1 Introduction

The world financial crisis of 2008 threatened to destroy the international monetary system, and would have done so if governments and central banks had not prevented it. There had been several financial crises in the previous forty years, including the Latin American debt crisis of the early 1980s, the Nordic banking crises of the early 1990s and the Asian crisis of 1997–98. However, the crisis of 2007–09 was on a different scale. Its essential difference was that it endangered the continued existence of many of the largest financial companies in the world, and consequently threatened to do devastating damage to much of the world economy. It was a global systemic crisis rather than a serious regional crisis. In that respect, the only comparably serious event in the previous century was the banking crisis of 1931, which not only threatened but actually destroyed the international monetary system of that time. When the crisis struck in 1931, governments and central banks could not prevent the severe recession that had begun in 1929 from turning into the global Great Depression.

At the time of writing in early 2012, the global economic outlook is overshadowed by the euro-area sovereign debt crisis, which has remained unresolved since it emerged in the spring of 2010. That crisis may in some part be regarded as a consequence of the crisis of 2008, in that the public finance problems of Ireland and Spain have arisen from the need to support commercial banks, and the public finance problems of other euro-area countries have been aggravated by the recession that followed the 2008 crisis. Nevertheless, the euro-area crisis largely reflects problems within the euro area, notably payments imbalances among the member countries and persistent public finance problems in some of them. It can be regarded as an event separate from the 2008 crisis. This book is confined to the 2008 crisis, and a comparison with 1931; a comparable analysis of the euro-area crisis would be premature.

The book describes how the 2008 crisis was propagated from country to country, and how it was contained by the actions of central banks, led by the Federal Reserve, and governments. It compares the two crises, and argues that the crisis of 2008 was much better managed than that of 1931, largely because the gold standard, which was still in operation in 1931, prevented any adequate response to the earlier crisis. The fact that global economic growth resumed in 2009 testifies to the success of governments and central banks in short-term crisis management. Nevertheless, the crisis management of international liquidity in 2008 relied heavily on ad hoc action by the Federal Reserve, and the crisis exposed inadequacies in the normal management of international liquidity. These inadequacies are now being addressed, both by individual countries and by international bodies such as the G20 and the International Monetary Fund. The book discusses possible solutions, and explores the ways in which the crisis may affect macroeconomic policies.

The world financial crisis broke surface in 2007, when it became clear that defaults on mortgages in the United States were rising alarmingly and that many securities backed by mortgages were worth nothing like what the market had previously assumed. There was a contagious reaction, as Chapter 2 describes. It became very difficult to use US mortgages to raise funds, either by selling them or by using them as collateral for borrowing. The wholesale financial markets in which banks and other financial companies borrowed money to finance their lending dried up.[1] In the United Kingdom, too, banks were unable to sell UK mortgage-backed securities, and Northern Rock, whose business model depended on doing just that, had to be provided with emergency liquidity by the Bank of England and subsequently nationalised, even though, according to the UK Financial Services Authority, it was solvent, exceeded its regulatory capital requirement and had a good quality loan book.[2] The difference between the eurodollar interest rates (the cost of borrowing to banks) and US Treasury yields widened sharply in August 2007 (see Figure 1.1).

In all, the household mortgage losses of banks in the United States and Europe in the years 2007–10 were about $560 billion, or 4.7 per cent of their total mortgage assets.[3] The losses were the equivalent of

[1] See FCIC (2011a), ch. 13.
[2] Cited in Bank of England statement of 14 September 2007 (www.bankofengland.co.uk/publications/news/2007/090.htm).
[3] IMF (2010a), table 1.2.

