

THE CRISIS: POLICY LESSONS AND POLICY CHALLENGES

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Highlights

- There are three different, non-mutually exclusive lines of explanation for the crisis: wrong incentives in the financial sector, unsustainable macroeconomic outcomes, and misunderstood and mismanaged systemic complexity. These yield different sets of policy recommendations.
- Steps have been taken to address several issues – overhaul of financial regulation, supervisory reform, changes in the monetary policy framework – but some crucial themes are still to be addressed.
- On the regulatory front, moral hazard, separation of retail and investment banking, the desirable size of the financial institutions, and the impact of new capital regulations on the cost of capital have to be resolved.
- On the macro-financial front, the crisis has shown that economic policy must encompass risk-management, and has raised questions about the role of central banks in financial stability. There is no agreement as to how much current-account imbalances contributed to financial instability, and the history of peer-pressure-based surveillance does not bode well for the newly-created G-20 framework for sustainable growth.

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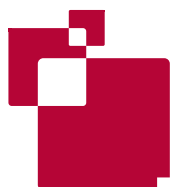


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NON-TECHNICAL SUMMARY

Throughout the 2000s, mainstream economists concurred on an ‘augmented Washington consensus’ which was deemed favorable to rapid, stable, non-inflationary growth: light-touch regulation, limited government intervention, rules-based fiscal and monetary policies. The financial crisis that erupted in the summer of 2007 and turned into a sharp, global economic downturn in the autumn of 2008 led policymakers into transgression. Not only did they engage on unprecedented scale in discretionary monetary and fiscal stimulus, but they also intervened heavy-handedly by bailing out banks and some non-financial industries.

The present paper reviews the main causes of the crisis, recalls how governments around the world had to depart from established policy stances, and reflects on the legacy of the crisis both in terms of future challenges and changes in policy doctrine.

There are three different, non-mutually exclusive lines of explanation to the crisis: wrong incentives in the financial sector, unsustainable macroeconomic outcomes, and misunderstood and mismanaged systemic complexity. These yield different sets of policy recommendations, all of which combine the overhaul of financial regulation, supervisory reform, changes in the monetary policy framework, and some of which also involve reforming the international monetary system and rethinking the remit and governance of international organizations. The G-20, relying on specialized international bodies such as the International Monetary Fund and the Financial Stability Board, as well as on national and regional authorities, has addressed many of these. Crucial themes, however, have been left unaddressed, both on the regulatory and the macro-financial fronts:

- on the *regulatory front*, four issues stand out unresolved: (i) moral hazard, which was magnified when G-7 finance ministers decided not to let financial institutions of systemic significance collapse; (ii) the separation between retail and investment banking; (iii) the desirable size of the financial sector, both in terms of efficient resource allocation and in face of the ‘too big to be saved’ dilemma; and (iv) the impact of new capital regulations on the cost of capital, which may hamper post-crisis growth;
- on the *macro-financial front*, the crisis has been a reminder that economic policy is not only about targets and rules but also about risk-management, both in the private and in the public sector. On the monetary side, the crisis has questioned the relevance for central banks to target consumer-price inflation and leave aside asset prices, and more generally financial stability. As concerns international coordination, there is no agreement yet as to how much current-account imbalances contributed to financial instability. Historical experience with peer-pressure-based surveillance, including in Europe, allows for low expectations on the newly-created G-20 framework for sustainable growth.

ABSTRACT

We review the competing explanations of the 2007-2008 global crisis, recall how governments around the world had to depart from established policy stances, and reflect on the legacy of the crisis both in terms of future challenges and changes in policy doctrine. The G-20 has addressed important regulatory and macro-financial dimensions of the crisis, but it has left difficult questions unanswered. We review some of these incoming challenges such as moral hazard in the post-bail-out world, the trade-off between financial stability and the cost of capital, the feasibility for central banks to manage their new financial stability mandate, and the effectiveness of peer review to address global imbalances.

JEL Classification: E50, E6, F02, F36, G18, G28

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INTRODUCTION

As long as the global economy was growing at a rapid, stable and non-inflationary pace, whether this ‘great moderation’ was a result of prudent, predictable macroeconomic policies, or merely of luck, was a matter of debate among academics.¹ Some form of consensus had however emerged which resulted in a set of policies which were deemed favorable to growth and stability (the ‘augmented Washington consensus’) and which emphasized the benefits of rule-based policies and the need to eschew discretionary activism. It was also agreed, and enshrined in international agreements, that any significant government assistance to private firms operating on competitive markets was to be regarded with considerable suspicion.

The financial crisis that started in the summer of 2007 and moved into a sharp, global economic crisis in the autumn of 2008 – which we shall address in short here as ‘the crisis’ – suddenly led policymakers to break with the prevailing consensus. Not only did governments and central banks embark upon discretionary monetary and fiscal stimulus, but they also intervened heavily by bailing out banks and by assisting non-financial industries (especially the car industry).

The main reason why policymakers made this choice was probably that the memory of the Great Depression of the 1930s had not been lost. Even before it became clear that the fall in stock prices, output, and international trade was initially as fast as during the Great Depression, if not faster (Eichengreen and O’Rourke, 2009), policymakers decided to make full use of monetary and fiscal instruments to tackle the crisis. After the US investment bank Lehman Brothers went bankrupt in September 2008 – with dire consequences for market conditions - they also put the free-market motto aside and embarked on wholesale bank support.

As a result the crisis gave rise to what the heads of state of the G-20 called “the largest and most coordinated fiscal and monetary stimulus ever undertaken”.²

Financial crises are not exceptional events (see the historical record reported by Reinhart and Rogoff, 2009a,b) but truly global crises are. This one immediately triggered a series of debates.

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¹ See especially Romer (1999) and Blanchard and Simon (2001).

² According to the declaration of the September 2009 G-20 summit of Pittsburgh.

The first debate has been about the causes of the crisis. It started early but is unlikely to be settled soon. On-the-spot analyses are often partial and overly influenced by particular aspects of the chain of events. It took decades to clarify why the Great Depression occurred: it was only in 1963, with the publication of Milton Friedman's seminal book with Anna Schwartz, *A Monetary History of the United States*, that the responsibility of monetary policy was highlighted, and it was in the 1980s – half a century after the facts - that Ben Bernanke brought new light to the debate with his research on the role of the credit channel. But like in the 1930s, action had to be taken and was taken without delay, on the basis of the available evidence and the immediate reading of the factors behind the crisis. This amounted to curing the symptoms, not the causes of the crisis.

The second debate has been about the policy response. Again, it started early, and was unsurprisingly controversial. Age-old discussions on the effectiveness of fiscal policy were revived and at a deeper level of questioning, citizens and politicians (more than economists) have started discussing whether the high cost of the crisis called for a fundamental rethink of the economic system.

