

THE EVOLUTION OF THE FINANCIAL CRISIS OF 2007–8

Ray Barrell* and E. Philip Davis**¹

Abstract: The financial crisis that started in August 2008 reached a climax in the autumn of 2008 with a wave of bank nationalisations across North America and Europe. Although banking crises are not uncommon, this is the largest since 1929–33. This paper discusses the build-up to the crisis, looking at the role of low real interest rates in stimulating an asset price bubble. That bubble was stocked by financial innovation and increases in lending. New financial products were not stress tested and have failed in the downturn. After discussing the bubbles we look at the collapse of the complex asset structure, and then put the crisis in the context of the literature. The paper concludes with a discussion of policy implications of the crisis, and advocates a significant improvement in the regulatory structure.

Keywords: Financial crises; asset bubbles; securitised assets; financial sector regulation

JEL Classifications: E44; G18

* National Institute of Economic and Social Research, e-mail r.barrell@niesr.ac.uk. **National Institute of Economic and Social Research and Brunel University, e-mail: e_philip_davis@msn.com.

Introduction

Although financial crises such as that currently underway tend to be seen as surprising and unusual when they occur, in fact they are common events, particularly in the period since 1970. For example, Demirgüç Kunt and Detragiache (2005) use a sample of 77 systemic crises over the period 1980–2002 in their research. Over 1970–2002, Caprio *et al.* (2005) found 117 episodes of systemic banking crises (with much or all of bank capital being exhausted) in 93 countries. They also found 51 episodes of borderline and non-systemic banking crisis in 45 countries over the same period. As Davis and Karim (2008) detail, seven systemic crises took place between 1980 and 2000 in advanced OECD countries, with minor crises in the US, Portugal and Italy, and large-scale systemic crises in the four countries listed in table 1. Other, more moderate crises have also taken place in OECD countries over this period, and are included in some of the lists referred to above. This would suggest that serious banking crises can take place with a probability of about one in fifty in any year in any OECD country, which is approximately 2½ standard deviations away from the mean. They are so common that strong defences should be built against them.

Table 1 Selected banking crises and their effects

	Date	Duration	direct cost to taxpayers*	output loss (% of GDP)
Japan	1991-2001	10 years	14.0	71.7
Norway	1989-1992	4 years	3.4	27.1
Sweden	1991-1994	4 years	2.1	3.8
Finland	1991-1994	4 years	10.0	44.9

* Per cent of annual GDP at end of episode Source: Barrell and Hurst (2008) and Hoggarth and Saporta (2001)

The Nordic crises were sharp and had a significant effect on output, and they were associated with rapid and poorly designed financial deregulation that led to excessive consumer and commercial real estate borrowing and housing market and commercial property bubbles. The collapse of consumption spending and commercial real estate companies that came with the pricking of asset bubbles was a factor behind large-scale losses in the banking sectors, as were exposed positions in foreign exchange dealings. Real house prices fell 30 per cent in Finland between 1991 and 1993, whilst they fell by 25 per cent in Sweden over the same period. In both countries essentially the whole banking system had to be nationalised. Output losses, commonly calculated as the cumulated drop below trend growth, were large, but there seems to have been little effect on longer-term growth prospects.

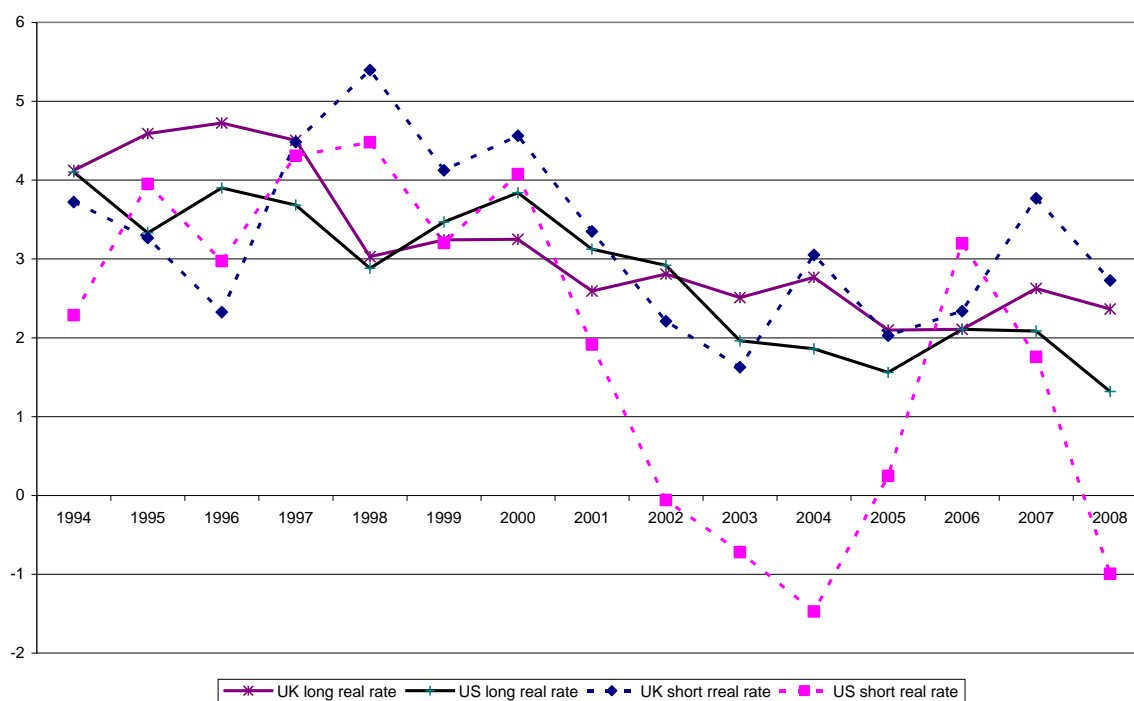
The Japanese crisis also followed from ill-judged deregulation and an expansion of borrowing but involved fewer failures. The crisis lasted for a significantly longer period and the cumulated output loss appears to have been large. The economy was also trapped in a period with zero interest rates, making monetary policy essentially ineffective. It was driven as much by falling commercial property prices after an extreme bubble and by corporate sector over-indebtedness as by personal sector problems, and it led to a re-evaluation of risk premia in Japan, raising the user cost of capital and reducing trend output growth for some time. The Japanese crisis probably has had a permanent effect on the sustainable level of output in that economy. Fast resolution may have been a wiser option. In this paper we look at the build-up to the current global crisis, the events of the past fifteen months, and then at some implications of theory for policy.

