Assignment 4: Rumours, Emotions, Information

Reader

This reader contains the parts of the sources you need for Assignment 4.

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How to use it

No finance background is needed.

Each case starts with a short introduction, written for this course. It gives the background of the case and explains the terms you need. The sources also contain other technical terms. You do not need them for the tasks: skip them or look them up. A list of the parts to read follows, with links to the original sources.

The excerpts come after the list. They are copies of the original pages. A grey box at the top of each of these pages names the source and describes the content of the part. The box also shows the reader page number.

In each part to read, the first and the last words are marked in yellow, with “Start” and “End” at the left edge of the page. Read from “Start” to “End”. “Correct:” marks a printing error in a source and gives the right wording.

When you cite a source, use the page numbers printed on the original pages, not the reader page numbers.

Case 1: Northern Rock, September 2007

This introduction is written for this course. It is not part of the sources. It gives the background of the case and explains the terms you need. The original sources follow on the next pages.

Northern Rock was a British bank based in Newcastle. Like most banks, it took money from savers and lent it out, mostly as mortgages to people buying a home. The money that savers keep in a bank account is called a deposit. The reading calls ordinary savers retail depositors.

Northern Rock also had a second source of money. It borrowed large sums from other banks and from investors, for short periods, and borrowed again when these loans ran out. This is called wholesale funding. In the summer of 2007 lenders around the world became reluctant to lend in this way.

When a bank cannot borrow money anywhere else, the central bank can lend to it. In this role the central bank is called the lender of last resort. The central bank of the United Kingdom is the Bank of England. In 2007 it shared responsibility for the stability of banks with two other bodies: the Treasury, which is the finance ministry and is headed by the Chancellor of the Exchequer, and the Financial Services Authority (FSA), which supervised banks. The reading calls the three together the Tripartite authorities.

A bank never keeps enough cash to pay out all its deposits at once. If many savers withdraw their money at the same time, this is a bank run. To protect small savers, many countries have a deposit protection scheme: if a bank fails, the scheme pays savers back, up to a limit. In the United Kingdom it is called the FSCS. A failed bank goes into administration: a legal procedure in which an appointed person takes control of the bank. During that time savers may not be able to get to their money. The reading also uses the term moral hazard. It means that people who are protected against a loss may take more risk, because someone else bears the cost.

What to read

The sources are a report by a committee of the UK Parliament, published in 2008, and the answers that Mervyn King, Governor of the Bank of England, gave to that committee on 20 September 2007.

1. **Treasury Committee, *The run on the Rock*, Summary, first page.** Printed page 3. Reader page 3.
   https://publications.parliament.uk/pa/cm200708/cmselect/cmtreasy/56/5603.htm
2. **Same report, Introduction, paragraph 1.** Printed page 5. Reader page 4.
   https://publications.parliament.uk/pa/cm200708/cmselect/cmtreasy/56/5604.htm
3. **Same report, Chapter 6, section "Co-insurance", paragraphs 221 to 225.** Printed pages 89 to 91. Reader pages 5 to 7.
   https://publications.parliament.uk/pa/cm200708/cmselect/cmtreasy/56/5609.htm
4. **Mervyn King, answers to questions 26 and 30 (Q26, Q30).** Reader pages 8 and 9.
   https://publications.parliament.uk/pa/cm200708/cmselect/cmtreasy/56/7092003.htm

Start

Summary

Overview

The period from Friday 14 September 2007 to Monday 17 September saw the first run on the retail deposits of a United Kingdom bank since Victorian times. We analyse the causes and consequences of the run on Northern Rock, and the lessons to be learnt from it. We emphasise the advantages of legislative change on a cross-party basis and make proposals for such change, and for reforms of the Tripartite arrangements, on that basis.

Northern Rock and its regulation

The directors of Northern Rock were the principal authors of the difficulties that the company has faced since August 2007. The directors pursued a reckless business model which was excessively reliant on wholesale funding. The Financial Services Authority systematically failed in its regulatory duty to ensure that Northern Rock would not pose a systemic risk.

Handling the support operation and stopping the run

The Chancellor of the Exchequer was right to view Northern Rock as posing a systemic risk to the financial system and to authorise the Bank of England's support facility. However, the Tripartite authorities did not prepare adequately for that support operation. Those authorities and Northern Rock ought to have strained every sinew to finalise the operation and announce it within hours rather than days of the decision to proceed with the operation. The Tripartite authorities at deputies level failed to plan in advance for the announcement of the Government guarantee on Northern Rock deposits that proved necessary to stop the run.

Dealing with failing banks

We recommend a series of measures for handling 'failing' banks in an orderly manner and in a way that insulates taxpayers and small depositors from the risk of banks failing. We recommend that a relevant authority be given power to acquire information relating to individual financial institutions and to take action in relation to an institution in specified circumstances. We also propose a special resolution regime for failing banks to enable smooth administration of such a bank to be combined with arrangements to ensure that insured deposits are safe and accessible.

Depositor protection

A deposit protection scheme must be simple and transparent. The "co-insurance" model of deposit protection—whereby small depositors stand to lose some of their money in the event of a bank closing—is discredited. Ensuring the speedy release of funds under any scheme is of critical importance, and we propose measures to provide for this. We recommend the establishment of a Deposit Protection Fund to be funded by participating institutions.

End

1 Introduction

The run on the Rock

Start

1. At 8.30 pm on the evening of Thursday 13 September 2007 the BBC reported that Northern Rock plc had asked for and received emergency financial support from the Bank of England.[1] The terms of the funding facility were finalised in the early hours of Friday 14 September and announced at 7.00 am that day.[2] That day, long queues began to form outside some of Northern Rock's branches; later, its website collapsed and its phone lines were reported to be jammed.[3] The first bank run in the United Kingdom since Victorian times was underway.[4] In this Report we examine what caused the run on the Rock, the consequences of that run for Northern Rock itself and for wider financial stability, the way the events were handled by public authorities and the lessons to be learned.

End

The conduct of our inquiry

2. Early in 2007 we identified financial stability as a matter of growing importance meriting greater scrutiny. On 1 February 2007, we took evidence from representatives of HM Treasury, the Financial Services Authority (FSA) and the Bank of England on the operation of the Memorandum of Understanding between them on co-operation in the field of financial stability.[5] In March 2007, we announced our intention to conduct a series of inquiries on the theme of "Transparency in Financial Markets and the Structure of UK plc".[6] We published a Report on Private Equity as part of that thematic approach in July 2007, including consideration of issues of economic risk and financial stability.[7]

3. On 20 September we were due to take evidence from Mervyn King, Governor of the Bank of England, and other members of the Monetary Policy Committee (MPC) of the Bank of England on the MPC's August 2007 Inflation Report.[8] Less than a week before that session, the run on Northern Rock occurred. At that meeting, we decided to start an inquiry on Financial Stability and Transparency, and we subsequently published terms of reference for the inquiry in October 2007.[9] We took oral evidence at nine sessions in total. We took evidence from the following witnesses on two occasions: Rt Hon Alistair Darling MP, Chancellor of the Exchequer, the Governor of the Bank of England and Sir John Gieve, the Bank's Deputy Governor with responsibility for financial stability, and Sir Callum McCarthy, Chairman, and Mr Hector Sants, Chief Executive, of the FSA. We also

1 www.bbc.co.uk/blogs/thereporters/robertpreston/2007/10/16/index.html

2 Qq 580, 1668

3 Qq 345, 678

4 For a discussion of previous bank runs, see Box 1.

5 HM Treasury, Bank of England and FSA, *Memorandum of Understanding between HM Treasury, the Bank of England and the Financial Services Authority*, 22 March, 2006; Treasury Committee, Oral Evidence, Thursday 1 February 2007, *Financial Stability*, HC (2006–07) 292–i

6 Treasury Committee Press Notice No.36, Session 2006–07

7 Treasury Committee, Tenth Report of Session 2006–07, *Private equity*, HC 567–I, paras 1, 35–66

8 Treasury Committee Press Notice no. 74, Session 2006–07

9 Treasury Committee Press Notices no. 83 and 88, Session 2006–07

with this view, but added that the "widows and orphans" rationale should extend only to natural persons, and not wholesale or business deposits.[455] Professor Buiter disagreed with the FSA's rationale for a depositor protection scheme, claiming such a scheme was purely "social policy" and had no purpose as a financial stability tool.[456] Sir Callum McCarthy, however, argued that a well-designed scheme, where depositors had confidence that they were covered 100% up to a certain amount, and that they would get a very rapid repayment, would make it "much less likely" that there would be a retail bank run, and that had implications again for financial stability.[457]