The third debate was best captured by the Queen of England when she famously asked during a visit to the London School of Economics “why did no one see it coming”. It has mostly developed among economists and has centered on the profession's potential responsibility for not having pointed out adequately that financial developments in the 2000s involved significant risks.

This paper focuses on the first two debates and hints at the third one. It does not attempt to provide a unified, empirically grounded analysis leading to unambiguous prescriptions. More modestly, we outline what we think we have learned this far, what are the policy issues raised by the response to the crisis, and which are the longer-term priorities for reform.

1. WHAT WENT WRONG?

1.1. A brief account of the crisis

The crisis started in a small and relatively obscure corner of the US mortgage credit market – the now world-famous subprime market. Subprime mortgages are financial products that aim to give access to home ownership to poorer and therefore less creditworthy households. These high-yield mortgages are riskier, and contracts were designed so as to mitigate this risk thanks to rising house prices: low-income borrowers could finance and refinance their homes by collateralizing them. This worked as long as house prices were rising, but in 2006 default rates started to ratchet up in response to the decline in house prices.

This would have remained the lenders' problem, had subprime credits not been securitized, *i.e.* transformed into marketable bonds (see Box 1 for a description of securitization). Furthermore, they had also been pooled with other types of mortgage-based securities to form structured assets that were therefore riskier, and had a higher return in comparison to standard fixed-income instruments. Complex and opaque packaging of this sort was commonplace, which explains why defaults on the subprime segments affected the whole range of asset-backed securities. As default rates exceeded what had been considered as probable, investors shied away from financial products previously considered as safe, and their price therefore

went down. The more complex a product was, the more difficult it became to value it. Asset holders became unable to value their ‘toxic’ products, let alone sell them.

Banks in the United States and in Europe had not only invested in these assets which had turned out to be riskier than first thought. They had done so by issuing debt rather than by investing their own capital, largely through legally distinct subsidiaries (the so-called *conduits* and *special investment vehicles* or *SIVs*) that used the income stream from their assets to service their debt. Being squeezed between losses on asset-backed securities on the one hand, and (as their losses started being known) an increasing difficulty to roll-over their debts on the other hand, these so-called ‘shadow banks’ (see below) had no choice but to draw on the credit lines they had with their parent banks. The latter then had either to extend credit to their subsidiaries or to repatriate them onto their balance sheets, and to seek a way to refinance them. But in 2007 this happened to be increasingly difficult because of rising mutual suspicion on the interbank market.

In August 2007, the usually highly liquid interbank market suddenly froze. Europe was affected as much as the US, because a large part of the so-called toxic assets had been bought by European banks. Central banks instantly stepped in and started to play their role of lender of last resort, providing liquidity directly to financial institutions (against collateral) in order to help them face debt repayment schedules. But liquidity was not enough. Market participants were not willing to lend to potentially bankrupt counterparties. Losses were meanwhile compounded as banks started to sell assets for which there was still a market – frequently stocks - to reap liquidity and comply with capital ratios. The resulting fall in asset prices in turn further damaged the banks’ balance sheets as they are based on the market values of assets (this is known as mark-to-market accounting) and the fall in assets prices forced banks to sell further assets. Furthermore, many complex assets they had purchased were no longer being traded and published accounts therefore did not provide accurate information on the true extent of the damage. As a result, some banks were proved, or suspected, to be insolvent, which exacerbated mistrust in the interbank market. The demise of Northern Rock, a UK building society which asked for liquidity support from the Bank of England in September 2007 and was subsequently taken into state ownership, illustrated the consequences of the liquidity crisis.

The panic reached a climax in September-October 2008 in the wake of incoherent responses by US authorities – investment bank Bear Sterns and insurer AIG were bailed out, but Lehman Brothers, another investment bank, had to default - and the precipitated bail-out of Dexia and Fortis, two major European banks with complex cross-border operations. There was a massive loss of confidence. Everybody hoarded liquidity and central banks had to cut interest rates to zero and engage in a near-total substitution of the interbank market. At this stage contagion to the real economy amplified as the fall in equity and the freeze of corporate bond markets reduced the ability of large companies to finance their investments. Banks had also become reluctant to lend to non-financial customers since this would have raised their exposure to risk whereas they wanted to reduce it. This especially affected small and medium-size companies that are dependent on bank credit.

Banks also reduced their exposure to emerging and developing markets, through credit rationing by their local subsidiaries (especially in Central and Eastern Europe) and more generally a ‘sudden stop’ in capital outflows. This was a crucial channel of crisis contagion to

those emerging economies that relied on external financing. Other channels materialized through the real economy: cuts in investment plans, together with the reduction in inventories, dramatically reduced world trade. This especially affected East-Asian countries whose growth models were based on export demand from the US and Europe, rather than on domestic or regional demand. The fall in previously inflated commodity prices also affected several emerging and developing countries. More generally, contracting demand in developed economies dragged the whole world into a recession, including low-income countries.

Governments at this stage responded to the crisis with full force instead of delegating its management to central banks. The US and Europe put in place bank rescue and guarantee plans amounting to about one-fourth of GDP. In an attempt to prevent further collapses they bailed out or nationalized insolvent banks, recapitalized the weak ones and provided credit guarantees to all. Major budgetary stimulus plans followed soon, while central banks engaged in non-conventional easing measures. The IMF, the World Bank, regional development banks and other donor institutions were also mobilized to counter capital outflows from emerging economies, finance international trade and help developing economies engineer countercyclical policies. This was not enough to prevent a world recession, but after a sharp fall of production in winter 2008-2009 stabilization occurred in spring 2009.

These various steps of crisis contagion are summarized in Table 1.