Precursors of the crisis

The structural background in the period 2000–7 was one of low global interest rates, arising in turn from high levels of global liquidity as countries such as China² built up current account surpluses and foreign exchange reserves, maintaining artificially low exchange rates and a positive saving investment balance. As a result of such pressure, global real interest rates fell after 2001 and long-term real rates were probably 100 or more basis points below their level of the previous decade. This in turn contributed to rapid credit expansion and rising asset prices which preceded the crisis.

Another contributor to the asset bubbles and the crisis was low short-term real interest rates arising from the monetary stance in countries such as the US, as we can see from figure 1. These low rates in turn prompted a hunt for yield on the part of banks and institutional investors. Financial innovations sought to provide higher returns to serve this desire, but the consequence was higher risk and/or increased opacity e.g. via higher credit risk in structured products and sub-prime loans.

Figure 1: Real Interest rates in the UK and the US



This pattern of innovation also fostered an accelerating shift of banks from holding loans on balance sheet to relying on securitisation (which in turn reduced the incentive to monitor loans). They profited from origination fees without having to suffer from capital requirements or a need to raise liabilities to cover the assets. Banks also held increasingly low levels of on-balance-sheet liquid assets, given low interest rates, and they undertook aggressive wholesale liability management to maintain funding levels. Furthermore, banks shifted risk to off-balance-sheet conduits and special investment vehicles (SIVs) in order to save capital under Basel 1 rules.³ More generally, scope for securitisation and the impression of liquidity it gave, high credit ratings on asset backed securities (ABSs) and the seeming precision of risk

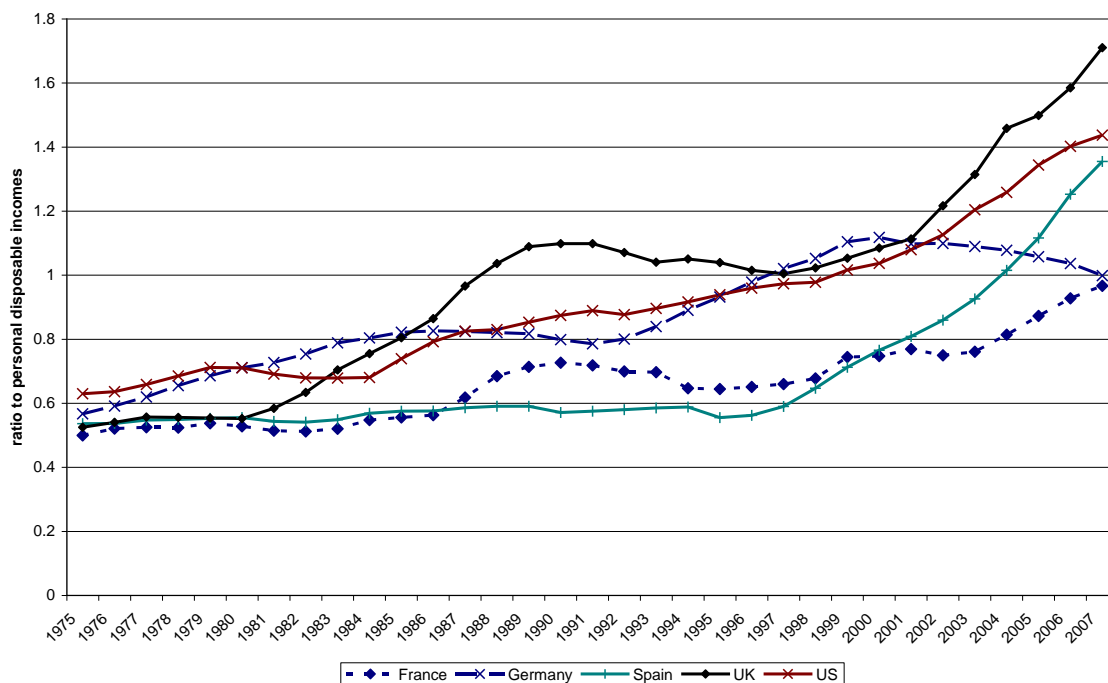
² Barrell and Choy (2005) suggested that the strength of the Chinese current account was responsible for over half of the decline in real interest rates between the late 1990s and the early part of this decade.

³ The capital charge on credit lines to such subsidiaries was less than that of holding the assets on balance sheet.

models based on inadequate data may have lulled banks into taking on more credit risk than they otherwise would.

Lending to households grew at unprecedented rates, as we can see from figure 2, especially in Spain, the US and the UK, where house prices also rose rapidly. The lending was often to types of borrower (notably sub-prime and buy-to-let borrowers) who had been previously excluded or quantity rationed, especially in the US, and to a lesser extent in the UK. Figure 3 plots real house prices in the UK and the US, showing that in both countries they rose far above their longer-term trend. This of course could have been due to structural factors, as Cameron *et al.* (2006) suggest, but simpler analyses such as Barrell, Kirby and Riley (2004), which did include the impacts of the real interest rate decline, lead us to think that house prices were 30 per cent or more above fundamentals in the past few years in the UK for example. Figure 3 suggests that house prices are similarly overvalued in Spain and France, and perhaps a little less so in the US. In all these countries borrowing had expanded rapidly

Figure 2 Personal sector borrowing as a proportion of disposable incomes



The asset price bubble in the years up to 2007 was perhaps most noticeable in real estate, but real equity prices also looked strong, albeit buoyed by a high profit share as well as by low real interest rates. As can be seen from figure 4, the value of the stock market as compared to nominal GDP in the US and the UK in 2007 was probably below its peak in the previous bubble at the turn of the decade. In France and Spain peaks had been regained, but signs of overvaluation for 2007 as a whole were not as strong as for house prices. Looking alternatively at real equity prices, they weakened into 2008, and, as we can see from figure 5, at their peak they had been just below the top of the 2000 market in real terms in the UK and France. On the other hand, they were well above that peak in Spain and the US, even after the crisis had begun.