Co-insurance

Start

221. Co-insurance is an attempt to share, in the context of deposit protection, the risk of bank failure between the deposit protection scheme and the depositor. Under a co-insurance scheme, depositors receive less than 100% of their guaranteed deposits if their bank fails. In the UK prior to 1 October 2007, for example, the FSCS would cover 100% of the first £2,000 of deposits but only 90% of the next £33,000. Theoretically, introducing co-insurance should reduce moral hazard on the part of depositors, by encouraging depositors to take a keener interest in choosing a financially-sound bank. In 1992, following the collapse of the Bank of Credit and Commerce International (BCCI), the then Government set out the rationale for co-insurance, under a deposit protection scheme which at the time guaranteed only 75% of qualifying deposits up to a value of £20,000:

> If depositors expected full compensation for losses, then they too would no longer need to consider the risk associated with the particular banks in which they placed their money. This, in turn, would have serious and potentially damaging consequences for the whole banking system as it would favour institutions which, for example, offered unrealistically high rates of interest, at the expense of more prudent ones. And it would encourage managers who wanted to attract deposits to adopt riskier strategies. The recent experience of US savings and loans institutions shows all too clearly that this is a real—and not simply a theoretical danger.[458]

222. More recently, in a speech made in February 2006, Sir Callum McCarthy warned that

> were the FSA to aim to relieve consumers of all adverse consequences, an environment would be created in which they no longer needed to weigh up the reasonableness of their financial decisions. No market can work effectively without involved customers. To relieve consumers of retail financial services of the consequences of their actions would destroy this as an effective market. Consumer responsibility is therefore vital to the effectiveness of financial markets.[459]

455 Q 906; The current scheme covers deposits by businesses with a turnover of less than £5.6 million

456 Qq 907-8

457 Q1431

458 Treasury and Civil Service Committee, Second Report of Session 1992–3, *Banking supervision and BCCI: The implications of the Bingham Report*, HC 250, p 27

459 Speech by Sir Callum McCarthy to the Financial Services Forum, 9 February 2006

Sir Callum noted that, in the US during the savings and loan problems, "it was quite clear that 100% coverage resulted in some distortion of behaviour and some serious moral hazard."[460] The London Investment Banking Association also mentioned the US savings and loan problem, arguing that it would be:

> important to avoid arrangements that could lead to the kind of costs borne by taxpayers following the losses of US Savings and Loans depositors in 1986-95. In order to address moral hazard issues, in reviewing the UK scheme it will be necessary to consider arrangements that address the risk of depositors simply opting for accounts paying the highest rate of interest.[461]

223. Although using co-insurance to encourage consumers to invest their savings in healthy institutions was attractive in theory, several witnesses argued that it did not work in practice. Professor Wood said that, if the purpose of depositor protection were protecting "widows and orphans", coverage had to be 100%, because it was unreasonable to expect such people to have the time or the knowledge to police their banks.[462] Professor Buiter argued that if coverage was anything less than 100%, it was still an invitation to have a bank run:

> Unfortunately while co-insurance is a good idea for most insurance—you cannot have a run on your life insurance company but you can have a run on the bank—I really would not recommend anything less than 100%.[463]

224. The Governor of the Bank of England also rejected the concept of co-insurance in depositor protection:

> if you have deposit insurance, there is no point having 90%, because that will not stop the bank run, as we saw, it has to be 100% but only up to some limit. In order to prevent banks taking excessive risks on the back of that deposit insurance—the moral hazard risk—it is much more important to have in place the special resolution regime whereby the authorities can get control of a bank that has been taking too many risks, particularly on the liquidity front. That is why … the FDIC mechanism does naturally go hand in hand with the deposit insurance for banks, but only for banks.[464]

225. Sir Callum McCarthy acknowledged that, at the time of the run on Northern Rock, the fact that the FSCS only guaranteed 100% up to the first £2,000, and 90% of the next £33,000 was a problem.[465] The FSA said that in making the decision to remove the coinsurance element of £35,000, it was "reflecting a belief that it is probably unrealistic to expect the consumer to have the necessary information and ability to judge funding risk …

460 Q1425

461 Ev 248

462 Q 913

463 Q 913 (will become *Ibid*. once previous amendment is made)

464 Q 1743

465 Q 345

our current thinking … is that it is a little too ambitious to expect the consumers to have detailed understanding of funding risk".[466]

End

226. Not only did witnesses consider the expectation that consumers be in a position to judge the health of banks, they also commented on how the complexity of co-insurance made it hard to explain to customers. Northern Rock explained to us that the scheme's co-insurance element between £2,000 and £35,000, "does not lend to sound bites when you are trying to deal with customers either on the telephone or queuing outside your branch.[467] Adrian Coles, of the BSA, also cited the complexity of coinsurance as causing difficulty,[468] as did Gerald Corrigan from Goldman Sachs:

> The other point I make for your consideration is that the payout provisions should be very simple and straightforward; in other words, in the United States the payout provision is $100,000—full stop. As I understand it, the current system here in the UK is a bit more complex than that and it has different layers and percentages. I am a little concerned that that may be a bit of a structured product in its own right.[469]

227. **The presence of an element of co-insurance in a deposit protection scheme adds considerable complexity for customers to understand: Northern Rock pointed to the difficulty of explaining the scheme's intricacies to their customers when the bank run occurred. Not only does co-insurance add complexity, it also does not work. Co-insurance implies that a potential depositor would have the means, time and ability to assess the financial strength of an institution through the examination of publicly-available information about that company. We do not believe this to be a realistic proposition. The main way the ordinary depositor can gauge the financial health of a bank is by considering the strength of the brand and whether the bank has a reputation for financial strength. Tellingly, Northern Rock did well on both of these counts. Rather than contributing to financial stability, co-insurance directly undermines it, by offering an incentive to join a bank run. We consider the co-insurance model to be discredited with regard to depositor protection. The moral hazard argument, that banks would offer excessively high rates to customers, on the back of the full deposit insurance for customers, would be mitigated by our proposals for a system of prompt corrective action and a special resolution regime, together with a modest compensation limit, to discussion of which we now turn.**

Compensation limit

228. A key consideration for future deposit protection arrangements relates to the limit up to which deposits are guaranteed. The FSA emphasised the importance of striking the right balance between protection for individuals on the one hand, and not encouraging irresponsible behaviour by institutions on the other.[470] Professor Wood argued that, if the compensation limit were set at a low level, large depositors and other banks might pay

466 Q1429

467 Q 677

468 Q1558

469 Q1254

470 Q 1426

Mr King: I think those different actions are all important and they all go to the responsibilities. This would have been no different without the Memorandum of Understanding.

Q24 Mr Fallon: Who was in charge?

Mr King: What do you mean by "in charge"? Would you like to define that?

Q25 Mr Fallon: What our constituents want to know given this mess is who is in charge of it, who is responsible?

Mr King: We are each responsible for the various responsibilities that we have been given under the MoU. The final decision on whether to put taxpayers' money at risk obviously belongs with the Chancellor, you would expect that. I do not have the authority to put taxpayers' money at risk. The responsibility for the design of the operations in markets that we carry out is our responsibility at the Bank and the judgment about individual institutions is that of the FSA.

Start **Q26 Mr Fallon:** Do you not see that three of you having different responsibilities all trying to reassure investors in your different ways that Friday morning ended up with the result that savers did not trust any of you—the Chairman of the FSA, you as Governor, or the Chancellor—because there were three people saying the same thing.

Mr King: No, it is not true there were three people all out there saying the same thing. The question of trust is one that you may want to reflect on. The behaviour of depositors in Northern Rock was, in my judgment, a consequence of a perfectly rational interpretation of what the end game might be. It was not so much a question of trust. Once the depositors of Northern Rock had heard the bad news and they suddenly realised that Northern Rock needed a lender of last resort facility—this is the problem with an overt operation—once they had seen that there was bad news about Northern Rock, and they could not possibly be reasonably expected to have been sitting at home thinking about the wholesale funding structure of Northern Rock, once they learned that there was concern about Northern Rock it is not that surprising that they thought perhaps it might be safer to take some money out. End

Q27 Mr Fallon: Would it not have been easier to have handled this affair if you were still in charge of banking supervision?

Mr King: I honestly believe not. I think that now there is a much more formalised and legalistic framework of supervision, which is not a consequence of the division between authorities but of the evolution of the financial system. I know that Callum McCarthy and Hector Sants have been working day and night to monitor all the institutions for which they are responsible. We have been extremely busy in the Bank doing the same for our responsibilities. The idea that one institution should cope with all of these I honestly do not believe would make sense. As I said, the root cause of this, in my view, is not the question of who does what—you can argue the merits of that quite separately and I do not believe it is a question of who is responsible for what or the fact that there is a tripartite agreement. My own view, for what it is worth, is that the MoU worked well and it is very sensible to have the responsibilities laid down so that you know what we are accountable for. The problems in this case were quite different. They came from the inherent logic of the economic position that Northern Rock

found itself in and the various constraints that were placed on the ability of the authorities to take action.

Q28 Mr Fallon: Okay. Given the that additional funding offered to Northern Rock had to be overt in the end why have you not made public the advice in the letter that you sent to the Chancellor last Thursday?

Mr King: I should be very happy to publish it at any moment but that is a question for the Chancellor and not for me.

