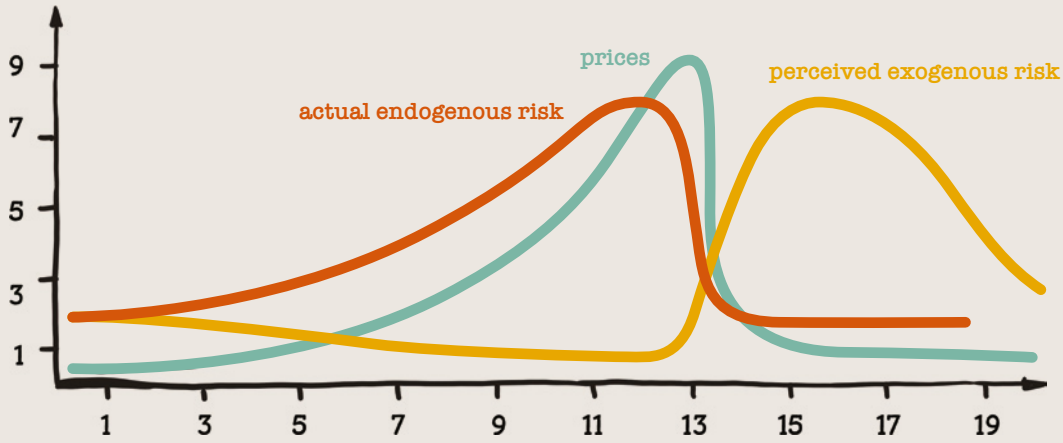
In this picture of financial market outcomes, the regulators desired policy outcome is fewer bad events and more good ones, that is, to thin the lower tail and fatten the upper tail.

The problem in achieving this is that practitioners and regulators don't agree on the problem. Regulators blame reckless yield-seeking, whereas the investors consider regulators to be over-focused on superficial measures of risk. We persist in the belief that actors in the market all have access to a single riskometer, a mythical device that can capture the true level of risk in the system and express it as a precise number.

It is futile to try to construct an accurate riskometer. Any measure of risk, even if it captures historical data accurately at high frequency, suffers from the problem that almost all the data that is fed into the model is irrelevant. We are interested only in rare, bad events, and so their importance and frequency are interpretations of model builders.

Because stability is destabilising, bank risk forecast models underestimate risk before a crisis (they are seemingly earning money for





nothing) and overestimate it after a crisis (there's too much price volatility). Therefore, our models are systematically wrong in all states of the world.

Solving the control problem.

Therefore, there is a trilemma in regulation. We cannot have all of stability, efficiency and uniformity.

Regulators choose efficiency and uniformity. Uniform regulation aims for fair competition. It focuses on measurable factors driven by exogenous events. Therefore, regulated entities will respond in similar ways to those events. It also addresses only a small part of the action because it ignores endogenous changes – the risk-amplifying reactions of market participants.

Less uniformity in regulation would create heterogenous financial institutions that are free to choose different responses to these events. This would help to increase the shock absorption capacity of the system, therefore improving automatic stabilisation.

The alternative, Danielsson argues in his book, is to continue to create regulation that is not fit for purpose. And, despite 15 years of well-intended regulation, that makes a systemic crisis more likely.

Danielsson, Jon. 2022. *The Illusion of Control: Why Financial Crises Happen, and What We Can (and Can't) Do About It.* New Haven, CT: Yale University Press.