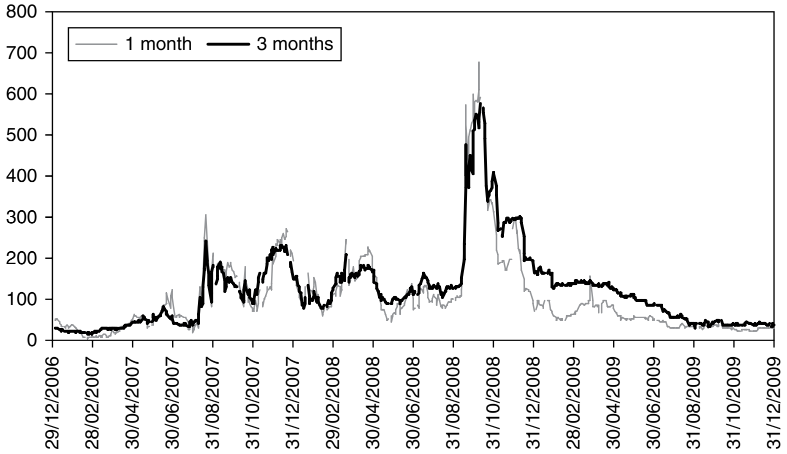

Figure 1.1 The 'TED spread': difference between eurodollar interest rates and US Treasury yields (basis points).
Source: Federal Reserve Table H15, author's calculations.

about 1 per cent of the world's annual gross product. This is a large amount, but not nearly as large as the amounts lost as a result of the ensuing financial crisis, which caused the largest recession since the Great Depression of the 1930s. World output, which had grown at 5.2% in 2007, decelerated to 2.8% in 2008 and contracted by 0.6% in 2009. Even if world output returns very quickly to its former growth path, which would require extremely rapid growth in the next few years, there will have been a permanent loss equivalent to a multiple of the original mortgage losses. The losses will therefore be quite disproportionate to the shock which was their immediate cause, which is prima facie evidence that the financial system was in an unstable condition when the shock occurred. Nevertheless, this book will argue that the outcome would have been much worse had it not been for the prompt emergency provision of international liquidity by the Fed.

Central banks responded to the events of August 2007 by providing additional liquidity in massive amounts, and by accepting a wider range of assets as collateral than hitherto. Governments extended deposit insurance schemes. In most cases these measures were sufficient, and were adopted quickly enough, to contain the crisis, though the United Kingdom experienced its first bank run since the nineteenth

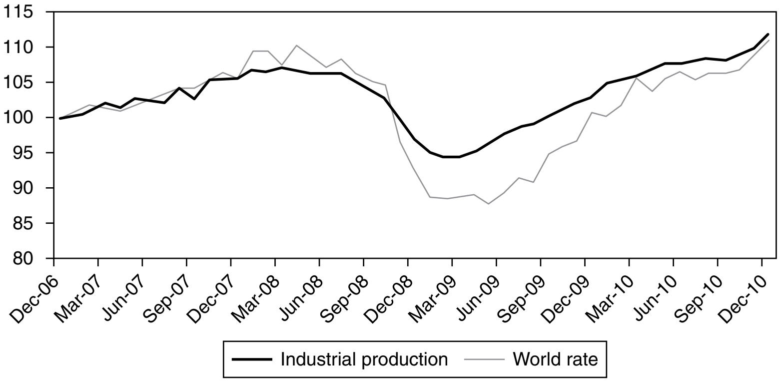

Figure 1.2 World activity indicators (indexes, December 2006 = 100, seasonally adjusted).
Source: CPB Netherlands Bureau for Economic Policy Analysis.

century when depositors queued to withdraw money from Northern Rock.

With the passage of time it became increasingly clear that, for some financial companies, the problem was not just one of liquidity but that there was also a threat to their solvency. Bear Stearns, a New York broker-dealer, was taken over by J.P.Morgan in March 2008, in an operation managed by the Federal Reserve, which was concerned about the risk of financial instability if Bear Stearns failed. In order to facilitate the transaction, the Fed accepted considerable financial risk: it lent \$28.8 billion to the buyer, J.P.Morgan, against the collateral of Bear Stearns' mortgage assets and without recourse to J.P.Morgan. The news that Bear Stearns had needed to be rescued caused additional problems for banks in borrowing money to finance their lending (see Figure 1.1). During this period, the problems of the financial industry had no dramatic effects on the economy at large. World trade continued to increase from August 2007 to April 2008 (see Figure 1.2). After April 2008, it fell, but only moderately.