Table 1 - Main stages in financial crisis development

Date	Events	Policy responses
2006-Summer 2007	Localized credit concerns in the US <ul style="list-style-type: none"> • Rising defaults in riskier housing mortgages • Falling prices of lower credit tiers of some credit securities 	
Summer-Autumn 2007	Initial cracks in confidence and liquidity strains <ul style="list-style-type: none"> • Interbank rates rise sharply. Funding of asset-backed securities dries up • Failure of two large hedge funds • Run on British bank Northern Rock 	<ul style="list-style-type: none"> • Central banks extend liquidity to banks through exceptional tenders • Rescue of Northern Rock
Autumn 2007-early Summer 2008	Accumulation of losses and continuation of liquidity strains <ul style="list-style-type: none"> • Severe mark-to-market losses in trading books • Collapse of commercial paper market • Structured Investment Vehicles (SIVs) brought back on bank balance sheets • Worries about liquidity of major financial institutions 	<ul style="list-style-type: none"> • Continued liquidity support by central banks • US government bails out investment bank Bear Stearns and sells it to JP Morgan
Summer 2008	Intensification of losses and liquidity strains <ul style="list-style-type: none"> • Mark-to-market losses and liquidity strains escalate • US agencies Fannie Mae and Freddy Mac insolvent • Funding problems of UK mortgage banks intensify 	<ul style="list-style-type: none"> • Fannie Mae and Freddy Mac de facto nationalized in early September
September 2008	Massive loss of confidence <ul style="list-style-type: none"> • Bankruptcy of US investment bank Lehman Brothers • Loss of confidence that major institutions are too big to fail • Bankruptcy of Washington Mutual in the US, Bradford and Bingley in the UK, Icelandic banks • Almost total seizure of interbank money markets and short-term funding markets • Rescue of European banks Dexia and Fortis 	<ul style="list-style-type: none"> • US government refuses to bail out investment bank Lehman Brothers. Lehman files for bankruptcy protection. • US government bail-out of insurer AIG
October 2008		<ul style="list-style-type: none"> • Widening of collateral range and wholesale liquidity support by central banks • Governments assist banks through capital injections and funding guarantees • Explicit commitment that systemic banks will not be allowed to fail • Central banks' refinancing rates brought to zero or close to zero
Autumn 2008 - Spring 2009	Crisis transmitted to real economy <ul style="list-style-type: none"> • Sharp decline in industrial production and GDP • Series of financial crises in emerging Europe as capital flows suddenly stop • Collapse of world trade • Slow normalization of interbank markets 	<ul style="list-style-type: none"> • Central banks turn to unconventional policies • Large-scale government stimulus • International coordination of crisis responses • International swap agreements • IMF-led assistance programs

Source: Adapted and updated from Financial Services Authority (2009).

1.2. Three questions on the crisis

These developments raise three major questions: Why did the crisis occur? Why did it engulf the entire financial system? Why have its economic consequences been so severe?

The *third question* is the easiest to answer. Financial crises affect the real economy through credit supply constraints (this is the *credit channel*), wealth effects (the drop in asset prices reduces household wealth and diminishes consumption, while companies incur losses on their balance sheets and reduce investment accordingly) and, last but not least, confidence effects. A robust stylized fact emerging from a series of financial crises in recent decades is that they result in sharp and more or less prolonged drops in output (Cerra and Saxena, 2007; Reinhart and Rogoff, 2009a,b).

In 2008-2009 international dimensions added to the shock and compounded its effects. In a sense, this was the first global crisis since the end of the previous wave of globalization, in the 1930s. Although there are questions for research on the relative importance of the transmission channels and the magnitude of the corresponding effects, once the financial system had reached near-paralysis a sharp drop in global output had to be expected and initial hopes for a *decoupling* of emerging economies were soon rebuffed.³

The *first* and *second* questions – why a financial crisis, and why so widespread - are much more challenging. Part of the explanation can be found in financial conditions that prevailed in 2007, especially a high appetite for yield and a pervasive mispricing of risk, which had led many private financial agents to enter on a massive scale into debt-financed (or *leveraged*, see below) investments in risky assets. Once liquidity dried up and risk was re-priced, the same firms whose aim had been to maximize return through leverage entered into a precipitated and disorderly process of *deleveraging*. Another part of the explanation has to do with the rise of the *shadow banking system*. Banks had created special vehicles to outsource and refinance long-term assets by raising short-term money from financial markets. Such vehicles were located outside of the banks' balance sheets and were therefore not subject to banking regulation and particularly to capital requirements. They were nevertheless controlled by the parent bank, which extended liquidity lines which could be triggered in case of refinancing difficulty. When these vehicles found themselves in trouble, banks had at the same time to repatriate them onto their balance sheets and to digest the corresponding losses, which suddenly put them at odds with regulatory capital adequacy ratios. Part of the explanation also has to do with the complexity and connectedness of the global financial architecture: the system *looked* able to absorb and diffuse shocks, and it had performed very well when facing a sectoral shock on the occasion of the 'dotcom' crash, but in 2007-2008 it turned out to amplify and reverberate, rather than diffuse the shock arising from the subprime crisis. Part, finally, results from the banks selling their remaining liquid assets, stocks, thereby transferring the crisis to the stock market and reducing the value of the remaining stock on their balance sheet.

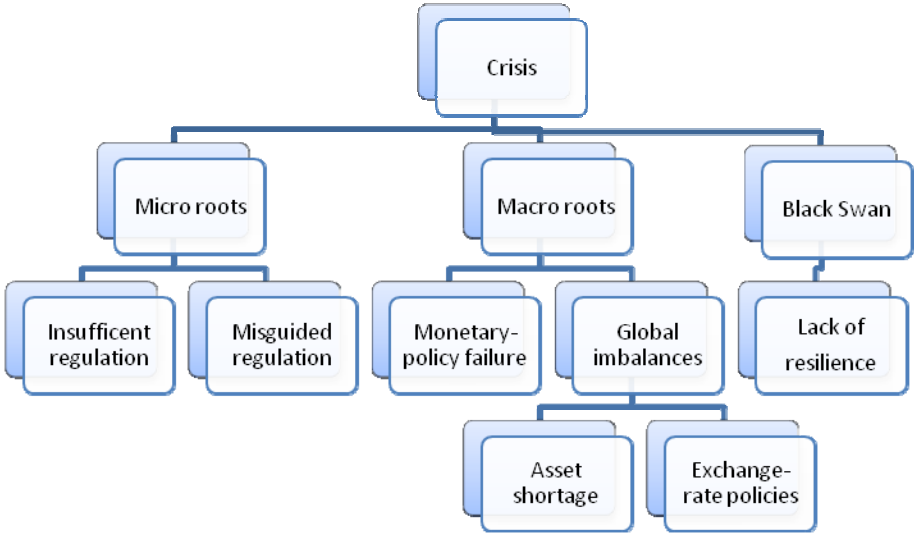
³ Much hinges of course on what 'decoupling' is supposed to mean. Clearly, the crisis has demonstrated that emerging markets were importantly affected by the implications of the shock originating in the US. However, it became apparent in the first half of 2009 that big emerging countries would emerge from the slump earlier and faster than the US or Europe.

In order to clarify the role of these factors in the genesis and the development of the crisis, and the actions taken by policy-makers, it is best to start from the root factors that contributed to them.

1.3. A taxonomy of crisis theories

It is useful to start from a simple taxonomy of crisis theories (Figure 1).