Q29 Mr Fallon: He is preventing it being made public?

Mr King: No, I do not think. I would welcome it if you would like to ask him now for the letters. I have nothing against publication but I do not think it is for me to proffer that.

Start **Q30 Mr Fallon:** I see. If all the deposits in any bank are now guaranteed by the Government how does that not encourage exactly the kind of excessive risk-taking that you warned us about?

Mr King: It does not encourage the moral hazard of the banks themselves. It encourages potential moral hazard on the terms that might be offered to retail depositors, not the structure of the funding which the banks put in place for the conduits and vehicles and the risk of a big maturity transformation. You are quite right, however, that this is not a sustainable position and it is very important that we move as quickly as possible to an exit route towards a sensible framework, but that sensible framework will not be where we started. The system of administration for banks which means that retail depositors find their deposits frozen for months on end and they cannot access them is a system which is a direct inducement for retail depositors to take their money out at any sign of trouble. End

Q31 Mr Fallon: On what date did you first become aware that Northern Rock was seriously exposed with the freezing up of the wholesale market?

Mr King: Would you excuse me if I refer to the sheet which sets out dates here. I would like to refer to this calendar in doing that?

Q32 Mr Fallon: I just want the date you first became aware of it.

Mr King: 14 August was when the first Tripartite phone call between deputies took placed and I was alerted to it. 9 August was when the financial market disturbance began and it was on 14 August that I was first alerted to that.

Q33 Mr Fallon: On what date were ministers first alerted?

Mr King: On the same day, I imagine, because it is a tripartite process. I cannot vouch for who in the Treasury was told. You would have to ask them; I do not know that.

Q34 Mr Fallon: Were you aware that in its interim statement on 21 July Northern Rock reported that the FSA had allowed it to weaken its balance sheet by widening its Basel II waiver and thus enable it to pay a 30% increase in its dividend?

Case 2: Black Monday, 19 October 1987

This introduction is written for this course. It is not part of the sources. It gives the background of the case and explains the terms you need. The original sources follow on the next pages.

On Monday 19 October 1987 the US stock market had the largest one-day fall in its history. The Dow Jones Industrial Average fell by 22.6%. The Dow Jones is an index: a single number that tracks the share prices of 30 large US companies. A share, also called a stock, is a small part of the ownership of a company. Its price is set by trading between buyers and sellers.

Investors do not only trade shares. They also trade stock index futures. A stock index future is a contract about the value of a whole stock index at a fixed date in the future. Its price normally moves together with the prices of the shares in the index. Index arbitrage is trading that profits from small gaps between the two prices, and in doing so keeps them close together.

Portfolio insurance was a strategy used by large investors such as pension funds. Its aim was to limit losses: when prices fell, it sold shares or futures, following a formula. A mutual fund pools the savings of many small investors. When these savers ask for their money back, which is called a redemption, the fund has to sell shares. A clearinghouse is the institution that completes trades: it makes sure that the seller is paid and the buyer receives the shares.

The reading distinguishes two groups. Individual investors are private persons who invest their own money. Institutional investors are organisations that invest professionally, such as pension funds, insurance companies and banks. Shiller's tables label the two groups INDIV and INSTI. PILOT1 and PILOT2 are two small test surveys that he also sent out. One news item in the reading is the trade deficit: the amount by which a country's imports exceed its exports.

What to read

The sources are the report of a task force set up by the US President (the "Brady report", 1988), a survey of investors by the economist Robert Shiller, sent out right after the crash, and a short history essay by the Federal Reserve, the US central bank.

1. **Brady report, Executive summary, sections "Introduction" and "The Market Break".** Printed page v. Reader page 11.
   https://archive.org/details/reportofpresiden01unit
2. **Federal Reserve History, *Stock Market Crash of 1987*, from the start to the end of the section "What Caused Black Monday".** Reader pages 12 and 13.
   https://www.federalreservehistory.org/essays/stock-market-crash-of-1987
3. **Shiller (1987), abstract.** Reader page 14.
4. **Shiller, from "With the results reported here in Table 2" (printed page 9) to "little action" (printed page 12).** Reader pages 15 to 18.
5. **Shiller, Tables 1, 2 and 3.** Printed pages 26 to 29. Reader pages 19 to 22.
   https://www.nber.org/system/files/working_papers/w2446/w2446.pdf

Shiller's text refers to the tables, so keep them open while you read. How to read them: the left block is individual investors, the right block is institutional investors. Use the column "All" in each block. The numbers in brackets are standard errors, a measure of how precise each percentage is. You can ignore them. The source has two printing errors. On printed page 10, "9 or 19.7%" of 48 respondents should read 18.75%. On printed page 11, "institutional investors (INDIV)" should read INSTI. The small note numbers in the Federal Reserve essay refer to endnotes that are not in this reader.

Start

Executive Summary

Introduction

From the close of trading Tuesday, October 13, 1987 to the close of trading Monday, October 19, the Dow Jones Industrial Average declined by almost one third, representing a loss in the value of all outstanding United States stocks of approximately $1.0 trillion.

What made this market break extraordinary was the speed with which prices fell, the unprecedented volume of trading and the consequent threat to the financial system.

In response to these events, the President created the Task Force on Market Mechanisms. Its mandate was, in 60 days, to determine what happened and why, and to provide guidance in helping to prevent such a break from happening again.

The Market Break

The precipitous market decline of mid-October was "triggered" by specific events: an unexpectedly high merchandise trade deficit which pushed interest rates to new high levels, and proposed tax legislation which led to the collapse of the stocks of a number of takeover candidates. This initial decline ignited mechanical, price-insensitive selling by a number of institutions employing portfolio insurance strategies and a small number of mutual fund groups reacting to redemptions. The selling by these investors, and the prospect of further selling by them, encouraged a number of aggressive trading-oriented institutions to sell in anticipation of further market declines. These institutions included, in addition to hedge funds, a small number of pension and endowment funds, money management firms and investment banking houses. This selling, in turn, stimulated further reactive selling by portfolio insurers and mutual funds.

Portfolio insurers and other institutions sold in both the stock market and the stock index futures market. Selling pressure in the futures market was transmitted to the stock market by the mechanism of index arbitrage. Throughout the period of the decline, trading volume and price volatility increased dramatically. This trading activity was concentrated in the hands of a surprisingly few institutions. On October 19, sell programs by three portfolio insurers accounted for just under $2 billion in the stock market; in the futures market three portfolio insurers accounted for the equivalent in value of $2.8 billion of stock. Block sales by a few mutual funds accounted for about $900 million of stock sales.

The stock and futures market handled record volume of transactions and had a generally good record of remaining available for trading on October 19 and 20. However, market makers were unable to manage smooth price transitions in the face of overwhelming selling pressure.

Clearing and credit system problems further exacerbated the difficulties of market participants. While no default occurred, the possibility that a clearinghouse or a major investment banking firm might default, or that the banking system would deny required liquidity to the market participants, resulted in certain market makers curtailing their activities and increased investor uncertainty. Timely intervention by the Federal Reserve System provided confidence and liquidity to the markets and financial system.

End

Copy for course use. Source: https://www.federalreservehistory.org/essays/stock-market-crash-of-1987
Retrieved 13 November 2026.

Stock Market Crash of 1987

Start

October 1987

The first contemporary global financial crisis unfolded on October 19, 1987, a day known as "Black Monday," when the Dow Jones Industrial Average dropped 22.6 percent.

Composite of newspaper headlines reporting the Stock Market Crash of 1987 (Associated Press)

by Donald Bernhardt and Marshall Eckblad

The first contemporary global financial crisis unfolded in the autumn of 1987 on a day known infamously as "Black Monday."[1] A chain reaction of market distress sent global stock exchanges plummeting in a matter of hours. In the United States, the Dow Jones Industrial Average (DJIA) dropped 22.6 percent in a single trading session, a loss that remains the largest one-day stock market decline in history.[2] At the time, it also marked the sharpest market downturn in the United States since the Great Depression.

The Black Monday events served to underscore the concept of "globalization," which was still quite new at the time, by demonstrating the unprecedented extent to which financial markets worldwide had become intertwined and technologically interconnected. Black Monday led to a number of noteworthy reforms, including exchanges developing provisions to pause trading temporarily in the event of rapid market sell-offs. In addition, the Federal Reserve's response set a precedent for the central bank's use of "liquidity" to stem financial crises.[3]

Events Leading Up to the Crash

Stock markets raced upward during the first half of 1987. By late August, the DJIA had gained 44 percent in a matter of seven months, stoking concerns of an asset bubble.[4] In mid-October, a storm cloud of news reports undermined investor confidence and led to additional volatility in markets. The federal government disclosed a larger-than-expected trade deficit and the dollar fell in value. The markets began to unravel, foreshadowing the record losses that would develop a week later. Beginning on October 14, a number of markets began incurring large daily losses. On October 16, the rolling sell-offs coincided with an event known as "triple witching," which describes the circumstances when monthly expirations of options and futures contracts occurred on the same day. By the end of the trading day on October 16, which was a Friday, the DJIA had lost 4.6 percent.[5] The weekend trading break offered only a brief reprieve; Treasury Secretary James Baker on Saturday, October 17, publicly threatened to de-value the US dollar in order to narrow the nation's widening trade deficit.