The crisis became acute when Lehman Brothers filed for bankruptcy on Monday 15 September 2008, after attempts to find a private buyer for it had failed. On the same day, Bank of America announced that it would take over Merrill Lynch, whose survival had been in doubt. On Tuesday 16 September, the Fed rescued American International Group. Interest rate spreads blew out to their widest levels yet (Figure 1.1).

There was extensive financial contagion in US financial markets, as uncertainty about the scale of the exposures to the now-insolvent Lehman Brothers caused doubts about the solvency of a wide range of other financial companies.

A run on money market mutual funds began when the net asset value of shares in the Reserve Primary Money Market Fund, which had lent to Lehmans, fell below $1 ('broke the buck') on Tuesday 16 September. On Friday 19th, the Fed announced that it would finance commercial banks' purchases of high-quality asset-backed commercial paper from money market mutual funds, and the Treasury announced a temporary guarantee programme for money market mutual funds.

Noting that Lehman Brothers, a non-bank broker-dealer, had been allowed to fail despite its systemic importance, hedge funds withdrew massive quantities of cash and unsecured assets from other non-bank broker-dealer companies that had been providing them with prime brokerage services. Securities markets dried up. Banks knew that they would have to meet pre-arranged commitments to lend to borrowers who could no longer borrow in commercial paper and other markets. To protect themselves against unforeseeable contingencies, they added massively to their cash assets, mainly in the form of deposits with the Fed. The pressures thus created led to a 'collateral squeeze'. There was a general surge in demand for cash and liquid assets or assets which could be turned into cash even in the stressed market environment of the time.[4] This had the effect of sucking dollar funds from abroad into the United States. It was in this acute phase that the crisis caused major problems for international liquidity and began to do serious damage to the world economy.

The flow of dollars home to the United States meant that banks in other countries were unable to roll over the short-term wholesale dollar borrowing with which they had been financing longer-term dollar assets, many of which were claims on US borrowers. They could either sell the assets, or find other financing. The first option was difficult in the prevailing illiquid markets and would have depressed asset prices further and compounded the existing stresses in US financial markets. The second option was also difficult and unattractive. Non-US banks

[4] For accounts of these events, see Paulson (2010), FCIC (2011a), chs 18–20 and the timeline available on the Federal Reserve Bank of St Louis website (http://timeline.stlouisfed.org/index.cfm?p=timeline).

were able to borrow from their home central banks in their home currencies, but the markets in which they could swap their home currencies for dollars quickly became stressed and illiquid.

Central banks outside the US had the option of using their own foreign exchange reserves to provide dollar liquidity to their domestic commercial banks, but few were both willing and able to do so. The Fed itself solved the international liquidity problem by greatly extending the size and geographical scope of the swap lines that it had set up in 2007, and providing dollars for foreign central banks to on-lend to local commercial banks to replace the dollars that had been pulled back to the United States. In doing so, it took both financial and political risks; nevertheless, it acted promptly and decisively.

International liquidity stresses were not confined to dollars. There were also large homeward flows of yen to Japan and of Swiss francs to Switzerland. The yen flows were the result of the unwinding of some of the yen carry trades that had been established after Japanese interest rates fell to very low levels in the late 1990s. The unwinding of these carry trades had serious macroeconomic effects in the countries, such as New Zealand, which had earlier received large capital inflows from Japan. The Swiss franc flows were largely from Hungary, Poland and Austria, where many mortgages had been denominated in Swiss francs, on account of the low level of interest rates in that currency.