Figure 1 - A simple taxonomy of crisis theories



There are three, non-mutually exclusive approaches:

- A first strand of analysis emphasizes the *microeconomic roots of financial imprudence*. According to this approach excessive risk-taking and *leveraging* (i.e. debt-financed financial investment) on the part of financial players were rooted in inadequate incentives that in turn can be ascribed either to insufficient or, on the contrary, to inappropriate regulation. This approach points to financial and accounting regulatory reform as the main structural response. There are, however, diverse views on what the regulatory agenda should be. The debate can also take on a moral dimension as greed is regarded by public opinion as having been at the heart of financial excesses.
- A second approach claims that *the macroeconomic environment contributed to excessive leveraging and risk-taking*. Two main factors contributed to such a lax environment. First, the US and global monetary policy stances have been criticized as excessively expansionary, which favored extensive leverage and the mispricing of financial and real-estate assets. Second, the flow of foreign savings into the US (which had global current-account imbalances as its counterpart) resulted in a low level of *long-term* interest rates. For the supporters of this view, the underlying macro factors need to be addressed if future crises are to be avoided.
- Finally, a third view is inspired by engineering and ecology. It posits that the problem did not lie so much with either specific micro deficiencies or macro factors, but rather with the resilience of the financial system as a whole. Instead of putting emphasis on

fundamental causes, it sees the financial turmoil as a very low-probability event (a ‘black swan’) in which a shock of limited magnitude set in motion a chain-reaction that eventually resulted in a near-collapse. The policy implication is that the emphasis should be put on strengthening the robustness of the financial system *as a whole*.

1.4. Micro roots

By far the most popular explanation of the crisis was that it was due to irresponsibility and to “reckless greed and risk-taking,” as expressed by President-elect Obama in January 2009. Popular representations combine imprudence, voracity, felony and corruption to depict what could be called a series of behaviors *à la* Bernard Madoff. However, unchecked greed was already pervasive in the 1980s and the 1990s while the financial system and the global economy prospered: neither junk bonds nor the Enron fraud triggered a world crisis.

Scholars of economic policy must avoid a repetition of the error made at the time of the Asian crisis by those who blamed ‘crony capitalism’ without questioning why cronyism, which had been there all along East Asia’s path to prosperity, had suddenly become a problem.⁴ And there is a thin line between ‘reckless greed’ and self-interest, which economists have considered as the engine of decentralized economies since Adam Smith’s famous remark that: “it is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love.” Sixty years earlier, Bernard de Mandeville had argued that private vices were at the root of prosperity.⁵

A more interesting question is what led private-market participants to undervalue or misprice financial risk both on the sell-side and on the buy-side, and why an already burdensome public regulation and supervision apparatus did not tackle the problem. Since the crisis broke out, major deficiencies in what had become standard financial practice have been highlighted by observers. Many are important, raise puzzling questions, and call for significant regulatory reform. Four stand out: compensation practices, securitization, leverage, and market valuation.

⁴ Paul Krugman (1998a) was an early advocate of the ‘cronyism’ interpretation, in support of a widely shared view within the International Monetary Fund, before changing his mind about the causes of the Asian crisis (Krugman, 1998b)

⁵ Adam Smith (1776, 1977); Mandeville (1714).

a. Compensation practices

The traders' hefty bonuses have been repeatedly resented by outraged citizens and they have become in some countries the symbol of the pre-crisis excesses. Beyond legitimate distributional concerns, the compensation structure impacts on incentives for risk-taking. In order to attract and retain talent, firms in the early 2000s routinely rewarded executives and traders on the basis of short-term performance. Executives generally received equity incentives in the form of options and shares without cash-out restrictions, and traders received bonuses tied to their annual performance. Also, a standard practice in banking was to reward executives with shares or options in a bank's parent holding company. Because the limited liability of shareholders restricted their potential losses to the value of their capital, managers had a strong interest in taking on leverage in order to maximize expected gains.⁶ For all, compensation structures acted as a powerful incentive to take risk.

This issue is at its core one of corporate governance. Setting compensation is the role of a company board's compensation committee, which is expected to act in the interest of the holders of capital. But, as demonstrated in the crisis, the failure of a large bank or financial company involves systemic risk, which in turn compels public authorities to intervene to prevent it. This without doubt entails moral hazard and results in distorted incentives.

b. Securitization

Most economists consider that financial innovation is favorable to long-term growth and that securitization is a case in point. The *packaging* of a series of loan portfolios into a single product and the *tranching* of this product into securities of different qualities of risk can be regarded as positive innovation: the former because it reduces dependence on specific portfolio risk and the latter because it allows investors to diversify and choose the desired combination of risk and return.⁷

Box 1. A primer on securitization

Securitization, the technique through which bank loans are transformed into marketable securities, was invented in the 1970s when US-government-sponsored agencies like Fannie Mae (the Federal National Mortgage Association) started securitizing residential mortgages. Previously, banks held loans until they matured or were paid off (the so-called *originate and hold* model). But after World War II, depository institutions simply could not keep pace with the rising demand for housing credit and sought ways of increasing the sources of mortgage funding. To attract investors, an investment vehicle was developed that isolated mortgage pools, sorted them by order of credit quality and sold them as tranches, allowing banks to reduce their exposure to credit risk and thereby to increase their volume of credit. This is the so-called *originate-and-distribute* model.

Securitization implies the pooling of various claims (such as mortgages, loans, bonds, trade and credit-card receivables, etc.) and their use as collateral to issue a prioritized capital structure of claims (the *tranches*).⁸ This process results in a series of rated securities. The highest tranches are senior to the lower ones, so that they can achieve a good risk rating even though the underlying collateral includes high-risk mortgages. The lower tranches are high-yield ones to compensate for the higher risk.

⁶ See the research by Lucian Bebchuk and colleagues, for example Bebchuk (2009).

⁷ For a discussion see Hellwig (2008).

⁸ For a full description and discussion, see Coval *et al.* (2009)

The best known such *asset-backed securities (ABS)* include *mortgage-based securities* (MBS, collateralized by the service of mortgage loans), *collateralized mortgage obligations* (CMO, emanating from a further securitization of MBS), and the now-famous *collateralized debt obligations (CDOs)*, resulting from the securitization of various ABS). Often, various credit-enhancement mechanisms are added to these products, such as *credit default swaps* (CDS) and various derivatives. Also, CDOs were in turn sliced into tranches and sold to vehicles themselves financed by debt – thereby forming what was known as ‘*CDO square*’ or CDO².

Securitization was enormously successful: in the US, the amount outstanding of corresponding *asset-backed securities (ABS)* reached 2.5 trillion dollars in 2007 (almost 20% of US GDP) and gave rise to further developments as simple securitized credits were restructured and repackaged into more complex ones.