Figure 3 Real House Prices

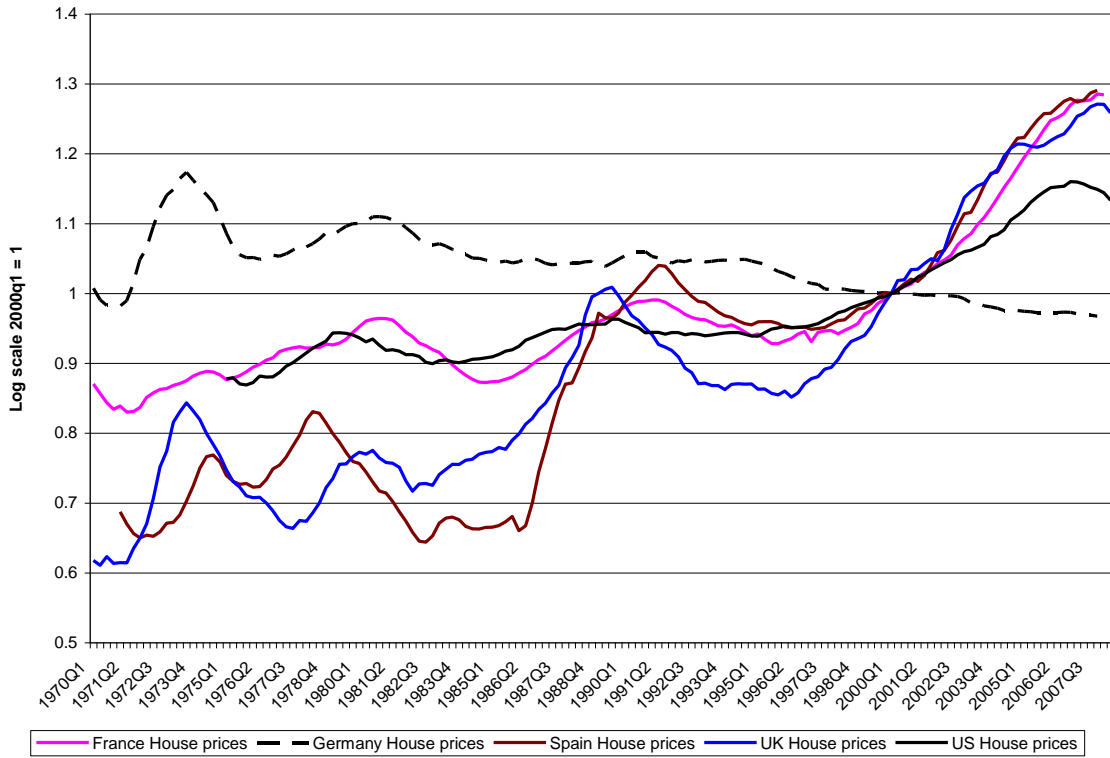


Figure 4 Stock market capitalisation as a proportion of Nominal GDP

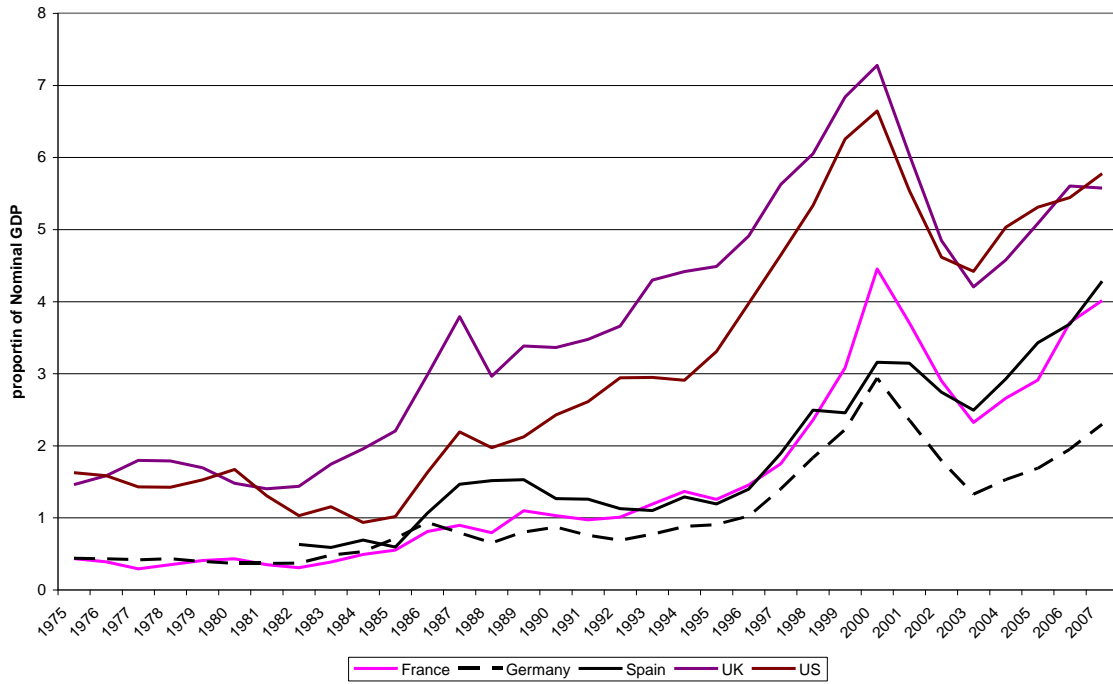
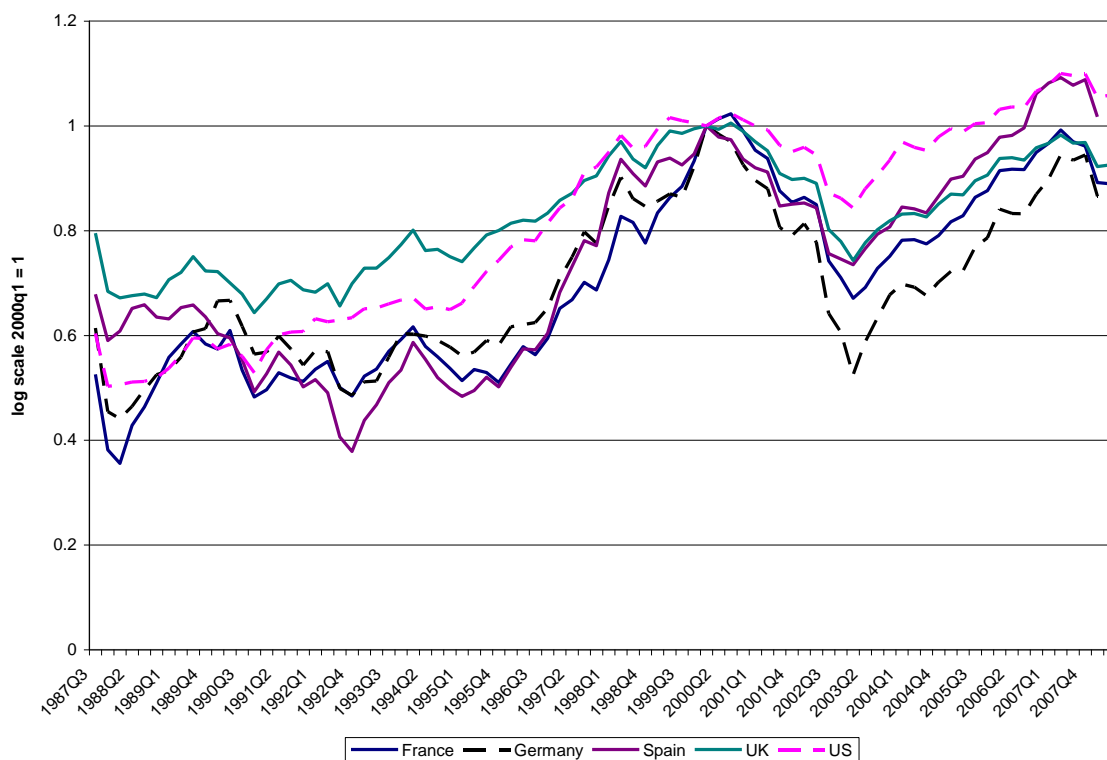