2022
Are we running out of ideas?

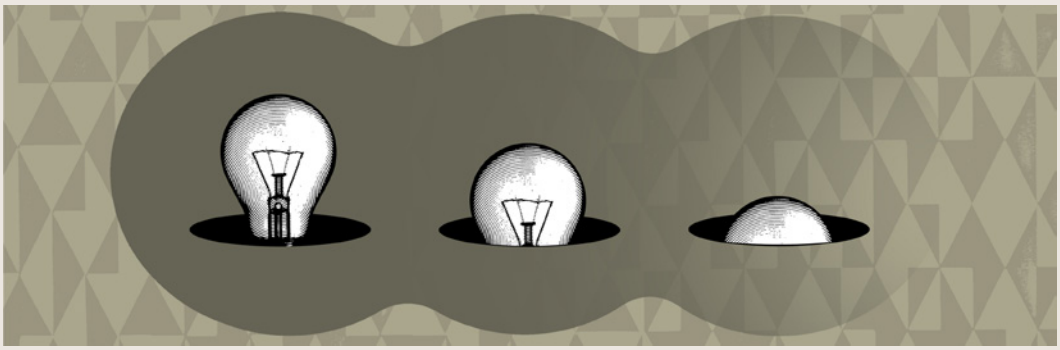
SRC Discussion Paper 121

Innovation requires both inventors with new ideas, and entrepreneurs to turn those ideas into new products or techniques. The constraint on productivity growth (measured as a term in economics called Total Factor Productivity, or TFP) may be the ability to take an idea and turn it into productive technology. If we want to examine how effective a country is at improving its productivity, both idea supply and idea processing capacity play a central role. The authors call this ability "innovativity".

They find that innovativity predicts the evolution of average US TFP growth over the last 120 years, and that idea processing capacity (rather than idea supply) is the binding constraint on innovativity.

While policymakers struggle to improve the pace of innovation, the historical data instead suggests that an economy's idea processing capacity can be (and has been) influenced by policy, and in particular by policies that improve financial market effectiveness. The recent record of slow TFP growth is not a fact of nature. Policy can improve it..

James, Kevin R., Akshay Kotak, and Dimitri Tsomocos. 2022. "Ideas, idea processing, and TFP growth in the US: 1899 to 2019." SRC Discussion Paper 121.



2022

2022
Do multinational banks invest based on cultural stereotypes?

SRC Discussion Paper 123

Do Germans trust Greeks, and do Brits trust Italians?

In the financial system, trust is fundamental.

The authors compiled a database of which banks hold another country's sovereign bonds. They found that cultural stereotypes cause higher investment in sovereign bonds.

"When a bank has branches in a foreign country, that foreign country is more likely to be represented in the managerial team of that bank … So whether you are a multinational bank or a national bank, increase the diversity of your managerial teams as much as possible," says Orkun Saka of City University London, one of the authors, and a research associate at the SRC.

Eichengreen, Barry, and Orkun Saka. 2022. "Cultural Stereotypes of Multinational Banks." SRC Discussion Paper 123.

2022
How does risk affect growth?

VoxEU opinion piece and journal article

The relationship between financial risk and growth might seem straightforward: high risk is detrimental to growth. But how does low risk affect growth? This research shows that the strength of agents' beliefs in the accuracy of their risk estimates is crucial. It drives investment decisions and capital flows.

But this also means that the impact of low risk on the macroeconomy differs from that of high risk. Perceptions of low risk have a "boom-to-bust" effect. We cannot directly measure risk, so we infer it from market prices. When we perceive risk as low, we take on riskier investments. Asset prices also increase and that drives a boom in investment.

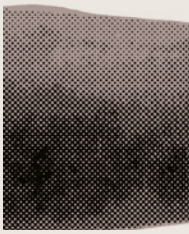
Over time, the supply of good investments falls, and the riskiness of investments increases, rendering the financial system increasingly fragile. This lays the seed for a reversal – the bust in the boom-to-bust cycle.

Even then, the overall impact of perceptions of low risk on growth is positive, unless credit growth has been high or the low-risk environment has persisted for a time. That is exactly the result we saw during the global crisis in 2008: excessive credit growth coupled with robust risk appetite fuelled a boom-to-bust cycle that culminated in 2008.

Using a panel of 73 countries spanning 1900 to 2016, with an average of 55 years of observations per country, the paper calculates annual realised volatility using 12-monthly real stock returns for each country, with an estimate of the duration of low risk for each country, and a global estimate of the perception of risk. This gives an important insight: even if a domestic monetary authority intends to either stimulate or cool down its national economy by affecting the price and quantity of money, global risk perceptions and risk-taking incentives in global financial markets (or a central economy like the US) can override national monetary policy decisions.

Danielsson, Jon, Marcela Valenzuela, and Ilknur Zer. 2022. "How global risk perceptions affect economic growth." VoxEU.org, 13 January.