But sophisticated securitization had two consequences. First, it resulted in a major increase in the complexity of financial products that made risk difficult to assess. The first generation of structured products such as CDOs was admittedly rather simple since their purpose was only to sort a bundle of loans into a series of tranches of increasing risk and expected return so as to match investors’ different preferences for risk and return. But even sophisticated investors had difficulty assessing and therefore monitoring the risk embedded in more complex products such as CDO-square (Box 1), for two reasons: details on the underlying risks were often not available, and even when they were, the value of the CDO was a complex, highly non-linear function of the distribution of the underlying risks. Scrutiny of risk was widely outsourced to credit-rating agencies and more often than not replaced by a blind and ultimately lethal faith in the robustness of market mechanisms. As Buiters (2009) has noted, risk transferred through securitization ended up with the investors most *willing* to hold it, but not necessarily the most *able* to bear it.

The second consequence of securitization was that the credit originators – the lending institutions at the origin of the mortgage – had weak incentives to assess the credit risk. To the extent they were able to package and sell an entire credit portfolio, their incentive was limited to making sure that credit quality *as assessed at the time of the sale* matched the standards required by regulators and credit-rating agencies to qualify for a given risk category. The originate-and-distribute model of credit therefore involved moral hazard. Unsurprisingly, over the period following the sale of their loan, loans sold in the secondary market underperformed bank loans by a significant margin on a risk-adjusted basis (Berndt and Gupta, 2009). Securitization therefore contributed not only to disseminating risk, but also to sourcing new risk.

Additionally, the pooling of various loans in a single product was an efficient way to diversify individual risks but it did not allow diversification of the macroeconomic risk related to the housing bubble. When house prices started falling, a large number of borrowers were *simultaneously* unable to repay their debt. This rise in the correlation of individual default rates was not correctly taken into account in the models used by securitizers. The CDO tranches rated ‘AAA’, the highest possible score, although they were deemed diversified enough to be robust, became vulnerable, triggering a loss of confidence and a contagion effect.⁹

⁹ See Coval *et al.* (2009) for a discussion of the role of correlations. The authors notably show that the high credit rating of many securities pointed to rating agencies being extraordinarily confident about their ability to measure the underlying default risks and default correlations. Through the issuance of a capital structure,

A key question, though, is why rational investors nevertheless bought securitized debt. Gorton (2009) provides an interesting hypothesis.¹⁰ He points out that the essence of banking is the provision of liquidity through producing what he calls ‘informationally-insensitive debt’: thanks to deposit insurance, which prevents bank runs, demand deposits are regarded as good as central bank money and no one can derive any profit from the production of private information about them. He then argues that securitization was a way to create ‘relatively informationally-insensitive debt’ without insurance: the higher-rated tranches served this purpose, until a systemic shock transformed informationally-insensitive into informationally sensitive debt prone to a run. Yet investors were accustomed to not bothering about information and they did not know how to produce it when it became needed, and the market for this debt collapsed.

c. Leverage

Leverage is a very old technique that makes it possible to increase the return on capital by incurring debt. Suppose an investor invests his or her capital K in a (risky) asset of expected yield r . The return s/he can expect to earn per unit of capital is then simply r . But if instead s/he borrows D at rate i and invests $A = K + D$ in the risky asset, s/he can expect to earn:

$$\rho = r + (r - i)l \quad (1)$$

where $l = D/K$ is the leverage ratio. When $i < r$, leverage thus appears as a simple way to increase return. Things are different when r turns out to be less than the cost of borrowing. And, worse, if the investor actually incurs a loss of $z\%$ on its investment, this implies a capital loss of $z\%$ without leverage but of $(1+l)z\%$ with leverage (and a total negative rate of return of $-[z+(z+i)l]$). The loss can exceed the investor’s capital, which means s/he is unable to repay the debt and is therefore bankrupt.

Applied to banks, this simple mechanism has important consequences (Adrian and Shin, 2008). Even in the absence of a true bankruptcy, the very fact that a bank’s assets have lost value implies a sudden rise in the leverage ratio, which is likely to lead the bank to sell off assets or restrict credit in order to deleverage. Suppose, for example, that initially $A = 100$, $D = 90$ and $K = 10$ (implying $l = 9$). Then a 5% decline in the value of A implies a 50% decline in the value of K and thus a doubling of the leverage ratio. Bringing it back to its previous value of 9 implies a considerable shrinking of the balance sheet.

What this elementary calculation illustrates is the simple fact that leverage increases the expected return on capital but has two consequences: first, it also increases the risk of bankruptcy; second, it leads banks to respond *pro-cyclically* to fluctuations in the value of their assets, thereby amplifying financial and economic fluctuations (Box 2).

small errors in evaluating the risk of underlying securities can translate into substantial variation in the default risk of the final structured product.

¹⁰ Gorton (2008b) also questions the relevance of an explanation based on the ‘originate and distribute’ view, according to which risks were passed along to investors, thus lessening incentives to care about risk. He argues that risks remained involved all along the chain from originators to underwriters and that the interests of the various parties were aligned in securitization.

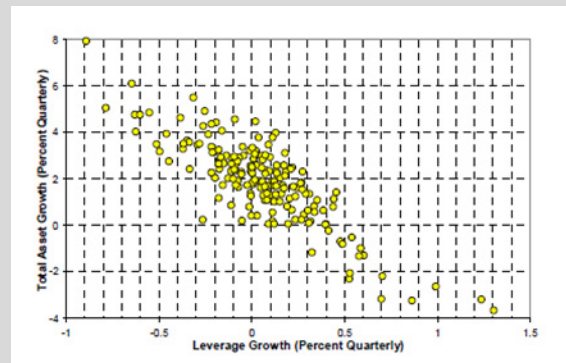
Box 2 – Leverage and pro-cyclicality

Tobias Adrian and Hyun Song Shin (2008) have used micro-data to demonstrate the pro-cyclicality of leverage in financial firms. Financial intermediaries adjust their balance sheets actively to changes in their net worth. Adrian and Shin first observe that for a passive investor, the relationship between the value of assets A and the leverage ratio l is downward-sloping: leverage falls when the value of total assets rises. This is simply because if debt D is held constant, l and A are negatively related:

$$l = \frac{D}{K} = \frac{D}{A - D} = \frac{1}{A/D - 1} \quad (2.1)$$

Data indicate that households follow this type of behavior as the relationship between asset growth and leverage growth is negative (Figure 2.1).

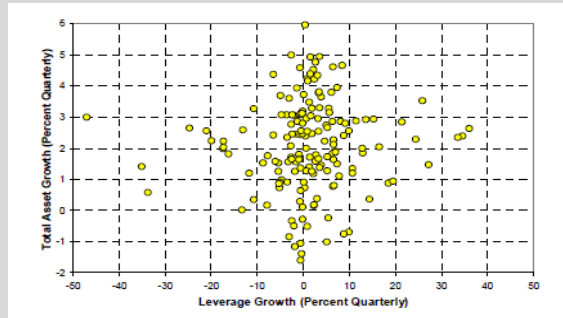
Figure 2.1 – Relationship between asset growth and leverage growth, US households, 1963-2006



Source: Adrian and Shin (2008, figure 2.2).