Figure 4 Real Equity Prices



At a deeper level, it can be argued that the pattern of asset price bubbles also reflected policy errors. One aspect is the monetary policies, notably in the US, which were a partial cause of low nominal and real interest rates. The monetary stance was initially eased as a response to the equity bear market of 2000–3, whose feared deflationary impact they sought to counteract. But it can be argued that the equity price fall was soon more than offset by a debt-financed housing boom in many OECD countries, which gathered strength as equity prices recovered in 2003–4. This was not counteracted by monetary policy that stayed ‘too loose for too long’, especially in the United States. Even from an inflation targeting point of view, as in the UK and Euro Area, it can be argued that wealth effects of the housing bubble were inadequately taken into account.

Moreover, there were failures of regulation. As noted in Davis and Karim (2008) many central banks have developed ‘macroprudential surveillance’ in recent years, with teams of analysts producing financial stability reviews. These in turn have often highlighted the risks of high leverage by home owners, accompanied by house prices above sustainable levels. They also, albeit to a lesser extent, saw the risks of opaque financial innovations and the risk of a liquidity crisis in the financial markets as in 1998 (the Russia-LTCM episode). The problem is that beyond speeches by Central Bank Governors (moral suasion), there were no effective policy instruments for macroprudential action in the hands of these central banks beyond the interest rate, which was devoted to price stability. They could, as in the case of Sweden, have ‘leaned against the wind’ in the context of inflation targeting, as Wadhvani (2008) suggests, but that was not considered appropriate in the UK or the US. It appears that the UK central bank seemed relaxed about the house price bubble, believing that it was not a major support for demand or a problem if it burst. The US authorities were convinced they could mop up the bubble once it burst. They can, but at a much greater cost to the US and the global economy than they had anticipated.

The situation was arguably aggravated by the fragmentation of microprudential regulation in the US, its separation from the Central Bank in the UK in 1997 and the lack of a unified

regulator in the EU (Barrell and Davis, 2005). All of these arguably contributed to a division of microprudential and macroprudential regulation. In this context, although capital adequacy regulation continued to be focused on avoiding systemic risk as well as individual institution failure (and hence a difference between ‘regulatory’ and ‘economic’ capital), there seems to be a tendency to greater focus in recent years on micro efficiency at the cost of macro stability. The sharp potential reductions in capital needs when banks adopted the advanced internal ratings-based (IRB) approach under Basel 2 is a symptom of this. Another is the lack of response of regulators to the concerns expressed in Financial Stability Reports by central banks, given that they had the scope to warn institutions against the background of a threat of tighter capital standards. A third is the tendency of the financial system to become increasingly pro-cyclical, as pointed out repeatedly by the BIS (Borio, 2005; Borio *et al.*, 2001). The Spanish approach of requiring higher provisions from institutions with rapidly growing balance sheets shows the scope for better integration of micro and macroprudential policies, in that, although it did not prevent a major debt and real estate boom, it has left Spanish banks in a reasonable state of robustness. However, the Spanish banking system became more reliant on wholesale funding than others in Europe, and it has been the major user of the ECB’s short-term facilities. Hence its business model, which was similar to that of Northern Rock, was not robust to a crisis where interbank interest rates rose.

Looking more closely at European issues, over the past decade or so the European Commission has created a Single Market in financial services, and has recognised the need for a single, or at least coordinated, regulatory framework. Little was done in response to this felt need, and solvency concerns were left in the hands of home regulators, whilst host regulators could only concern themselves with the liquidity of foreign banks (in the case of branching). This took place as EU banks grew highly dependent on wholesale funding, often cross border, that eventually proved unreliable. The inadequacy of this approach is best illustrated by the problems of the Icelandic banking system, which had been predicted by many commentators for some years. Icelandic banks took retail deposits in many countries and invested in equity assets (directly or via lending) as if they were holding companies or hedge funds. There was little regulators in the UK or elsewhere could do about this, and Icelandic banks built up asset bases that summed to more than ten times Iceland’s GDP. Accordingly, bank failures following liquidity crises, which on standard definitions of crises often involve losses of 10 per cent or more of assets, could not easily be covered.

Events of the crisis⁴

2007 saw growing realisation of potential losses on sub-prime mortgages as US house prices fell and defaults increased. Whereas initial estimates in July 2007 quoted by Fed Chairman Bernanke were for \$50–100 billion in losses, by February 2008 Greenlaw *et al.* were forecasting \$500 billion, and by October 2008 the IMF (2008b) was reasonably sure that losses could be as high as \$1.4 trillion, around \$450 billion more than the figure they had suggested as a possibility in April 2008. The capital reserve assets of the US banking system in 2007 were not much larger than this number, and if all defaults had been contained within the system, it would have failed. As Honohan (2008) notes, over half of the assets backed by sub-prime loans had been offloaded, mainly on European banks. There had also been a significant amount of recapitalisation from sovereign wealth funds in the early months of the crisis as Greenlaw *et al.* (2008) note, with up to \$400 billion raised, much of which was subsequently lost by the investors as bank equity prices fell in 2008.