Danielsson, Jon, Marcela Valenzuela, and Ilknur Zer. 2023. "The impact of risk cycles on business cycles: A historical view." *The Review of Financial Studies* 36(7): 2922–61.



EVENT

Are central bank digital currencies a threat or an opportunity?

28 October 2022

If cryptocurrencies are to promote innovation in the financial sector, one channel can be through central bank digital currencies (CBDCs), justified by central banks as a mechanism to provide a safe asset in the digital wallets of the population when cash has disappeared.

Would it be destabilising for banks if crypto currencies evolved to become a form of money issued by central banks? Rosa and Alessandro Tentori argue[22] that the transition should be taken slowly. CBDCs threaten to replace the role of banks in domestic and international payments. The result may be a build-up of systemic risk, as happened when financial markets developed in the 1980s and 1990s.

2022

Does stewardship reduce systemic risk?

Journal article

Climate change and other environmental risks can have implications for systemic risk. In the real economy, sustainability risks could lead to a decline in economic growth, a rise in unemployment, or a disruption to supply chains.

So, what to do? In the UK, Eva Micheler and her co-author, Dionysia Katelouzou of King's College, London, examined the role of stewardship in 2022 and found that the government could take part in, as well as define good practice. The UK Stewardship Code 2020 delivered guidance on how investors can do this by engaging with companies on so-called "woke" environmental, social and governance (ESG) issues.

The Code believes there is a market for stewardship: those whose money is invested (e.g. those who have invested in pensions) will demand it. But, as Micheler and Katelouzou point out, "the UK government overlooks the fact that it is itself a financial contributor to the market" through tax relief on pension contributions. To help mitigate sustainability risk by providing an incentive for better stewardship, the government could tailor its tax credits to investments that prioritise stewardship.

Katelouzou, Dionysia and Eva Micheler. 2022. "The market for stewardship and the role of the government." In *Global Shareholder Stewardship* by Dionysia Katelouzou and Dan W. Puchniak, eds : 67–88. Cambridge: Cambridge University Press.

22 Rosa, Brunello, and Alessandro Tentori. 2022. "CBDCs: Potential impact on bank profitability, asset and risk management and financial stability." SRC Special Paper 22.

2023

2023
Does high-frequency trading affect market quality?
Journal article

In 2010, soon-to-be members of the SRC contributed (see The Flash Crash, p. 10) to the UK government's Foresight Report into high-frequency trading (HFT). Thirteen years later, the issue is still under discussion, as the SRC's latest work shows.

The authors explore whether latency (the time taken for an order to be executed) affects the quality of a market. High speed of trading means little latency, and so as HFT develops, latency declines. The research takes advantage of technical improvements that affected the latency of trades between London and Frankfurt in 2017 and 2018 and shows that about a third of the latency arbitrages were toxic.

The exploitation of latency arbitrage opportunities by high-frequency traders was beneficial for liquidity when these opportunities were driven by price pressures (when they were non-toxic). The economic magnitude of a 1 millisecond increase in latency yields an approximate increase of 18.5% for the effective spread, and 17.0% for the quoted spread, following non-toxic latency arbitrage opportunities.

Rzayev, Khaladdin, Gbenga Ibikunle, and Tom Steffen. 2023. "The market quality implications of speed in cross-platform trading: Evidence from Frankfurt–London microwave." *Journal of Financial Markets*, 66: 100853.

Khaladdin Rzayev

2023
How do we assess the suitability of AI for regulation and crisis resolution?
SRC Discussion Paper 125

In earlier work[23] the authors questioned the suitability of AI for macro regulation (see 2017). But the financial authorities are increasing their use of AI for micro regulations, such as detecting fraud, consumer protection, and routine banking regulations The effectiveness of the AI will benefit from ample data, short time horizons, clear objectives, and repeated decisions, and in these domains often outperforms humans.