This downward-sloping relationship gets lost for nonfinancial corporations. For commercial banks it becomes vertical at a zero-leverage growth intercept (Figure 2.2): commercial banks thus tend to keep leverage constant. This implies that credit is likely to be pro-cyclical: holding l constant means that the growth rate of debt D is the same as that of assets A .

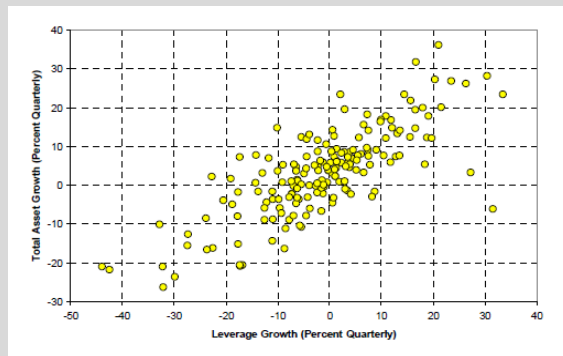
Figure 2.2 – Relationship between asset growth and leverage growth, US commercial banks, 1963-2006



Source: Adrian and Shin (2008).

The relationship is even reversed and turns positive for securities brokers and dealers (a statistical category that included the investment banks) (Figure 2.3), indicating strong leverage pro-cyclicality: the higher the growth of total assets, the faster the growth of debt and of the leverage ratio l . In other words, investment banks tended to accelerate borrowing when market conditions were improving. This is what led Lehman Brothers to excessive leveraged exposure to risky assets.

Figure 2.3 – Relationship between asset growth and leverage growth, US securities brokers and dealers, 1963-2006



Source: Adrian and Shin (2008).

The pro-cyclicality of leverage in turn results from the counter-cyclical behavior of measured risk (low during booms and high during busts). Adrian and Shin (2008) conjecture that banks maintain a stock of capital K proportional to total Value-at-Risk ($K = \lambda \times \text{VaR}$). Using the same notation as previously, the leverage ratio l can be written as:

$$(2.2)$$

The leverage ratio l is therefore negatively related to unit Value-at-Risk, VaR/A . Adrian and Shin’s data confirm the counter-cyclicality of unit Value-at-Risk, which implies the pro-cyclicality of leverage. The interpretation is the following: when asset prices increase, financial intermediaries’ balance sheets tend to get stronger, creating an incipient situation of surplus capital. The incentive is for intermediaries to find ways to employ this surplus capital through an expansion of balance sheets and an increase in leverage.

Given that large European banks in 2007 had leverage ratios comprised between 20 in the UK and 35 in Switzerland,¹¹ these mechanisms played a major role in the transmission of the crisis from asset prices to bank behavior.

As bank failures may involve massive externalities, leverage has to be regulated in order to limit excessive risk-taking. Thus an important question is why existing regulation failed. Part of the answer is to be found in the role of the shadow banking system (Adrian and Shin, 2009). By mid-2007, just before the crisis erupted, market-based assets amounted to more than 16 trillion US dollars, while bank-based assets were less than 13 trillion. Against this background, existing banking regulation proved insufficient. It mainly rested on two instruments: mandatory capital adequacy ratios and leverage ratios.

Mandatory capital-adequacy ratios limit the size of a bank's risk-weighted asset portfolio relative to its capital. They are at the heart of the Basle I and Basle II accords (Box 3) which have been implemented in most OECD countries and many East-Asian countries, but not in the US. Capital adequacy ratios proved to be both too low and unevenly enforced:

- In the US, neither hedge funds nor investment banks had to comply with capital-adequacy ratios (only bank holding companies had to), whatever the potential (or, in the case of Lehman, actual) repercussions of their bankruptcy;
- Most importantly, the sophisticated capital-adequacy ratios put in place after 2006 under the Basel II accord to replace the rough ratios of the first Basel accord were found to add, rather than to reduce, the pro-cyclicality of bank behavior. This is because they were themselves based on market valuations of assets and encouraged banks to expand their balance sheets in good times and to shrink them in bad times.

In the US, risk-weighted capital ratios were supplemented with a cruder, non-risk weighted capital-to-asset ratio called a *leverage ratio*. Major bank holding companies (not investment banks) were required to hold Tier-1 capital (see Box 3) of at least 4% of their total assets.¹² The US leverage ratio did not prevent the crisis but it may be the case, as argued by the Swiss vice-governor Philipp Hildebrand (2008), that "it ensures a minimal buffer to absorb the negative consequences of imprudent behavior." World leaders decided at the G-20 Pittsburgh summit to incorporate it into the Basle II framework as a supplement to the capital-adequacy ratio, and to make it compulsory when valuation standards have converged sufficiently so that the denominator of the ratio is measured consistently across countries.

¹¹ See Panetta and Angelini (2009).

¹² The link between the capital-to-asset and debt-to-asset ratios can be understood using the above notation: $K/A = 1/(1+l)$.

Box 3 – Why are capital-adequacy ratios procyclical?

The setting of minimal capital requirements is intended to provide a buffer so that banks remain solvent across a wide range of shocks. As such, it is an application of the Value-at-Risk approach.

Capital-adequacy ratios for internationally active banks were first introduced in 1988 by the Basel I accord, which imposed to banks a minimum capital of 8% of risk-weighted assets. Risk was supposed to depend on the asset class, so for example governments were deemed safe and corporate bonds risky. In the 1990s this crude approach was subject to criticism, which resulted in the introduction in the mid-2000s of the new Basel II ratios.

Two categories of capital are distinguished: Tier 1 capital, which broadly corresponds to shareholder equity, and Tier 2 capital, consisting of reserves, provisions and subordinated debt. The 8% ratio determines total Tier 1 + Tier 2 capital, with the proviso that Tier 2 capital must be inferior or equal to Tier 1 capital. Basel II especially differs from Basel I in its approach to risk, which is not given for broad asset classes anymore but is asset-dependent and time-varying. It can be calculated according to one of two methods, the standardized approach and the internal ratings-based approach.

The standardized approach uses ratings published by the credit rating agencies to measure risk. Both loans to governments and loans to corporations are therefore deemed risky and enter into the calculation of total credit risk, with weights dependent on their ratings (for example, in the original Basel II framework claims on governments rated AAA did not enter into the calculation of total risk, while claims on governments rated BBB were taken into account for 50% of their value; for claims on corporations, the corresponding weights were 20% for AAA borrowers and 100% for BBB borrowers). Once the total risk has been calculated, the minimum capital adequacy ratio (8% in the original Basel II framework) is applied to determine the bank's minimum capital.