⁴ This section draws on Davis (2008) and IMF (2008a and b).

These losses, along with uncertainty and concern about asymmetric information due to the opaque structures of related structured asset-backed securities (ABS), combined to generate sales of such assets. Sales led in turn not just to price falls but also to market liquidity failure for the over-the-counter (OTC) markets for the ABS. Prices fell and trading became difficult or impossible even among the lowest risk tranches of the relevant securities. As noted by ECB (2008), price falls affected not only the standardised instruments such as index-based collateralised debt obligations (CDOs) but also the 'bespoke' structures that are not normally traded but which are nonetheless marked to market, since implicit prices for the latter are derived from the former. Furthermore, Scheicher (2008) shows econometrically that there was indeed a major element of concern over market liquidity and lower risk appetite in accounting for the fall in prices/rise in spreads and not only credit risk. Such liquidity and risk aversion effects are omitted from standard CDO pricing models.

This liquidity failure was aggravated by rising margin requirements, which limited the freedom of action of speculative investors such as hedge funds, and led them to sell holdings of ABS. It was also worsened by lesser risk capital allocated to market making in such products due to the rise in volatility and lesser revenues to investment banks, which limited their ability to take risks.

The rush to sell securitised assets may also have been worsened by the impact of mark-to-market accounting on the capital of leveraged institutions and reliance on quantitative techniques of trading and risk management that assume continuous liquidity (IMF, 2008a). Long-term investors may have been constrained from taking contrary positions that could have renewed market liquidity due to excessive leverage (e.g. of hedge funds) and consequent credit restrictions in the context of mark-to-market accounting. Later the ban on short selling further constrained hedge funds' freedom of action.

Banks were impacted rapidly by the market liquidity failure for securitised loans due to mark-to-market pricing, so price falls affected solvency. This was unlike banking crises in the past where loans have typically been held at historic cost with no specific price. Furthermore, the fact that a great many ABSs were held in conduits and SIVs spread the contagion, since these institutions require financing in the market for asset-backed commercial paper. Doubts by money market funds regarding the ABS that the conduits and SIVs held led on to a market-liquidity collapse of the asset backed commercial paper (ABCP) market also, which meant sponsoring banks had to take the assets back onto their balance sheets. The extensive holding of US ABSs by EU banks and related conduits and SIVs spread the impact internationally.

Meanwhile, traders' attempts to hedge, meet margin calls or realise gains in safer or more liquid markets, transmitted the demand for liquidity contagiously, affecting liquidity in other markets. Market makers in a range of markets were often unwilling to trade at posted prices (IMF, 2008a) due to uncertainty, volatility and concern about default risk of counterparties.

There are also new patterns in funding-liquidity risk which link from market-liquidity risk. Banks were unable to securitise the mortgages and other loans they were issuing owing to the liquidity collapse of the ABS market. They also experienced calls on back-up lines of credit for conduits and SIVs unable to issue ABCP. Accordingly, banks hoarded liquidity in order to provide sufficient funding for their ongoing business. This hoarding was aggravated by fear of counterparty risk in the interbank market due to other banks' undisclosed losses on ABS from credit and liquidity risk. Mark to market becomes a highly uncertain process when liquidity collapses (ECB, 2008), giving rise to concern that assets of counterparties are mismeasured. One consequence of these problems of funding-liquidity risk was the failure of the solvent UK mortgage bank Northern Rock, which had an aggressive wholesale funding ratio and had

been relying on securitising assets, which was no longer feasible (UK Parliament, 2008). In contrast, the US bank Countrywide was able for a time to rely on liability insurance contracts that limited scope for a run, a feature not present in earlier crises.⁵

These combined features led on to the emergence of historically large premia – and quantity-rationing of funds – in the domestic interbank markets in the US, UK and Euro Area, at all but overnight maturities, alongside the securities markets. Funding at three months in particular became very difficult to obtain. These patterns in turn meant that funding-liquidity risk was closely related to market-liquidity risk. Banks were vulnerable to this linkage due to their low holdings of liquid assets, growth in reliance on short-term wholesale funding,⁶ dependence on securitisation and the rise in overall maturity mismatch on their balance sheets related to SIVs and conduits. Banks in the wake of this sought to reduce balance sheet lending, at the same time that borrowers were rendered cautious by house price falls, leading to unprecedented falls in mortgage lending. Central banks offered massive volumes of liquidity to supply banks and sought to restart the interbank funding markets. Beyond Northern Rock, failures in 2007 included two small German banks. The casualties of this ongoing pattern in 2008 were much more important. They included Bear Stearns (taken over with government guarantees), IndyMac (failed) and Fanny Mae and Freddy Mac (effectively nationalised).

The ongoing process unleashed by the crisis can be referred to as deleveraging (IMF, 2008b), as banks and other institutions sought to reduce exposure to high risk sectors, selling assets or reducing asset growth, as well as reducing dependence on unstable wholesale funding and rebuilding capital adequacy. Arguably, it is also involving a reduction in the excess capacity that has built up in the financial system over many years (Davis and Salo, 1998). The process is aggravated by the ongoing fall in asset prices and rise in private sector defaults on loans, as noted above, as well as by closure of securitisation markets, notably in Europe. By September 2008 it seemed that the crisis was ongoing, but not worsening. However, following the bankruptcy of Lehman Brothers (unsupported by the authorities) in mid-September, there was a sharp worsening of market conditions and the process of deleveraging became disorderly as counterparty risk perceptions ballooned.

The equity market, which had been surprisingly little affected by the crisis up to that point, began to fall sharply. This particularly reflected low confidence in banks that were dependent on wholesale funding, because markets for such funds, that had previously been costly and restrictive, proved to be totally closed to such institutions after Lehman's failure. Cross-border lending was even more sharply curtailed than domestic, showing again the historic instability of the international interbank market (Bernard and Bisignano, 2000). Money market funds in particular underwent losses when Lehman's collapsed, and this led to them 'breaking the dollar' and needing support from the Federal Reserve. They underwent massive redemptions (\$320 billion in one week), as did hedge funds and mutual funds, leading to forced asset sales which intensified the downward spiral in asset prices. Instead of offering liquid funds to banks, money market funds began rather to compete with them for financing. The Fed had to start purchasing commercial paper directly from non-financial companies to avoid a liquidity crunch for them. A large number of creditors, including significant hedge funds, had their assets frozen in the Lehman bankruptcy, and were forced to find alternative funds, adding to selling pressure in equity markets.