Even if the authorities are conservative in adoption of AI, it will likely become widely used by stealth, taking over increasingly high-level functions, driven by significant cost efficiencies, robustness and accuracy. Therefore, the authors propose six criteria against which to judge the suitability of AI use by the private sector, financial regulation and crisis resolution:

1. Does the AI engine have enough data?
2. Are the rules immutable?
3. Can AI be given clear objectives?
4. Does the authority the AI works for make decisions on its own?
5. Can we attribute responsibility for misbehaviour and mistakes?
6. Are the consequences of mistakes catastrophic?

Given the financial system's complexity, AI will probably provide essential advice to senior policymakers.

Jon Danielsson and Andreas Uthemann. 2023. "On the use of artificial intelligence in financial regulations and the impact on financial stability". SRC Discussion Paper 125.

23 Danielsson, Jon, Robert Macrae, and Andreas Uthemann. 2022. "Artificial intelligence, financial risk management and systemic risk." *Journal of Banking & Finance* 140(106290).

The work is never over

Two decades ago, Danielsson received a referee's report from a journal to which he had submitted one of his papers on systemic crises. The paper was rejected. It was, it said, "irrelevant because the problem of crises has been solved."

The International Monetary Fund's (IMF's) systemic banking crises database uses a broad definition of a crisis to calculate that the typical OECD country suffers a systemic crisis once in 43 years. The United Kingdom is the correct location for the Systemic Risk Centre (SRC): it endures more systemic crises than other developed nations, one every 18 years on average. Fasten your seat belts: the last one was in 2008. Unless the findings of the SRC have been learned and incorporated into the fabric of financial markets, Zigrand puts his money on the next GFC occurring around 2026/7.

"Like armies always training to fight the last war, our banking system is always merely setting up protection against past experiences," reads an article in *The Bankers Magazine*.[24] This is not news – not for battles nor for banking. But it might have been when this article was written, in 1941.

On 12 May the previous year, the problems of fighting the last war had been made abundantly clear. The German army smashed through the French Maginot Line by attacking through the Ardennes. The French generals had carefully prepared the Maginot Line to resist the tactics Germany had used in World War I. But weapons technology had changed, and the German blitzkrieg ignored the Line entirely.

This is inevitably how risk regulation works. "The last crisis always has an undue influence on how we think about future ones," Jon Danielsson points out. But, like weapons of war in the 1940s, the threats to financial stability may be entirely novel, and as much a surprise to regulators as the blitzkrieg was to the French generals.

There will always be a trade-off between safety and risk, and the SRC will continue to analyse it, communicate with both regulators and practitioners about future problems, suggest potential solutions and hold those who ignore or fail to manage systemic risk to account.

So how does a risk management centre prepare for the next war? By making sure its doors are always open to new ideas.

"Jon and JP have always invited people in who had interesting things to bring to the table, no matter what background," says Andreas Uthemann, formerly of the SRC, "It is an open-door and a meeting place where people can have a chat over coffee for an hour. The SRC is unique in being at the interface between a very strong academic research background, specifically in the finance department, but being very open to interacting with less highbrow academic research work."

"Mixing practitioners in the Centre with academics brings fresh air and new ideas from outside. So, I think it's meritorious," adds Brunello Rosa who, as an academic contributor to the SRC's work and a practitioner, has experience of both. "The approach of the SRC is the winning one and we still need it. In periods of difficulty, especially financial difficulties, there's always this temptation to retrench, to go back to the old ways of doing things. That would be the wrong approach. There should still be lots of interaction between the academics and the practitioners."

"It is top quality academic work, but it thinks practically and does not retreat to an ivory tower. They operate in circles where they can pick up what's going on in the real world of finance," says Tim Frost, chair of Polus Capital Management, emeritus governor of the London School of Economics (LSE), former director of the Bank of England – and, for 10 years, a member of the SRC's scientific advisory board.

"If the researchers at the SRC wanted to run derivative research at an investment bank, they could have earned ten times the salary they earn today. It's a credit to the guys that they didn't. I'm proud to have been associated with the SRC and the influence it has had.

"The most impactful days of the SRC may well be ahead of it."