Even before US markets opened for trading on Monday morning, stock markets in and around Asia began plunging. Additional investors moved to liquidate positions, and the number of sell orders vastly outnumbered willing buyers near previous prices, creating a cascade in stock markets. In the most severe case, New Zealand's stock market fell 60 percent. Traders reported racing each other to the pits to sell. In the United States, the DJIA crashed at the opening bell and eventually finished down 508 points, or 22.6 percent. "There is so much psychological togetherness that seems to

have worked both on the up side and on the down side," Andrew Grove, chief executive of technology company Intel Corp., said in an interview. "It's a little like a theater where someone yells 'Fire!'" (Glaberson 1987).

"It felt really scary," said Thomas Thrall, a senior professional at the Federal Reserve Bank of Chicago, who was then a trader at the Chicago Mercantile Exchange. "People started to understand the interconnectedness of markets around the globe." For the first time, investors could watch on live television as a financial crisis spread market to market—in much the same way viruses move through human populations and computer networks.

"You learn how interrelated we all are and how small we are," said Donald Marron, chairman of Paine Webber, at the time a prominent investment firm. "Nowhere is that exemplified more than people staying up all night to watch the Japanese market to get a feeling for what might happen in the next session of the New York market" (Cowen 1987).

What Caused Black Monday

In the aftermath of the Black Monday events, regulators and economists identified a handful of likely causes: In the preceding years, international investors had become increasingly active in US markets, accounting for some of the rapid pre-crisis appreciation in stock prices.[6] In addition, a new product from US investment firms, known as "portfolio insurance," had become very popular.[7] It included extensive use of options and derivatives and accelerated the crash's pace as initial losses led to further rounds of selling.[8] [9]

A number of structural flaws in the market exacerbated the Black Monday losses; in the years that followed, regulators would address these structural flaws with reforms. At the time of the crisis, stock, options, and futures markets used different timelines for the clearing and settlements of trades, creating the potential for negative trading account balances and, by extension, forced liquidations.[10] Additionally, securities exchanges had been powerless to intervene in the face of large-volume selling and rapid market declines.[11] After Black Monday, regulators overhauled trade-clearing protocols to bring uniformity to all prominent market products. They also developed new rules, known as circuit breakers, allowing exchanges to halt trading temporarily in instances of exceptionally large price declines.[12] For example, under current rules, the New York Stock Exchange will temporarily halt trading when the S&P 500 stock index declines 7 percent, 13 percent, and 20 percent in order to provide investors "the ability to make informed choices during periods of high market volatility."[13] In the wake of the Black Monday episode, risk managers also recalibrated the way they valued End options.[14]

The Fed's Response

In a statement on October 20, 1987, Fed Chairman Alan Greenspan said, "The Federal Reserve, consistent with its responsibilities as the Nation's central bank, affirmed today its readiness to serve as a source of liquidity to support the economic and financial system" (Carlson 2006, 10). Behind the scenes, the Fed encouraged banks to continue to lend on their usual terms. Ben Bernanke, writing in 1990, noted that "making these loans must have been a money-losing strategy from the point of view of the banks (and the Fed); otherwise, Fed persuasion would not have been needed. But lending was a good strategy for the preservation of the system as a whole" (Bernanke 1990). According to Bernanke, the 10 largest New York banks nearly doubled their lending to securities firms during the week of October 19 even though discount window borrowings didn't themselves increase (Garcia 1989).

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Investor Behavior in the October 1987 Stock Market Crash: Survey Evidence

Start

ABSTRACT

Questionnaires were sent out at the time of the October 19, 1987 stock market crash to both individual and institutional investors inquiring about their behavior during the crash. Nearly 1000 responses were received.

The survey results show that: 1. no news story or rumor appearing on the 19th or over the preceding weekend was responsible for investor behavior, 2. investors' importance rating of news appearing over the preceding week showed only a slight relation to decisions to buy or sell, 3. there was a great deal of investor talk and anxiety around October 19, much more than suggested by the volume of trade, 4. Many investors thought that they could predict the market, 5. Both buyers and sellers generally thought before the crash that the market was overvalued, 6. Most investors interpreted the crash as due to the psychology of other investors, 7. Many investors were influenced by technical analysis considerations, 8. Portfolio insurance is only a small part of predetermined stop-loss behavior, and 9. Some investors changed their investment strategy before the crash.

End

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and government economic policies. Their respondents did not think that banks announcing an increase in interest rates was important at all, whereas in the results I report in Table 2, this had moderate importance. Barron's also found that the decline in the dollar and the recent merger and takeover activities were unimportant.

Start With the results reported here in Table 2, there was little difference between buyers' and sellers' ratings of the news events, with minor exceptions: sellers October 19 were somewhat more impressed than others with Treasury Secretary Baker's statement that the dollar should slip further, and slightly more impressed with the rise of the prime rate.

That nothing stood out in the Table 2 results beyond the price delines may be thought of as perhaps consistent with the general conclusion I was inclined to from previous surveys: that investors may be reacting to price movements themselves on days of big market drops, and not to any specific news stories. However, some of the non-price news stories were rated as almost as important as the news of the price drop itself. Moreover, one question that I wrote with the expectation that it might confirm that people reacted to price movements did not go as I expected. I asked "Suppose that as of October 19, 1987 the same news had occurred except for the news of price drops. Would your evaluation of the market or decisions to buy or sell on October 19 have been substantially different?" Only 18.3% of the individual investors and 34.0% of the institutional investors agreed with this statement (Table 2, Question B.). Perhaps the question was too subtle, and open to alternative interpretations.

Other evidence also suggests that people were not reacting to concrete news stories. In the PILOT2 survey, respondents were asked "Was any news

story, that you read in the paper then, heard from an advisory service, etc., or from anyone else, or any rumor on your mind over the weekend or on that day as a reason to buy or sell that day? Of the 48 respondents who answered, 9 or 19.7% said yes, the remainder no. These were then asked "If yes, can you describe the story or rumor? (Be sure you're describing something you heard on that day. Please try hard to put something down, but don't put something done that really wasn't on your mind then.)" Only 3 put down a genuine news story. Among the others one wrote "a friend who is a securities analyst had informed me two weeks earlier he had pulled all of his clients out of the market." Another wrote "News media stories about 'panic'/'free fall,' 1929 etc," another that "I discussed with my broker on 10/15 and decided to stay calm," another that "news commentators looked grim - like trying hard not to panic people." In PILOT1, respondents were asked the same question regarding the days October 14-16. Of these, 21.6% said yes, but few of these entered any news story, and nothing consistent emerged. Almost all of the responses reported not news stories but advice of brokers and friends, or predictions others made about the future course of the market.

Correct: 18.75%

Much Talk, Much Anxiety, little Action

The survey revealed a remarkable amount of concern and involvement in the stock market among individual and institutional investors, while very few individual investors and only a moderate number of institutional investors actually changed their holdings on October 19.

Almost everyone (96.7%) in the random sample INDIV of individual investors who responded said they had heard of the market crash on the day of the crash. Of these, the average time when the investor became aware of

"above average stock market drops" was 1:56 p. m. Eastern Daylight Time, remarkably early for individuals in the nation as a whole when one considers that this is only 10:56 a. m. Pacific Daylight Time. Only 18.4% of the individual investors in INDIV did not hear of the drop until after 5:00 p. m. local time (as would be the case if they learned of it on the evening news). For institutional investors (INDIV) the average time when they became aware was 10:32 a. m. Eastern Daylight Time. Roughly speaking, they were almost all aware as the event unfolded.

Correct: (INSTI)

The average individual investor in INDIV reported talking to 7.4 other people on the day of the crash, the average institutional investor 19.7 other people. The average individual investor (INDIV) checked the price of stocks 3.2 times on that day. The average institutional investor (INSTI) checked the price of stocks 35.0 times that day.[6]

Many of these people were emotionally involved in the market. The questionnaire asked about actual symptoms of anxiety experienced by respondents (see Table 3, Question A): difficulty concentrating, sweaty palms, tightness in chest, irritability, or rapid pulse. Fully 20.3% of the individual investors in INDIV and 43.1% of the institutional investors answered yes for the date Monday, October 19; substantial percentages answered yes for adjacent days. It is remarkable that such a proportion of the general population reported such specific symptoms of real anxiety at one time.

Moreover, 23.0% of the individual investors and 40.2% of the institutional investors reported experiencing a contagion of fear from other

---

[6]The figure is the number who provided an answer to the question; many did not answer but wrote in the margin "very many times" or "continuously".

investors. Among individual investors who sold on October 19, 53.9% reported experiencing contagion of fear. Moreover, 35.0% of the individual investors and 53.2% of the institutional investors report talking of events of 1929 on the few days before October 19. The percents who spoke of 1929 were even higher for those who sold on October 19. (See Table 3, Questions B and C.)