⁵ Goodhart (2007) however, notes that such liability insurance is not a resolution for a systemic crisis, it merely relocated liquidity risk.

⁶ Bradley and Shibut (2006) show US banks' ratios of deposits to liabilities has fallen from 93 per cent in 1965 to 60 per cent since 2000.

The authorities acted in the wake of the worsening of market conditions. The US authorities devised and passed the Paulson plan, which was designed to restore liquidity to the markets by using \$700 billion to buy up mortgage backed securities. However, this plan did not address the solvency of the banks directly, and left many exposed. The American Insurance Group (AIG) had made a major foray into insuring complex products, and had lost most of its capital base when default rates rose to ten times those on which policies were based. It, along with Bradford and Bingley in the UK, had to be nationalised in succession. Merrill Lynch and Wachovia were taken over. Washington Mutual was closed by regulators and sold to JP Morgan Chase. The remaining US investment banks had to become bank holding companies.

Banks dependent on cross-border financing were hardest hit. For example, the two major Belgian banks have had to be nationalised and all three Icelandic banks failed in October. Significant public sector stakes totalling £37 billion were taken in three major lenders in the UK, HBOS, RBS and Lloyds, in order to ensure their solvency, while guarantees were offered for their liabilities and the Bank of England expanded its swap facility for illiquid assets. The effective nationalization of a large part of the UK banking sector ensured that this system would remain solvent, and a number of European countries announced that they would also strengthen the equity base of banks by taking a public share. It also appeared that the Paulson plan could be redirected to the same purpose, and in mid-October \$250 billion was made available to US banks to increase their capital adequacy ratios with public stakes in their equities being taken in return. The lessons of the Nordic crisis had been noted, albeit a month later than would have been wise.

Public intervention had been made urgent by the fact that the equity market seemed to foresee a liquidity crisis for many banks when medium-term funding became due in coming years. The UK bank HBOS seemed close to failure until it was announced that a takeover by Lloyds would occur. In the week of 6–10 October, stock markets around the world fell by 25 per cent, despite approval of a rescue package for US banks and the announcement of a yet more comprehensive plan to support UK banks' capital and liquidity. Emerging markets, that had hitherto been relatively unscathed, began to be badly affected (IMF, 2008b) as external finance became much harder to obtain.

Theories of financial instability

Financial crises differ in their details but are similar in essentials. A number of traditional theories of financial instability can be discerned in the literature, which help us to understand both past events and the current turmoil (Davis, 1995; 2003). A selective synthesis of these theories is needed for accurate understanding, no single theory has a monopoly of wisdom.

- **Debt and financial fragility** theory suggests that financial crises follow a credit cycle with an initial positive shock (displacement) provoking rising debt, mispricing of risk by lenders and an asset bubble, which is punctured by a negative shock, leading to a banking crisis. These patterns are seen as a normal feature of the business cycle (Fisher, 1933; Kindelberger, 1978; Minsky, 1977).
- **Monetarist** views are that bank failures impact on the economy via a reduction in the supply of money. Crises tend to be frequently the consequence of policy errors by monetary authorities generating 'regime shifts' that, unlike the business cycle, are impossible to allow for in advance in risk-pricing (Friedman and Schwartz, 1963).
- **Uncertainty** as opposed to risk (in the sense of Knight, 1921) can be seen as a key feature of financial instability, in that, unlike the cycle, one cannot apply probability analysis to rare and

uncertain events such as financial crises and policy regime shifts and hence price risk them correctly. Financial innovations are subject to similar problems when their behaviour in a downturn is not yet experienced. Uncertainty is linked closely to confidence, and helps to explain the frequently disproportionate responses of financial markets in times of stress in response to adverse shocks (Shafer, 1986), as investors change their decision processes and not merely their risk perceptions.

- **Disaster myopia and credit rationing** suggests that competitive, incentive-based and psychological mechanisms in the presence of uncertainty lead financial institutions and regulators to underestimate the risk of financial instability, accepting concentrated risks at low capital ratios. The pattern leads to sharp increases in credit rationing when a shock occurs (Guttentag and Herring, 1984; Herring and Wachter, 1999; Herring, 1999).
- **Asymmetric information and agency costs** implies that these aspects of the debt contract, which generate market failures of moral hazard and adverse selection, help to explain the nature of financial instability e.g. credit tightening as interest rates rise and asset prices fall (Mishkin, 1991; 1997), or the tendency of lenders to make high risk loans owing to the shifting of risk linked to agency problems (Allen and Gale, 1999; 2000).
- **Bank runs** suggest that the basic ingredient of crises is panic runs on leveraged institutions such as banks which undertake maturity transformation, generating liquidity crises (Diamond and Dybvig, 1983); such theory can also be applied to failures of securities market liquidity, as all market participants seek to sell simultaneously (Davis, 1994; 1999; 2008).
- **Industrial** aspects are that effects of changes in entry conditions in financial markets can both encompass and provide a supplementary set of underlying factors and transmission mechanism to those noted above (Davis, 1995), as for example entry of new intermediaries leads to deterioration of information for existing players and heightened uncertainty about market dynamics.

As noted, the crisis was centred on a series of market liquidity failures, which, as detailed in Davis (2008), are comparable to a bank run on a liquid market that changes liquid securities to illiquid loans, following a shock that makes asset holders and traders uncertain of the value of the underlying assets. The market liquidity failure also reflects contagion via market price changes (Adrian and Shin, 2008). Financial institutions are seen to manage balance sheets actively in response to price changes and measured risk. There is seen to be a positive relation between changes in leverage of commercial banks and balance sheet size, as they have taken on behaviour patterns hitherto more typical of investment banks. In an upturn, when balance sheets are strong, banks see leverage as too low and seek to expand balance sheets via increased lending and incurrence of short-term liabilities. This is seen as boosting aggregate liquidity across the economy as a whole, as was available to lend to sub-prime borrowers in the run-up to 2007. Then, when there is a shock to market prices, as occurred due to heightened perceptions of credit risk and the collapse of market liquidity in 2007, financial institutions that mark to market find their leverage too high and seek to contract their balance sheets – which entailed ceasing to lend in the interbank market.