Amid these vast flows of funds caused by distress within the financial system, the credit needs of many bank customers were not met, and many credit lines were abruptly curtailed. According to the Fed's quarterly Senior Loan Officer Survey, credit conditions for commercial and industrial borrowers in the fourth quarter of 2008 were at their tightest since the survey was first published in 1990. Surveys conducted by the European Central Bank and the Bank of England also showed very tight credit conditions at that time.[5] Trade credit insurance suddenly became very expensive and hard to get. The volume of world trade fell by 7.8% (seasonally adjusted) between October and November, and by February 2009 it had fallen by 15.4%. World industrial production

[5] These surveys are available on the websites of the sponsoring central banks. See www.federalreserve.gov/boarddocs/SnLoanSurvey/default.htm, www.ecb.int/stats/money/surveys/lend/html/index.en.html and www.bankofengland.co.uk/publications/other/monetary/creditconditions.htm.

fell by 8.1% between October 2008 and February 2009 (see Figure 1.2).

The swap lines that were provided, particularly those provided by the Fed, were provided promptly. They prevented bank failures that would have made the global recession much more serious, and thereby prevented the financial crisis from having far worse consequences than it actually had. They demonstrated enlightened self-interest on the part of the United States. However, in different circumstances, they might not have been forthcoming. For example, the Fed might have been less sensitive to market developments, or less conscious of the need to respond to them. Or if political sentiment in the United States had been more isolationist, it might have been impossible for the Fed to provide funds to other financially important countries, even though it was clearly in the interests of the United States for it to do so.

Problems of bank liquidity within a single currency area can be managed if the local central bank is able and willing to act as 'lender of last resort' by providing emergency liquidity promptly and in as large amounts as are needed, at high interest rates and against good collateral, as recommended by Bagehot in 1873, and as practised by the Bank of England in various nineteenth-century banking crises. International liquidity problems are inherently more difficult to manage because there is no acknowledged international lender of last resort. Nevertheless, the globalisation of finance has brought with it the globalisation of liquidity problems. The Fed acted decisively as an ad hoc international lender of last resort in 2008, but it cannot be assumed that a future international liquidity crisis could be managed in the same way as the recent one.

For a period in 2008 and early 2009, the spectre of the Great Depression of the 1930s hung over the global economy, and there were serious concerns about 'tail risks'. If the crisis had been badly managed, the tail risks might have materialised, and a comparison of the recent crisis with the one which happened eighty years earlier is therefore pertinent. The economic boom of the 1920s ended in June 1929, when world output reached its peak. The equity market famously collapsed in October. The United States was affected more quickly and more severely than countries in western Europe, and the monetary policies of the Federal Reserve have been widely blamed for failing to combat the depression effectively.[6] Bank failures had been fairly widespread in the United States during the 1920s,[7] but they increased sharply in 1930 and 1931. In the absence of effective deposit insurance, they played an important role in aggravating the depression.[8] In Europe, the initial economic downturn was less severe, but the collapse of Creditanstalt, the largest bank in Austria, in May 1931, set off banking crises in Hungary and Germany, as well as Austria itself. Those countries' gold and foreign exchange reserves were quickly exhausted by the support provided to distressed domestic commercial banks, and they imposed restrictions on foreign payments. London banks had large short-term claims on borrowers in central Europe, which suddenly became illiquid. As a result, the financial stress was transmitted to London, the financial centre of Europe. The international liquidity position of the UK was already fragile, in that the Bank of England's gold reserves were much smaller than the UK's short-term external liabilities. There were large withdrawals of funds from the UK and associated sales of sterling. The Bank of England tried vainly to support sterling by foreign official borrowing but eventually abandoned the gold standard in September 1931. This marked the end of the attempt to recreate the pre-war international monetary system in post-war conditions. Other countries, notably France, maintained the gold standard for several more years, but were ultimately forced to abandon it, against a background of high unemployment, weak output and growing political instability in Europe.