Despite all this anxiety, most people did not change their holdings of stocks. As we saw from Table 1, only 5.2% of the individual investors surveyed reported actually being net buyers or sellers of either individual corporate stocks, index futures or stock options on October 19. (A higher proportion reported having changed their holdings between October 12 and 19) There were almost four times as many who experienced the symptoms of anxiety. With institutional investors, 31.1% changed their holdings on October 19; slightly less than the percentage reporting experiencing symptoms of anxiety. Thus, there was a lot of talk and anxiety, little action.[7]

End

Many Investors Thought They Knew What the Market Will Do

I asked a question aimed at discovering whether investors thought on October 19 that they knew when a rebound was to occur (Table 4, question A). The point of this question was to learn the motivation of buyers that day. Among individual investors fully 29.2% (or ten times the number of people who actually bought that day) reported yes. Among institutional investors, 28.0% reported yes, well over the percent who bought that day. Respondents were then asked "If yes, what made you think you knew when a rebound would

[7] A Wall Street Journal/NBC News poll Nov. 17-18, 1986 queried 271 adults who said they have an account with a stockbroker. Of these, 67% said they traded financial securities three times a year or less, 16% four to ten times a year, 10% more than ten times a year, and 7% were unsure. Wall Street Journal, Nov. 5, 1987, p. 2.

Start

Table 1. Buyers vs. Sellers

A. Did you buy or sell either individual corporate stocks, index futures or stock options on that October 19, 1987?

	I bought (mostly)	I sold (mostly)	I did not buy or sell
INDIV:	2.9%	2.3%	94.8%
(n=549)	(0.7%)	(0.6%)	(0.9%)
INSTI:	17.7%	13.4%	69.0%
(n=277)	(2.3%)	(2.0%)	(2.8%)

B. What was the change in your holdings in 1987 of stocks (in terms of number of shares or contracts, not value) between each of the following dates (at close of market):

	Holdings Increased	No Change	Holdings Decreased
a. between September 12 and October 12			
INDIV: (n = 383)	18.0%	72.3%	9.7%
	(2.0%)	(2.3%)	(1.5%)
INSTI: (n = 262)	11.1%	44.3%	44.7%
	(1.9%)	(3.1%)	(3.1%)
b. between October 12 and October 19			
INDIV: (n = 383)	4.4%	85.6%	9.9%
	(1.0%)	(2.2%)	(1.5%)
INSTI: (n = 262)	7.6%	64.9%	27.5%
	(1.6%)	(2.9%)	(2.8%)
c. between October 19 and October 20			
INDIV: (n = 383)	4.7%	85.9%	9.4%
	(1.1%)	(1.8%)	(1.5%)
INSTI: (n = 262)	20.6%	66.7%	12.6%
	(2.5%)	(2.9%)	(2.1%)
d. between October 20 and later in week			
INDIV: (n = 383)	15.4%	76.7%	7.8%
	(1.8%)	(2.2%)	(1.4%)
INSTI: (n = 262)	33.6%	50.0%	16.4%
	(2.9%)	(3.1%)	(2.3%)

Note: Standard errors are shown in parentheses.

Table 2. Importance of News Items

Individual (INDIV)					Institutional (INSTI)				
All	Buyers		Sellers		All	Buyers		Sellers	
	October 12-19	19	October 12-19	19		October 12-19	19	October 12-19	19

A. Please tell us how important each of the following news items was to you personally on October 19, 1987 in your evaluation of stock market prospects. Please rate them on a one to seven scale, 1 indicating that the item was completely unimportant, 4 indicating that it was of moderate importance, 7 indicating that it was very important. Please tell how important you then felt these were, and not how others thought about them.

a. Drop in U. S. Stock Prices October 14-16 1987

4.54	5.29	5.12	5.13	5.38	5.23	4.85	5.18	5.77	5.83
(0.07)	(0.35)	(0.41)	(0.29)	(0.46)	(0.09)	(0.45)	(0.22)	(0.15)	(0.21)

b. Drop in Japanese or London Stock Prices that preceded October 19, 1987

3.74	4.19	4.53	4.55	5.00	4.78	4.90	4.83	5.11	5.14
(0.08)	(0.47)	(0.45)	(0.32)	(0.47)	(0.09)	(0.33)	(0.25)	(0.18)	(0.25)

c. The 200 point drop in the Dow the morning of Monday, October 19

5.14	5.69	5.76	5.32	6.54	5.93	6.05	5.86	6.24	6.08
(0.08)	(0.36)	(0.39)	(0.30)	(0.26)	(0.08)	(0.23)	(0.19)	(0.13)	(0.21)

d. Trade deficit figures announced Wednesday October 14, 1987

4.21	3.94	4.24	4.50	4.62	4.21	4.40	4.14	4.75	4.39
(0.08)	(0.43)	(0.33)	(0.30)	(0.46)	(0.09)	(0.33)	(0.24)	(0.19)	(0.28)

e. Producer Price Index figures announced Friday October 16, 1987

3.26	3.13	3.47	3.13	3.23	3.17	3.00	3.22	3.38	3.03
(0.07)	(0.32)	(0.43)	(0.28)	(0.45)	(0.08)	(0.32)	(0.21)	(0.18)	(0.24)

f. Prechter's short-run sell signal the morning of Wednesday October 14

2.17	2.07	3.00	2.49	2.45	2.59	2.80	2.37	3.10	2.94
(0.07)	(0.34)	(0.43)	(0.29)	(0.53)	(0.10)	(0.35)	(0.22)	(0.18)	(0.21)

g. Chemical Bank raising prime rate Thursday October 15

4.14	4.18	4.00	4.58	4.77	3.95	4.25	3.82	4.51	4.28
(0.08)	(0.48)	(0.41)	(0.28)	(0.44)	(0.10)	(0.36)	(0.22)	(0.18)	(0.25)

h. Treasury bond yields hit 10.5%

4.27	4.56	4.41	4.46	4.46	5.57	5.85	5.84	6.01	5.64
(0.08)	(0.49)	(0.42)	(0.34)	(0.47)	(0.08)	(0.22)	(0.16)	(0.15)	(0.25)

i. Baker suggested that the dollar should slip further

4.04	4.50	4.05	4.11	5.31	4.84	4.45	4.67	5.41	5.39
(0.08)	(0.49)	(0.46)	(0.32)	(0.51)	(0.10)	(0.33)	(0.25)	(0.20)	(0.25)

j. U. S. attack on Iranian oil station Monday, October 19, 1987

3.73	3.13	3.53	3.70	3.46	3.32	3.30	2.96	3.61	3.28
(0.08)	(0.49)	(0.39)	(0.31)	(0.39)	(0.10)	(0.33)	(0.25)	(0.20)	(0.25)

k. Other (fill in)

_____

_____

B. Suppose that as of October 19, 1987 the same news had occurred except for the news of price drops. Would your evaluation of the market or decisions to buy or sell on October 19 have been substantially different?

18.3%	12.5%	37.5%	29.7%	53.9%	34.0%	40.0%	48.0%	39.1%	40.0%
(1.6%)	(8.3%)	(12.1%)	(7.5%)	(13.8%)	(2.9%)	(10.9%)	(7.2%)	(5.9%)	(8.2%)

Note: Standard errors are in parentheses. For question B, percents give yes answers relative to those answering question.

Table 3. Investor Anxieties

Individual (INDIV)					Institutional (INSTI)				
All	Buyers		Sellers		All	Buyers		Sellers	
	October 12-19	October 19	October 12-19	October 19		October 12-19	October 19	October 12-19	October 19
A. On which of the following dates did you experience any unusual symptoms of anxiety (difficulty concentrating, sweaty palms, tightness in chest, irritability, or rapid pulse.) regarding the stock market?									
Wednesday-Friday October 14-16, 1987:									
3.7%	5.9%	12.5%	13.0%	7.7%	13.1%	5.0%	12.5%	23.6%	22.2%
(0.8%)	(5.7%)	(8.3%)	(7.4%)	(7.4%)	(2.0%)	(4.8%)	(4.8%)	(5.0%)	(6.9%)
The weekend October 17-18:									
3.3%	5.9%	12.5%	0%	23.2%	15.0%	5.0%	14.6%	31.9%	30.6%
(0.7%)	(5.7%)	(8.3%)	-	(11.7%)	(2.2%)	(4.8%)	(5.1%)	(5.5%)	(7.7%)
Monday, October 19, 1987:									
20.3%	17.6%	18.8%	31.6%	30.8%	43.1%	30.0%	45.8%	51.4%	44.4%
(1.7%)	(9.2%)	(9.8%)	(7.5%)	(12.8%)	(3.0%)	(10.2%)	(7.2%)	(5.9%)	(8.3%)
Tuesday, October 20, 1987									
12.3%	5.9%	18.8%	23.7%	30.8%	30.3%	25.0%	37.5%	37.5%	27.8%
(1.4%)	(5.7%)	(9.8%)	(6.9%)	(12.8%)	(2.8%)	(9.7%)	(7.0%)	(5.7%)	(7.5%)
Wednesday-Friday October 21-3									
7.0%	5.9%	12.5%	13.2%	7.7%	29.2%	25.0%	39.5%	34.7%	30.6%
(1.1%)	(5.7%)	(9.8%)	(5.5%)	(7.4%)	(2.8%)	(9.7%)	(7.1%)	(5.6%)	(7.7%)
B. Do you think you may have personally experienced contagion of fear from other people on October 14-19?									
23.0%	31.3%	35.2%	31.6%	53.9%	40.2%	42.1%	44.9%	47.1%	45.7%
(7.7%)	(11.6%)	(11.9%)	(7.5%)	(13.8%)	(3.0%)	(11.3%)	(7.1%)	(6.1%)	(8.4%)
C. Do you remember thinking or talking about events of 1929 on the few days before October 19, 1987?									
35.0%	17.6%	31.3%	42.1%	46.2%	53.2%	55.0%	61.2%	54.0%	63.9%
(2.0%)	(9.2%)	(11.6%)	(8.0%)	(13.8%)	(3.0%)	(11.1%)	(7.1%)	(5.9%)	(8.0%)