Alternatively, banks can be authorized by their supervisor to use an internal ratings-based approach, whereby weights are determined by the bank's own assessment of the riskiness of its claims on the basis of methodologies and parameters determined by the regulator. For example the original Basel II framework required banks to compute the maximum losses that they could suffer at a 99.9% confidence interval. The bank would be required to hold at least enough capital to absorb this "maximum probable" loss. However, the evaluation of a borrower's probability of default was left to the bank itself. The intention was to make better use of a bank's internal information on the riskiness of its clients and to better take into account the correlation of risks across assets within the bank's portfolio.

The standard approach is subject to pro-cyclicality to the extent that credit ratings are themselves procyclical, which tends to be the case although rating agencies claim to smooth risk assessment over the cycle. Simple empirical evidence indicates that average ratings decline in a downturn, leading to an increase in capital requirements. Similarly they improve in boom times, relaxing capital requirements (Panetta and Angelini, 2009). Instead of dampening the pro-cyclical effects of leverage, regulation therefore tends to increase them.

There is no direct empirical evidence yet on the internal ratings-based approach since it was introduced in 2008 only (and only in Europe) but simulations have shown that it is likely to be open to the same criticism as the standard approach. For example Repullo and Suarez (2008) find that the Basel II framework provides better protection against bankruptcy than Basel I but that, since banks are unlikely to hold sufficient buffers above the minimum requirements, the increased risk of borrower default during a recession should imply credit contraction in downturns.

d. Market valuation

It has been noted above that leverage leads banks to respond pro-cyclically to fluctuations in the value of their assets. This raises the question of how bank assets should be valued, which is a complex and as-yet unresolved question.

In the years before the crisis, the financial reporting of banks had been increasingly based on so-called *fair-value* or *mark-to-market accounting*: Assets and liabilities were reported at market value, with capital gains and losses being registered in the profit-and-loss account.

When market prices were not available, fair value was constructed by discounting expected future cash flows, based on some forecasting model. This principle was enshrined in the International Financial Reporting Standards (IFRS), adopted by more than a hundred countries including EU member states, and in the *US Generally Accepted Accounting Principles (GAAP)*.

There are several issues with fair-value accounting:

- *Consistency between standards*: a given asset may be valued differently by the bank's supervisor and by its auditors, and both standards may vary across countries. The Deutsche Bank, a German bank with significant US activities, reported total assets worth 2,202 billion dollars under IFRS and 1,030 billion dollars under US GAAP as at 31 December 2008. This is because financial derivatives are registered at gross value under IFRS and at net value under US GAAP;
- *Availability of market prices*: the crisis has led accounting standard-setters to acknowledge (somewhat reluctantly, at least initially) that market valuation is not possible when markets do not function. It may remain possible to discount expected future cash flows but investors are suspicious of biases in prices produced by fragile and potentially self-serving internal models;
- *Counter-intuitive outcomes*: as an example, when the creditworthiness of a bank deteriorates, the market value of its liabilities goes down and it can therefore register a profit;
- *Procyclicality*: a fall in asset prices induces banks to sell assets and contract credit in order to comply with capital requirements. Box 4 provides a telling illustration in the case of pension funds: the combination of a strict pension funding rule and mark-to-market accounting produces an upward-sloping demand curve on asset markets: when the price of bonds goes up, pension funds have to buy more of them. Such behaviors exacerbate disruptive market dynamics.

There is a minority view that market valuation should be abandoned altogether in favor of historical cost valuation, or strictly limited to trading activities.¹³ Based on the experience of past financial crises, the economics profession generally considers that this would obscure the perception of banks' soundness, delay the necessary disposal of non-performing assets, and eventually aggravate the cost of crises. An alternative is to supplement mark-to-market accounting with appropriate clauses so as to mitigate its procyclicality, such as buffers to weather sudden drops in market prices, and with temporary waivers in case of a crisis.¹⁴

¹³ In 2003, French President Jacques Chirac wrote to European Commission President Romano Prodi that the adoption of fair-value accounting would "lead to company management methods that will place excessive bias on the short term."

¹⁴ In response to the crisis, the US Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) authorized the temporary reclassification of assets at book value rather than market value in October, 2008.

Box 4 - Pro-cyclical mark-to-market accounting: the case of pension funds

We illustrate here how mark-to-market accounting may force financial institutions to act in a pro-cyclical way on financial markets. The example is adapted from Boeri *et al.* (2006).

Consider a pension fund with pension liabilities l_t at all future dates $t \geq 0$. For analytical convenience, we suppose the fund is entirely invested in perpetual bonds with a unitary face value, yielding a constant interest rate r . The market value of the bond portfolio is $A = pN$, where N is the number of bonds and $p = 1/r$ is their unit price. The model is in continuous time.

Looking forward, pension liabilities increase at a constant rate λ (say, because pensions are indexed on wage growth): $l_t = l_0 e^{\lambda t}$ with $0 < \lambda < r$. Since there is no active market for pension portfolios, their fair value L is computed using discounted expected cash flows:

$$L = \int_{t=0}^{\infty} (1+r)^{-t} l_t = \frac{1}{r-\lambda} l_0 \quad (4.1)$$

Let $\varphi = A/L$ be the funding gap of the pension fund, *i.e.* the discrepancy between its market-valued assets and liabilities. We define $d^A = \left| \frac{1}{A} \frac{\partial A}{\partial r} \right| = \frac{1}{r}$ as the *duration* of the bond portfolio and $d^L = \left| \frac{1}{L} \frac{\partial L}{\partial r} \right| = \frac{1}{r-\lambda}$ as the duration of the pension portfolio. It appears immediately that $d^A < d^L$: when interest rates go down (or, equivalently, when the price of bonds goes up), the value of liabilities increases more than the value of assets and the funding gap widens:

$$\frac{1}{\varphi} \frac{\partial \varphi}{\partial r} = d^L - d^A > 0 \quad (4.2)$$

Suppose now that the price of bonds p fluctuates and the fund manager, facing a given liability portfolio, adjusts in real time the size N of the asset portfolio to match a given funding gap φ (say, as imposed by pension fund regulation). The manager's rule is:

$$N(p) = \frac{A(p)}{p} = \varphi \frac{L(p)}{p} = \varphi \frac{1}{1-\lambda p} l_0 \quad (4.3)$$

$$\frac{1}{N} \frac{\partial N}{\partial p} = \frac{\lambda}{1-\lambda p} > 0 \quad (4.4)$$

Under the combination of a regulatory funding rule and mark-to-market accounting, the fund has to buy *more* bonds when their price goes up. When applied to the whole industry, such rules may exert a destabilizing, pro-cyclical impact on bond markets. This impact was documented on the euro and sterling bond markets when pension-fund regulation was tightened and moved to mark-to-market valuation in Scandinavia, then in the UK in the early 2000s (Boeri *et al.*, 2006).

e. Why did the subprime crisis trigger a generalized panic?