It is obviously of the highest importance to understand the reasons why so many bank assets went bad, and why banks incurred such enormous losses, so that the necessary institutional changes can be considered and put into effect. However, this book is concerned with first aid rather than diagnosis and cure. Much research has been done on diagnosis and cure. For example, Acharya, Carpenter, Gabaix *et al.* (2009) discuss the corporate governance of large complex financial institutions (LCFIs), many of which came under severe stress during 2008. They distinguish between 'equity governance', which is the responsibility of corporate boards, and 'debt and regulatory

[6] See Almunia, Bénétrix, Eichengreen, O'Rourke and Rua (2010), Maddison (2010) for information on output. On the role of the Federal Reserve, see for example Meltzer (2003).
[7] See Board of Governors of the Federal Reserve System (1976), p. 281.
[8] See e.g. Friedman and Schwartz (1963), Bernanke (2000).

governance', which is at least partly the responsibility of regulators. As regards equity governance, they comment that:

> It is hard to say how many of the large losses we have seen were the result of inefficient risk choices and how many were simply bets gone awry. But there are several reasons why even a strong equity governance system could have given rise to risky strategies with the outcomes that we have observed. Gaming of TBTF [too big to fail] guarantees, priced deposit insurance, and coarse capital requirements would all have led to similar strategies even if equity governance was effective.[9]

However, Acharya *et al*. also identify three reasons why equity governance may have been weak, namely:

i. Some LCFIs are so enormous that even the largest investors hold only a small fraction of the equity, which is not enough to make it worthwhile for them to incur the costs of becoming activist investors.
ii. LCFIs are so complex that it is difficult for board members, or potential acquirers, to exert discipline on the management.
iii. Entry into the banking industry is difficult, owing to high fixed costs and to capital requirements, so that competition is unable to exert discipline on managements.

Acharya *et al*. suggest that the second of these reasons also made it difficult for regulators to ask relevant hard questions.[10]

Just as this book does not attempt to analyse the causes of the crisis, nor is it primarily concerned with the development of the crisis in the year between August 2007, when sub-prime mortgage concerns caused liquidity in financial markets to dry up, and September 2008, when Lehman Brothers failed. Its focus is on how the crisis developed and was propagated internationally, and how it was managed, in its acute phase after Lehman Brothers failed. It describes why liquidity conditions became critical in the United States, and how the shortage of liquidity in the United States created localised shortages of dollar liquidity in other countries, and how the prompt emergency actions of the Federal Reserve relieved the shortages and thereby prevented

[9] P. 191.
[10] For more information on diagnosis and cure, see Shiller (2005), Reinhart and Rogoff (2009) and Davies (2010).

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the crisis from having far graver consequences. It also describes how localised shortages of other currencies emerged outside their home countries, and what measures were taken by central banks to relieve them. In other words, it is about crisis management rather than crisis prevention.

This book compares the acute phase of the recent crisis with that of 1931. It finds parallels in the way in which the two crises were propagated from country to country. As regards the management of the two crises, it concludes, consistently with the currently prevailing consensus, that the gold standard exerted a malign influence in the 1930s by preventing central banks from pursuing policies that might have alleviated the depression.[11] The management of the recent crisis was certainly not perfect, but it was decisively better than that of the 1930s.

Some might say that the recent crisis was fundamentally about the solvency of banks, that the liquidity crisis was just a symptom of that fundamental problem, and that the overriding priority is therefore to reduce the risks to bank solvency in future. Reducing the risks to bank solvency is certainly extremely important, but the example of Northern Rock shows that a bank judged to be solvent can nevertheless be destroyed if it has inadequate liquidity. The main official response to the crisis has been the Basel 3 programme, which intensifies the stringency of bank regulation by increasing minimum capital requirements and imposing for the first time internationally agreed minimum liquidity requirements. Whatever the merits of the programme, it would surely be unwise to assume that it will eliminate the risk of future crises.

The crisis has exposed the need for new thinking, not only about financial regulation but also about international liquidity. Many central banks simply did not have enough foreign exchange reserves to provide foreign currency liquidity support to commercial banks in their territories during the recent crisis. The book therefore reviews the development of international liquidity over the past four decades, since the collapse of the Bretton Woods structure. It discusses the main influences on reserve-holding behaviour, which have varied enormously among countries; so much so that a single country (China) held on its own 26.6 per cent of global foreign exchange reserves

[11] See Eichengreen (1992).