Note: Figures are percent of respondents selecting the item or answering yes from the respondents who answered the question. Standard errors are in Parentheses.

End

Case 3: Swiss franc, 15 January 2015

This introduction is written for this course. It is not part of the sources. It gives the background of the case and explains the terms you need. The original sources follow on the next pages.

Switzerland has its own currency, the Swiss franc (CHF). Its value against the euro changes every second, through trading on the currency market, also called the foreign exchange or FX market. The price is written EUR/CHF: the number of francs you pay for one euro. When the franc gains value, one euro buys fewer francs, and Swiss products become more expensive abroad. The reading says that the franc appreciates when it gains value and depreciates when it loses value.

In 2011 the franc had gained so much value that the Swiss National Bank (SNB), the Swiss central bank, set a minimum exchange rate of CHF 1.20 per euro. The SNB promised to buy as many euros as needed to keep the rate from falling below 1.20. The reading calls this rule the cap, because it capped the value of the franc. The SNB also sets interest rates. In 2014 and 2015 it set them below zero: banks had to pay interest on the money they kept at the SNB, which is called a sight deposit.

Today most currency trading happens on electronic platforms. The research paper in the reading uses data from one of them, called EBS. Traders send orders to the platform: an offer to buy is a bid, an offer to sell is an ask. Some orders wait on the platform until another trader accepts them. The paper calls them GTC orders, and the list of all waiting orders is the order book. Waiting orders provide liquidity, because they let others trade at once. An order that accepts a waiting order, called an IOC order, consumes liquidity. When few orders are waiting, even small trades can move the price a lot.

Many orders are placed by trading algorithms: computer programs that trade automatically. The paper distinguishes human traders, algorithms run by banks ("bank AI") and algorithms run by specialised trading firms ("PTC AI"). The paper also mentions FX options: contracts whose prices show what traders expect the exchange rate to do. It gives all times in GMT. 9:30 GMT is 10:30 in Zurich.

What to read

The sources are the statement made by Thomas Jordan, Chairman of the SNB Governing Board, on the day of the decision, and a research paper published by the Bank of England in 2018.

1. **Thomas Jordan, press conference remarks of 15 January 2015.** Whole text. Reader page 24.
   https://www.bis.org/speeches/20150116-rationale-discontinuing-minimum-exchange-rate-and-lowering-interest-rates
2. **Breedon, Chen, Ranaldo and Vause (2018), *Judgement Day*, abstract.** Reader page 25.
3. **Same paper, sections 4.1 and 4.2.** Printed pages 8 to 12. Reader pages 26 to 30.
   https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2018/judgement-day-algorithmic-trading-around-the-swiss-franc-cap-removal

The source has one printing error. In Figure 5 (printed page 12), the heading of the bottom-right chart should read USD/CHF, not EUR/CHF.

Start

Thomas Jordan: The rationale for discontinuing the minimum exchange rate and lowering interest rates

Introductory remarks by Mr Thomas Jordan, Chairman of the Governing Board of the Swiss National Bank, at the press conference of the Swiss National Bank, Zurich, 15 January 2015.

* * *

Ladies and gentlemen

Thank you for once again accepting our invitation to this press conference at such short notice. Let me begin by explaining the rationale for discontinuing the minimum exchange rate and lowering interest rates. Afterwards, I shall be happy to answer your questions.

Discontinuation of the minimum exchange rate

The Swiss National Bank (SNB) has decided to discontinue the minimum exchange rate of CHF 1.20 per euro with immediate effect and to cease foreign currency purchases associated with enforcing it.

The minimum exchange rate was introduced during a period of exceptional overvaluation of the Swiss franc and an extremely high level of uncertainty on the financial markets. This exceptional and temporary measure protected the Swiss economy from serious harm. While the Swiss franc is still high, the overvaluation has decreased as a whole since the introduction of the minimum exchange rate. The economy was able to take advantage of this phase to adjust to the new situation.

Recently, divergences between the monetary policies of the major currency areas have increased significantly – a trend that is likely to become even more pronounced. The euro has depreciated substantially against the US dollar and this, in turn, has caused the Swiss franc to weaken against the US dollar. In these circumstances, the SNB has concluded that enforcing and maintaining the minimum exchange rate for the Swiss franc against the euro is no longer justified.

Interest rate lowered

At the same time as discontinuing the minimum exchange rate, the SNB will be lowering the interest rate for balances held on sight deposit accounts to –0.75% from 22 January. The exemption thresholds remain unchanged. Further lowering the interest rate makes Swiss-franc investments considerably less attractive and will mitigate the effects of the decision to discontinue the minimum exchange rate. The target range for the three-month Libor is being lowered by 0.5 percentage points to between –1.25% and –0.25%.

Outlook for inflation and the economy

The inflation outlook for Switzerland is low. In December we presented a conditional inflation forecast, which predicts inflation of –0.1% for this year. Since this forecast was published, the oil price has once again fallen significantly, which will further dampen the inflation outlook for a time. However, lower oil prices will stimulate growth globally, and this will influence economic developments in Switzerland positively. Swiss franc exchange rate movements also impact inflation and the economic situation.

The SNB remains committed to its mandate of ensuring medium-term price stability while taking account of economic developments. In concluding, let me emphasise that the SNB will continue to take account of the exchange rate situation in formulating its monetary policy in future. If necessary, it will therefore remain active in the foreign exchange market to influence monetary conditions.

Thank you very much for your attention. I will now be happy to answer your questions.

End



BANK OF ENGLAND

Staff Working Paper No. 711

Judgement Day: algorithmic trading around the Swiss franc cap removal

Francis Breedon,[1] Louisa Chen,[2] Angelo Ranaldo[3] and Nicholas Vause[4]

Start

Abstract

A key issue raised by the rapid growth of computerised algorithmic trading is how it responds in extreme situations. Using data on foreign exchange orders and transactions that includes identification of algorithmic trading, we find that this type of trading contributed to the deterioration of market quality following the removal of the cap on the Swiss franc on 15 January 2015, which was an event that came as a complete surprise to market participants. In particular, we find that algorithmic traders withdrew liquidity and generated uninformative volatility in Swiss franc currency pairs, while human traders did the opposite. However, we find no evidence that algorithmic trading propagated these adverse effects on market quality to other currency pairs.

End

Key words: Swiss franc, algorithmic trading, liquidity, volatility, price discovery, arbitrage opportunities.

JEL classification: G14, G23.

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The views expressed in this paper are those of the authors, and not necessarily those of the Bank of England or its committees. We are grateful to EBS for providing their anonymised and aggregated market data. EBS has not contributed to any of the analysis in the paper and does not endorse or support any of its conclusions. We are also grateful to Patrick Schaffner for excellent research assistance, and participants at the 2016 conference on Microstructure of Foreign Exchange Markets at Cambridge University, the 2016 conference on Financial Determinants of Foreign Exchange Rates at the Bank of England and a 2017 seminar at the Swiss National Bank for their comments. Our title is inspired by that of a related paper, 'Rise of the Machines: algorithmic trading in the foreign exchange market' (Chaboud *et al* (2014)). 'Judgement Day' followed 'Rise of the Machines' in the Terminator film franchise.