Brunnermeier (2008) talks of four ‘amplifying mechanisms’ for liquidity risk, which amplify small shocks. These are first, borrowers’ balance sheet effects comprising a loss spiral (as an initial loss on a leveraged balance sheets leads to a decline in net worth, sales and price movements, leaving net worth worse...) and a margin spiral (as increased margins lead to deleveraging and sales which cuts prices and increases margins further...). Second is a lending channel effect (notably precautionary hoarding of liquidity). Third are runs on

institutions and markets (including the interbank, ABCP and investment bank repo markets). Fourth are network effects as caution expressed by Goldman Sachs about swap netting exposing Goldman to Bear Stearns led hedge funds to avoid holding liquidity with Bear as prime broker and helped accordingly in its demise.

Beyond the concept of market liquidity failure, we contend that all of the theories of crisis are relevant to understanding the events. For example, in terms of ‘financial fragility’ the crisis linked strongly to an asset price bubble which was fuelled by underpriced credit. There came a time of realisation that the situation was unsustainable (sometimes called a ‘Minsky moment’), leading in turn to tightening of credit, asset price falls and bank failures. The ‘monetarist’ approach would highlight the regime shift to laxity that took place from 2000 onwards, and the warranted tightening from 2004–6 which nevertheless exposed the weaknesses of the US housing market and overleveraged borrowers. Although not strictly monetarist, the regime shift from open to closed wholesale (including interbank) markets that began in August 2007 was almost wholly unexpected even by central banks, as highlighted in Davis and Karim (2008).

The ‘uncertainty’ approach can highlight the financial innovations that were highly opaque and wholly untested in a downturn. Related ‘disaster myopia’ seems to have pervaded both financial institutions and most policymakers in the boom period, sharpening the incidence of credit rationing after August 2007 as risk loving changed sharply to risk aversion. We argue that there were two turning points in the crisis when intense uncertainty led to a change in decision processes, not merely in perceptions of risk. The first was the announcement by BNP Paribas in August 2007 that their funds investing in ABS could not be valued, which brought on the initial interbank market failure. The second was the failure of Lehman’s in September 2008, which seemingly changed agents’ views of what institutions are ‘too big to fail’, unleashing immense systemic risks.

In terms of ‘agency costs’, the incentives to underprice credit came partly from the transfer of risk from informed to uninformed parties, a process that entails risk shifting by its nature. Asymmetric information was worsened by the opacity of the structured credit products and helps to explain the failure of wholesale funding markets, since banks were uncertain about ‘toxic assets’ on others’ balance sheets. The ‘industrial’ approach shows us that securitisation enabled a wide range of new players to enter markets for origination of loans and also investment in them. The former worsened the adverse selection of loans which is at the heart of the crisis. The latter include hedge funds, SIVs and conduits. This in turn gave rise to heightened risks to banks that were either providing credit directly or had backup lines to them. Hedge funds’ short selling, and later forced sales of assets, have also been central to falling asset prices in securities markets.

Policy responses

The short-term response to the crisis is clearly to seek to recapitalise banks and both guarantee liabilities and provide extensive central bank liquidity, until market conditions return to normal. These are classic and appropriate responses to systemic financial crises, a situation of panic, flight to quality, and widespread contagion. The aim is to reassure the public that financial disorder will be limited and to stop panic runs – by public announcements and visibility (Hoelscher and Quintyn, 2003). Other policies that may emerge are guarantees of all liabilities of banks and further interest rate cuts. All of these attempt to minimise damage to the non-financial sector due to credit rationing, as occurred following bank failures in the Great Depression (Bernanke, 1983).

In the longer term there is a need for better regulation to reduce procyclicality – the Spanish scheme appears a good one to ensure loan losses of this type do not recur. A loan to value limit could also be considered, with a maximum percentage of the initial value of an asset which lenders could foreclose against. However, the problems are actually threefold – bad lending leading to losses giving rise to liquidity problems, complex instruments leading to confusion, and excessive reliance on wholesale markets. So far the authorities have only dealt with the first. There is a need for further regulation of complex instruments or an increase in capital held against them. It is a moot point whether securitisation will or should recover to the extent it had in 2007, given the flaws in monitoring to which it gives rise. Also there is a need to change reliance on wholesale funds, which could be by raising capital requirements for banks that have high wholesale funding ratios. However, as Goodhart (2008c) notes, all such regulatory initiatives will have to take careful note of the ‘boundary problem’ whereby regulation of core institutions leads to disintermediation to an unregulated sector.

It can be argued that one key root cause of the crisis has been the decision in the 1980s and 1990s to move away from structural⁷ regulation to an almost sole concern with the efficiency of the financial system. Both should be of concern to regulators, and the costs and benefits of both should have been balanced. Efficient financial markets increase welfare, reduce risk premia and raise sustainable output. They also have a tendency to produce products that become widely adopted before they are stress tested. If they fail when tested, as have the majority of asset backed security innovations of the past decade, they can cause huge damage, as they have. This could have been prevented by better regulation. It is not only the focus of regulation that will have to change. Even though we do not advocate turning back the clock to the era before deregulation, there would appear to be some limits to current practice of prudential regulation that mean further prudential tightening and even some direct controls on bank activities may be needed. European wide financial markets need a single regulatory structure that ensures the solvency as well as the liquidity of all financial institutions in the European Economic Area. There may also be global regulatory issues to address once the dust has settled.

REFERENCES

- Adrian, T. and Shin, H. S. (2008), ‘Liquidity and financial contagion’, in *Banque de France Financial Stability Review: Special Issue on Liquidity*, No. 11, pp. 1–7.
- Allen, F. and Gale, D. (1999), ‘Bubbles, crises and policy’, *Oxford Review of Economic Policy*, 15/3, pp. 9–18.
- (2000), *Comparing Financial Systems*, MIT Press
- Barrell, R. and Choy, A. (2005), ‘The impact of China on the world and UK economies’, *Treasury Committee*, House of Commons HC 314 i–ii.
- Barrell, R. and Davis, E.P. (2005), ‘Policy design and macroeconomic stability in Europe’, *National Institute Economic Review*, 191, pp.94–105.
- Barrell, R., Kirby, S. and Riley, R. (2004), ‘The current position of UK house prices’, *National Institute Economic Review*, 189, pp.57–60.
- Bernanke, B.S. (1983), ‘Non monetary effects of the financial crisis in the propagation of the Great Depression’, *American Economic Review*, 73, pp. 257–76.
- Bernard, H. and Bisignano, J. (2000), ‘Information, liquidity and risk in the international interbank market: implicit guarantees and private credit market failure’, BIS Working Paper No. 86.
- Bradley, C. and Shibut, L. (2006), ‘The liability structure of FDIC-insured institutions: changes and implications’, *FDIC Banking Review*, 18(2), pp. 1–37.
- Borio, C. (2005), ‘Monetary and financial stability, so close and yet so far’, *National Institute Economic Review*, 192, pp. 84–101.