24 *The Bankers Magazine 1941 142: 148.*

Clockwise from top R: Haruhiko Kuroda, Stefan Ingves, Jonathan Hill, Agustín Carstens, Timothy Massad, Richard W. Fisher

Distinguished visitors

Throughout the life of the Systemic Risk Centre (SRC), it has consistently attracted globally important leaders from banking and regulation who spoke candidly at meetings and events about their work in progress.

In March 2014, at the event "Towards a sustainable financial system", **Haruhiko Kuroda, Governor of the Bank of Japan**, spoke about the Bank's new policy of quantitative and qualitative easing designed to end the years of economic stagnation in his country. Deflation expectations, he said, had become self-fulfilling and a depressant: "Japan's deflation had come to show symptoms akin to a chronic lifestyle disease."

At the same event, **Richard W. Fisher, President of the Federal Reserve Bank of Dallas**, described the conduct of monetary policy in the US. "We're all seeking to make sure that we have a sustained recovery," he promised, "and will conduct monetary policy accordingly."

In July 2014, at the event "Towards a safer and more stable financial system", the SRC hosted the person in charge of designing Basel III – the regulations that, while in draft, SRC members had criticised a few years earlier. The audience heard from **Stefan Ingves, Governor of the Riksbank in Sweden** and **Chairman of the Basel Committee on Banking Supervision**, how the revised plans were being implemented, and what work still needed to be done.

In May 2016, **Jonathan Hill, European Commissioner for Financial Stability, Financial Services and Capital Markets Union** spoke on "The Single EU Capital Market: Progress and challenges". The event followed the "Dialogue on creating an EU Capital Markets Union" from February 2015, in which the speakers included **Andrea Leadsom MP, UK economic secretary to the Treasury**, and **Steffen Kampeter, parliamentary state secretary, German Federal Ministry of Finance**.

In January 2017, **Timothy Massad, Commissioner of the Commodity Futures Trading Commission**, gave a lecture during what he called "a time of uncertainty. A time when the United States, the United Kingdom and Europe are all entering uncharted political waters." President Trump was waiting to take office; the UK was coming to terms with the consequences of the Brexit vote. "We are unlikely to predict what will cause the next financial crisis. But the measures we have implemented in response to the 2008 financial crisis have made the global financial system more resilient," he promised.

In May 2019, the focus was on emerging markets, as **Agustín Carstens, General Manager of the Bank for International Settlements**, gave the lecture "Exchange rates and monetary policy frameworks in EMEs: Where do we stand?". He spoke on the pressures that those economies faced when trying to achieve financial stability, warning that "looser financial conditions lead to the build-up of financial vulnerabilities that may pose risks to price stability over longer horizons."

Katrín Jakobsdóttir, Prime Minister of Iceland, delivered a lecture "The Politics of Equality, the "Populist Moment" and the Power of New Technologies" co-hosted by SRC, Institute of Global Affairs and International Inequalities Institute. In the lecture, she discussed democratic challenges stemming from social inequalities, authoritarian politics and new technologies.

In October 2023, **Andrea Enria, the outgoing Chair of the Supervisory Board of the European Central Bank**, reflected on the state of the European banking sector and looked at the future of the European Banking Union.

L to R: Craig Calhoun, Steffen Kampeter, Andrea Leadsom, Jim Esposito, Andrea Enria, Katrín Jakobsdóttir

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Jean-Pierre Zigrand

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Khaladdin Rzayev
Fernando Soares
Varun Sule
Paolo Tasca
Andreas Uthemann
Bixuan Xu
Yiying Zhong

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Mathieu Dubois
Ali Habibnia
Sevim Kösem
Olga Obizhaeva
Michael Punz
Malgorzata (Gosia) Ryduchowska
Seyed Seyeden
Luana Zaccaria
Cheng Zhang

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Administrative staff

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Maribel Glogowski
Laura Laget
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Minouche Shafik

Director of the London School of Economics, September 2017 to June 2023

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Daniel Ferreira

Professor of Finance, Head of Department of Finance (2020-2023), London School of Economics

Systemic Risk Centre

The London School of Economics and Political Science

Houghton Street

London WC2A 2AE

United Kingdom

+44 (0)20 7852 3557

src@lse.ac.uk

www.systemicrisk.ac.uk

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