The Bank's working paper series can be found at www.bankofengland.co.uk/working-paper/Working-papers

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which represent the effective trading hours of the day. We also exclude weekends, when the EBS trading platform is inactive.[10,11]

The transaction data set records the time stamp to the nearest millisecond of each trade that occurred, along with the actual transaction price, the amount transacted, and the direction of the trade. Importantly for our study, the nature of the party providing liquidity (submitting the good-till-cancelled (GTC) order) and consuming liquidity (submitting the immediate-or-cancel ("IOC") order) is categorised by EBS as human, bank AI or PTC AI.[12] Thus, each trade may be classified according to nine different possible combinations of liquidity provider and consumer. In addition, each trade has an indicator of whether the liquidity provider was the buyer or the seller. We line up these millisecond time-stamped transactions with the quote data, which are available at 100 millisecond intervals, so for a given transaction the top 10 anonymised best bid and ask prices at the nearest previous whole 100 millisecond interval are also available. All quotes are firm and therefore truly represent the market prices at that instant.[13] Unlike in the transactions data, the type of trader that posts each quote is not available to us.

Start

4 Overview of trading patterns around the Swiss franc event

4.1 The Swiss franc event

The Swiss National Bank (SNB) began intervening in FX markets to cap the value of the Swiss franc against the euro on 6 September 2011. In a press release of the same date, the SNB said "the massive overvaluation of the Swiss franc poses an acute threat to the Swiss economy and carries the risk of a deflationary development". Therefore, "it will no longer tolerate a EUR/CHF exchange rate below the minimum rate of CHF 1.20 … and is prepared to buy foreign currency in unlimited quantities" (SNB, 2011).

Following the introduction of this policy, the franc generally traded a little below its cap (Figure 2). It pushed against it for a period in mid-2012, before appreciation pressures again intensified towards the end of 2014 due to weakness in the euro-area economy. In response, the SNB cut its interest rate on sight deposits to *minus* 0.25%. However, commitment to the exchange rate policy appeared to remain firm. On 18 December 2014 the SNB Governor stated that the central bank was "committed to purchasing unlimited quantities of foreign currency to enforce the minimum exchange rate with the utmost determination" (Jordan, 2014). Similarly,

[10] See Chaboud *et al.* (2014) for further discussion of trading activity on the EBS system. In addition, EBS indicated to us that their dealing services are ordinarily open for trading 24 hours a day, 7 days a week, with the exception of a maintenance window that ordinarily occurs from 5:50pm New York time on a Friday until Saturday morning. For the purpose of computing market data products, such as 'highs' and 'lows', EBS regards trades between 5pm Friday New York time and 5am Monday Sydney time as not conducted in normal market conditions or market hours and excludes these trades from the calculations. However, the trades remain in EBS' data.

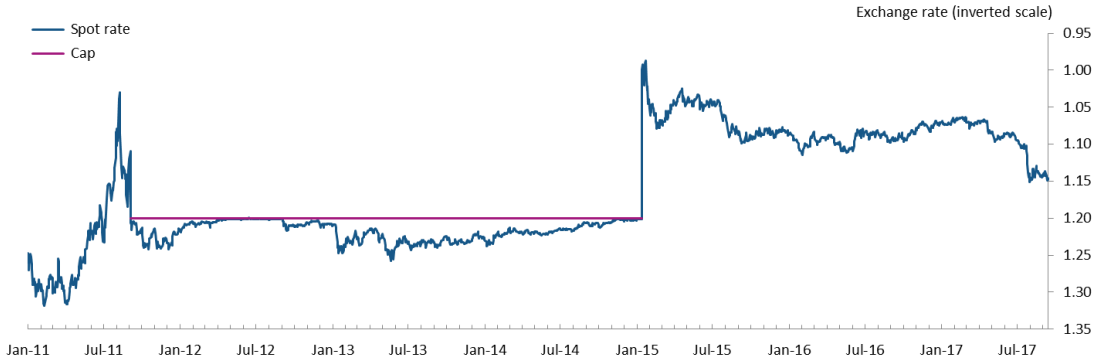
[11] In our sample, we drop five transactions and 24 quotes on EUR/CHF that took place between 09:32:29 GMT and 09:32:39 GMT on January 15, where the price was exceptionally low at 0.0015, with volume of one million of the base currency for each transaction. EBS confirmed that those transactions turned out to be errors made by the traders, and the counterparties have settled solutions outside EBS.

[12] GTC and IOC orders respectively align closely with the concepts of limit and market orders in the broader market microstructure literature.

[13] The historical market data provided by EBS is time-sliced at 100 milliseconds and is therefore a snapshot of the activity during previous time-period. Consequently the quote and paid/given trade data provided are a summary and not a full life-cycle of every event.

on 12 January 2015, another member of the SNB Governing Board said that "we are convinced that the minimum exchange rate must remain the cornerstone of our monetary policy" (Reuters, 2015a).

Figure 2: EUR/CHF exchange rate versus the cap set by the Swiss National Bank



Source: Bloomberg

Despite that, the policy of capping the value of the franc against the euro was discontinued at 9:30 GMT on 15 January 2015. A press release gave the following explanation: "Recently, divergences between monetary policies of the major currency areas have increased significantly. The euro has depreciated significantly against the US dollar and this, in turn, has caused the Swiss franc to weaken against the US dollar. In these circumstances, the SNB concluded that enforcing and maintaining the minimum exchange rate for the Swiss franc against the euro is no longer justified". This news came as a complete surprise to market participants, as was reflected both in FX options prices leading up to the announcement (Mirkov *et al.*, 2016) and financial reporting after it (*e.g.* Reuters, 2015b; Bloomberg, 2015).

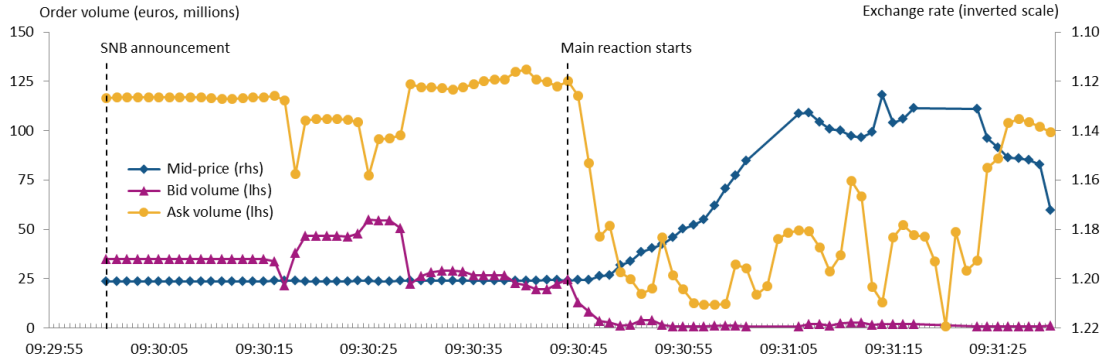
4.2 Overview of trading patterns

In this section we provide an overview of the market reaction to the SNB announcement on 15 January 2015. In particular, we illustrate graphically some of the key features of human and algorithmic trading around the announcement as a prelude to the more formal analysis in the rest of the paper. We first focus on the seconds around the announcement, then the minutes, and finally the hours.

Figure 3 plots the volume of GTC orders to buy ('bid') or sell ('ask') euros for Swiss francs as well as the mid-price, which is the mid-point between the best bid and ask prices, during the 90 seconds following the announcement. Not shown, for reasons of sensitivity, is a sharp fall in outstanding orders to sell francs in the seconds approaching 9:30. While our data from EBS does not include the identities of the institutions submitting the orders, we presume this was driven by the SNB in preparation for its 9:30 announcement. The chart does show that it was not until about 44 seconds after the announcement that the market reacted significantly. At this time, the mid-price started to reflect a very rapid appreciation of the franc, as both sides

of the order book collapsed in size.[14] Indeed, for a few seconds during the minute of 9.31, there were no orders to buy euros in exchange for Swiss francs at any price. We take the delayed response to the announcement as further evidence that it was not anticipated.

Figure 3: EUR/CHF price and orders in the seconds following the SNB announcement



Sources: EBS and authors' calculations.