⁷ Structural regulation sought to control banks’ activities and thereby limit competition that might cause financial instability.

- Borio, C., Furfine, C. and Lowe, P. (2001), 'Procyclicality of the financial system and financial stability: issues and policy options', BIS Papers no 1, pp. 1–57.
- Brunnermeier, M. (2008), 'Deciphering the 2007/8 liquidity and credit crunch', *Journal of Economic Perspectives* (forthcoming).
- Cameron, G., Muellbauer, J. and Murphy, S. (2006), 'Was there a British house price bubble? Evidence from a regional panel', CEPR Discussion Papers 5619, Centre for Economic Policy Research.
- Caprio, G., Klingebiel, D. Laeven, L. and Noguera, G. (2003), 'An update of the Caprio-Klingebiel database, 1996, 1999', Banking Crises Database, October.
- Davis, E.P. (1994), 'Market liquidity risk', in Fair, D. and Raymond R. (eds), *The Competitiveness of Financial Institutions and Centres in Europe*, Kluwer Academic Publishers.
- (1995), *Debt, Financial Fragility and Systemic Risk*, revised and expanded version, Oxford University Press.
- (1999), 'Russia/LTCM and market liquidity risk', *The Financial Regulator*, 4/2, Summer, pp. 23–8.
- (2003), 'A typology of financial crises', in *Financial Stability Review*, No 2, Austrian National Bank.
- (2008), 'Liquidity, financial crises and the lender of last resort – how much of a departure is the subprime crisis?', Paper presented at the Reserve Bank of Australia conference, 'Lessons from the financial turmoil of 2007 and 2008', 14–15 July.
- Davis, E.P. and Karim, D. (2008), 'Could early warning systems have helped to predict the sub-prime crisis?', *National Institute Economic Review*, 206, October.
- Davis, E.P. and Salo, S. (1998), 'Excess capacity in EU and US banking sectors – conceptual, measurement and policy issues', LSE Financial Markets Group Special Paper No. 105.
- Demirgüç-Kunt, A. and Detragiache, E. (2005), 'Empirical analysis of the causes and consequences of banking crisis', *National Institute Economic Review*, April.
- Diamond, D. and Dybvig, P. (1983), 'Bank runs, deposit insurance and liquidity', *Journal of Political Economy*, 91, pp. 401–19.
- ECB (2008), 'How has CDO market pricing changed during the turmoil?', *European Central Bank Financial Stability Review*, June, pp. 154–62.
- Fisher, I. (1933), 'The debt deflation theory of great depressions', *Econometrica*, 1, pp. 337–57.
- Friedman, M. and Schwartz, A. J. (1963), *A Monetary history of the US 1867–1960*, New York, NBER.
- Goodhart, C.A.E. (2007), 'Liquidity risk management', Financial Markets Group special paper 175, London School of Economics.
- (2008a), 'The regulatory response to the financial crisis', LSE Financial Markets Group Special Paper no. 177.
- (2008b), 'Liquidity and money market operations, a proposal', LSE Financial Markets Group Special Paper No. 179.
- (2008c), 'The boundary problem in financial regulation', *National Institute Economic Review*, 206, October.
- Greenlaw, D., Hatzius, L., Kashap, A. and Shin, H.S. (2008), 'Leveraged losses: lessons from the mortgage market meltdown', US Monetary Policy Forum, February.
- Guttentag, J.M. and Herring, R.J. (1984), 'Credit rationing and financial disorder', *Journal of Finance*, 39, pp. 1359–82.
- Herring J. (1999), 'Credit risk and financial instability', *Oxford Review of Economic Policy*, 15/3, pp. 63–79.
- Herring, J. and Wachter, S. (1999), 'Real estate booms and banking busts, an international comparison', Working Paper 99–27, Wharton Financial Institutions Center, University of Pennsylvania.
- Hoelscher, D.S. and Quintyn, M. (2003), 'Managing systemic banking crises', IMF Occasional Paper.
- Honohan, P. (2008), 'Risk management and the costs of the banking crisis', *National Institute Economic Review*, 206, October.
- IMF (2008a), 'Containing systemic risks and restoring financial sector soundness', *Global Financial Stability Report April 2008*, Washington DC, International Monetary Fund.
- (2008b), 'Financial stress and deleveraging', *Global Financial Stability Report April 2008*, Washington DC, International Monetary Fund.
- Kindleberger, C.P. (1978), *Manias, Panics and Crashes, A History of Financial Crises*, New York, Basic Books.
- Knight, F.H. (1921), 'Risk, uncertainty and profit', Boston, No. 16 in a series of rare texts in economics, republished by the LSE.
- Minsky, H.P. (1977), 'A theory of systemic fragility', in Altman, E.I. and Sametz, A.W. (eds), *Financial Crises*, New York, Wiley.
- Mishkin, F.S. (1991), 'Asymmetric information and financial crises: a historical perspective', in Hubbard, R.G. (ed.), *Financial Markets and Financial Crises*, Chicago, University of Chicago Press.

—(1997), ‘The causes and propagation of financial instability: lessons for policymakers’, in *Maintaining Financial Stability in a Global Economy: A Symposium*, U.S. Federal Reserve Bank of

Kansas City, August.

Scheicher, M. (2008), ‘How has CDO market pricing changed during the turmoil? Evidence from CDS index tranches’, ECB Working Paper (*forthcoming*).

Shafer, J.R. (1986), ‘Managing crises in the emerging financial landscape’, *OECD Economic Studies*, 8, pp. 56–77.

UK Parliament (2008), ‘The run on the rock’, House of Commons Select Committee Report.

Wadhvani, S. (2008), ‘should monetary policy respond to asset price bubbles? Revisiting the debate’, *National Institute Economic Review*, 206, October.