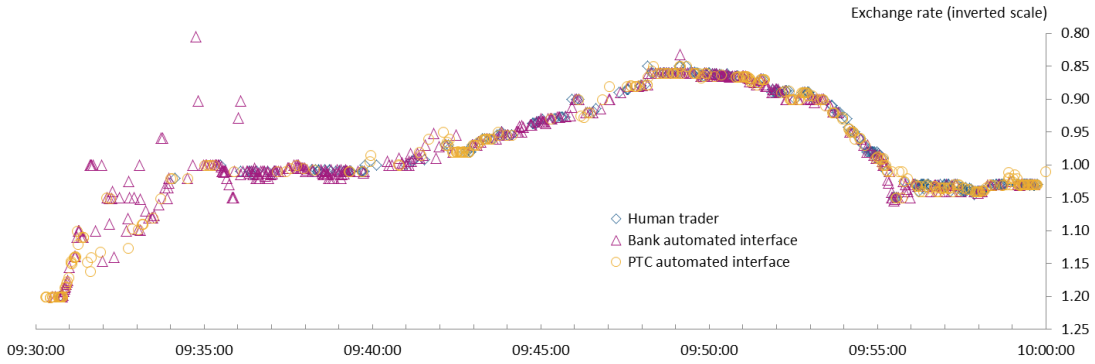
Figure 4 shows the prices at which different types of trader exchanged euros for Swiss francs in the 30 minutes following the SNB announcement depending on whether their trades were consuming liquidity (top panel) or providing it (bottom panel). Trades that consume liquidity result from IOC orders, while those that provide it result from GTC orders. The top panel shows that bank AIs consumed liquidity at extreme prices (prices significantly different to those of immediately preceding trades) on a number of occasions, notably between 9.31 and 9.36. Thus, over 75% of the cumulative appreciation of the franc in the 20 minutes to 9.50 was attributable to bank AIs, which accounted for 61% of the volume of liquidity-consuming trades. Indeed, we show below that bank AIs accounted for an even larger share of the realised variance of the EUR/CHF rate at this time. The lower panel shows that bank AIs also provided liquidity for some of the extreme-price trades. That bank AIs both consumed and provided liquidity at extreme prices may reflect the diverse set of traders from whom these trades may originate. This includes not only the different banks but also their various clients. In addition, a roughly equal number of extreme-price trades were accommodated by human traders. Indeed, human traders accounted for a significantly higher share of liquidity-providing trades (50%) than they did for liquidity-consuming trades (19%) during the 20 minutes to 9.50 when the Swiss franc appreciated sharply.[15]

[14] We thank Alain Chaboud for pointing out to us this 'Wile E. Coyote' moment, in which a significant portion of the orders underpinning the value of the euro against the franc were withdrawn but it was not until seconds later that the price started to fall.

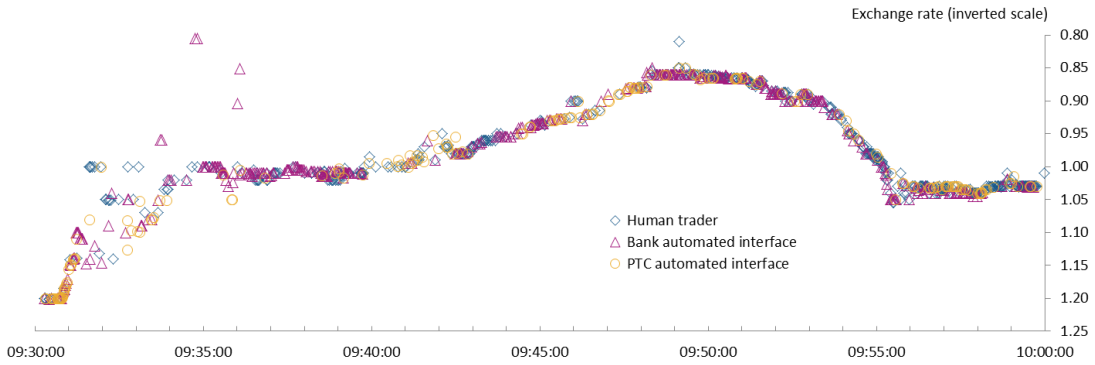
[15] Figure 4 excludes trades that we infer (as discussed later) may have involved the SNB, though we found few such trades in the first twenty minutes after the announcement.

Figure 4: EUR/CHF trades in the minutes following the SNB announcement[(1)]

By type of trader consuming liquidity (i.e. supplied the IOC order)



By type of trader providing liquidity (i.e. supplied the GTC order)

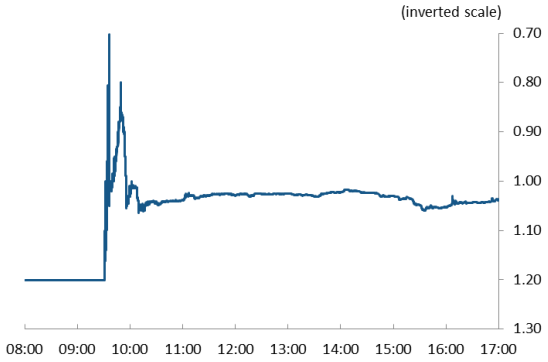


[(1)] Each data point plotted in the charts represents a simple average of trade prices within a given second. Due to averaging, the prices in the top and bottom panels need not be identical.
Sources: EBS and authors' calculations.

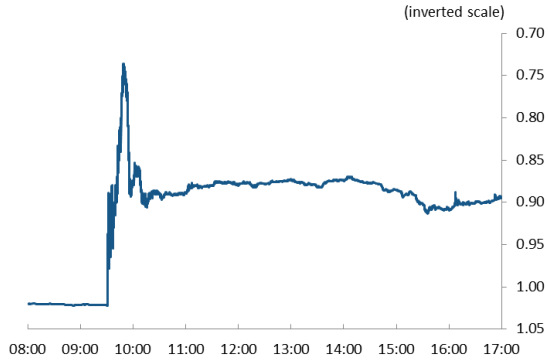
Figure 5 gives an overview of the reaction of both the EUR/CHF and USD/CHF markets to the SNB announcement over the whole trading day of 15 January 2015. The first row shows that the Swiss franc appreciated extremely sharply against both 'base' currencies in the first 20 minutes following the announcement, but that sizeable portions of these gains were reversed in the subsequent hour. After that the two spot rates were much more stable, with the Swiss franc worth about 10% more than at the start of the day. The second row shows that algorithmic traders were net purchasers of Swiss francs over the day, particular bank AIs against the euro and PTC AIs against the US dollar, while human traders were net purchasers of the base currencies. Thus, computers traded 'with the wind', buying the franc as it appreciated, while humans 'leaned against the wind'. Note, however, that human traders did not make net purchases of the base currencies in the key 20-minute period immediately after the announcement. Finally, the third row shows that human traders were consistently net suppliers of liquidity over the day, while PTC AI trades consumed it. However, as we shall see below, net liquidity consumption by PTC AIs is not unusual in these two currency-pairs.

Figure 5: Market reaction on the day of the SNB announcement

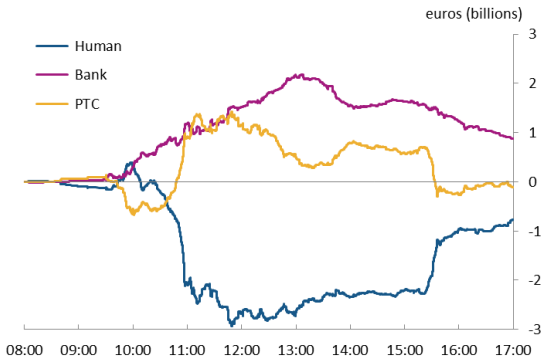
EUR/CHF: spot exchange rate



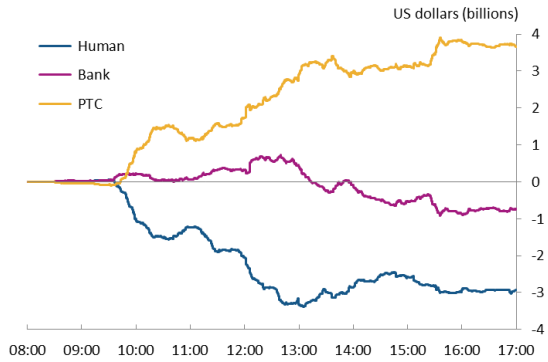
USD/CHF: spot exchange rate



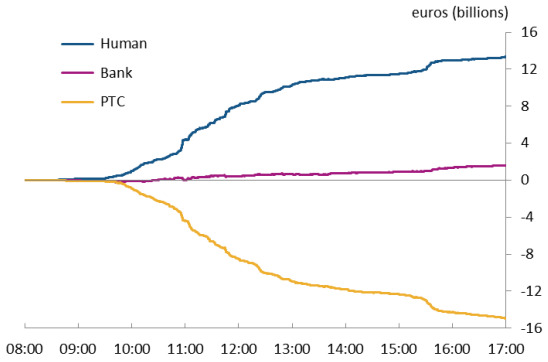
EUR/CHF: cumulative net purchases of CHF



USD/CHF: cumulative net purchases of CHF

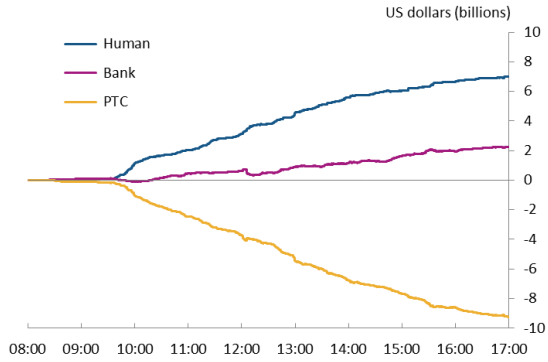


EUR/CHF: cumulative net liquidity provision



EUR/CHF: cumulative net liquidity provision

Correct: USD/CHF



Sources: EBS and authors' calculations.

Overall, our graphical overview suggests that algorithmic traders contributed both to the liquidity dry-up (as they were net consumers of liquidity) and the price move (as they were net purchasers of the appreciating currency) after the SNB announcement. In the following sections, we examine these issues in more detail.

End