It is now time to repeat our second question, *i.e.* why a crisis in a limited segment of financial markets, namely the subprime market, contaminated the entire financial system. Contagion cannot be ascribed primarily to the weight of subprime securities in investors' portfolios.

As developed by Gorton (2008b, 2009), special investment vehicles had broadly diversified portfolios and were not significantly exposed to subprime loans. A key element of crisis extension was the development of a market for repurchase agreements or repos (see Box 5) which played for firms a role akin to that of a banking system: lending firms deposited cash, borrowing firms posted bonds as collateral and this collateral could in turn be 'rehypothecated' in exchange for cash with a third party. The posting of securitized assets as collateral therefore provided the means to meet the borrowing needs of some firms and the demand for liquid, informationally insensitive deposits of some other. However, it also increased the complexity so that information on the distribution of risks was hardly available and increasingly costly to assemble. It also resulted in an exponentially increasing demand for safe assets to be used as collateral – we will come back to this point later.

Box 5 – Repo transactions

Repurchase agreements, or repos, are short-term loans backed by an exchange of collateral.

Counterparty risk is only residual provided that the amount of collateral is revised frequently enough to offset the change in value of the asset deposited as collateral. This is usually done through cash deposits called *margin calls*. Typically, Bank A borrows X million dollars from Bank B for a given, short period of time and transfers to Bank B the property of a pool of assets worth the same amount for the life of the loan. Bank B then regularly checks the market value of these assets. If they have depreciated by $x\%$, Bank A transfers to Bank B an additional xX million dollars in cash as a margin call. This ensures that bank B's loss will be limited if Bank A defaults. An alternative, which can be combined with margin calls, is to impose an arbitrary rebate on the value of collateral (called a *haircut*), depending on its creditworthiness. This increases the quantity of collateral required in exchange of a given monetary amount.

Repos involve less counterparty risk than uncollateralized bank loans and have therefore developed very rapidly. While there are few statistics about this market, it was believed to exceed 11 trillion dollars in 2008 and to have grown by around 10 percent a year.

As long as the system expanded steadily, no question needed to be raised about the quality of collateral. But the leveraging and tranching mechanism implied that the price of a subprime asset-based security was a highly non-linear function of house prices. In spite of the moderate share of subprime bonds in the pool of asset-based securities, the bursting of the real-estate bubble transformed what was perceived as 'informationally insensitive' into 'informationally sensitive' debt, to use Gorton's expression.

However, the complexity of the whole chain of structured financial products meant that the information necessary to properly value claims was not accessible. No one could accept structured products as collateral any longer. The subprime crisis thus translated into a collateral crisis and a dash for cash. Depositors were not able to assess counterparty risk. Average repo haircuts exploded, from zero in the first half of 2007 to 25% by mid 2008 and more than 45% by the end of 2008. The repo market dried up. The demand for cash could only be met by selling assets at much reduced prices, so that the price of non-subprime related assets also fell substantially. The mark-to-market value of all assets collapsed, feeding back into a further drying up of the repo market and solvency problems for financial intermediaries. The failure of Lehman further compounded both the signal, the dash for cash and the panic.

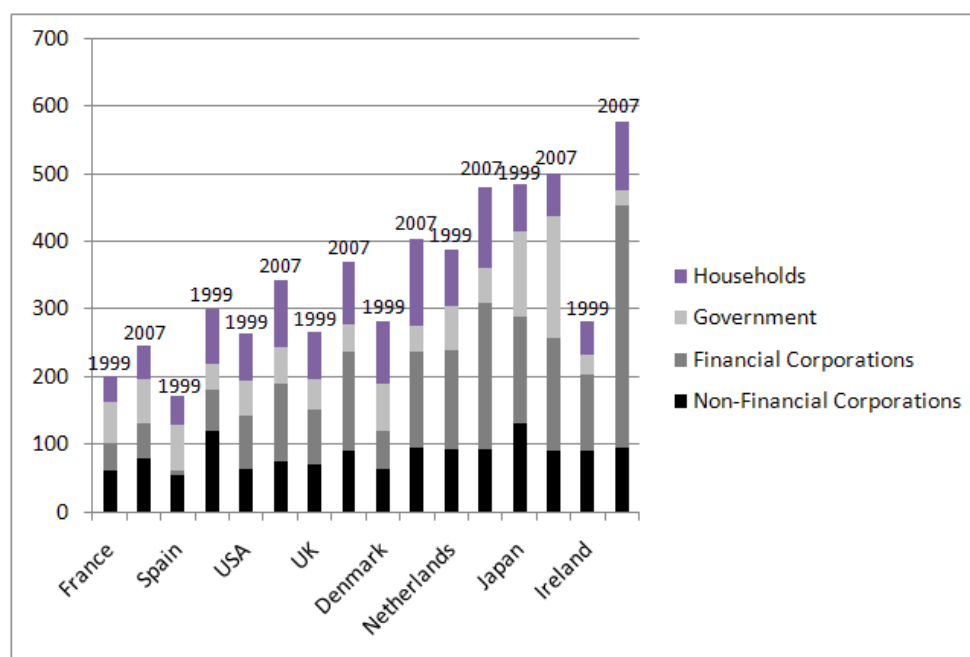
As suggested by Holmström (2008), this information-asymmetry problem was not primarily one of transparency, but rather one of complexity. The whole system thrived on non-transparent information, and it is when price information became more collective and transparent that the panic unfolded.

1.5. Macro roots

“At the core of the crisis lay an interplay between macro-imbalances which had grown rapidly in the last ten years, and financial market developments and innovations”. The gist of this sentence, from the Turner Review (Financial Services Authority, 2009) commissioned by the British government, can be found in many other assessments by experts and, interestingly, regulators.¹⁵ Beyond the microeconomic roots and the failures of regulation, broader permissive factors were conducive to financial imprudence.

In fact, if interest rates had been higher, housing booms, stock market valuations, and the rise in private debt would certainly not have reached the same levels. Cheap credit facilitated debt-financed investment in real estate and financial assets, and contributed to excessive risk-taking. From a macroeconomic standpoint also, this crisis has been a crisis of leverage (Figure 2).

Figure 2 – The rise of private debt between 1999 and 2007
Interest-rate liabilities (loans and non-equity securities) as % of GDP



Source: Eurostat, ECB, Federal Reserve and Barclays Capital.

Almost by definition, macroeconomic factors therefore played a role in the boom-bust cycle, because interest rates affect the demand for credit: there is necessarily an interest-rate level that would have prevented the boom. But the interesting question is what created this macroeconomic environment. Was it a failure of monetary policy? Was the broader saving-investment balance at global level the root cause of the low interest rates it produced?

¹⁵ See for example the De Larosière (2009) report prepared at the request of the European Commission.

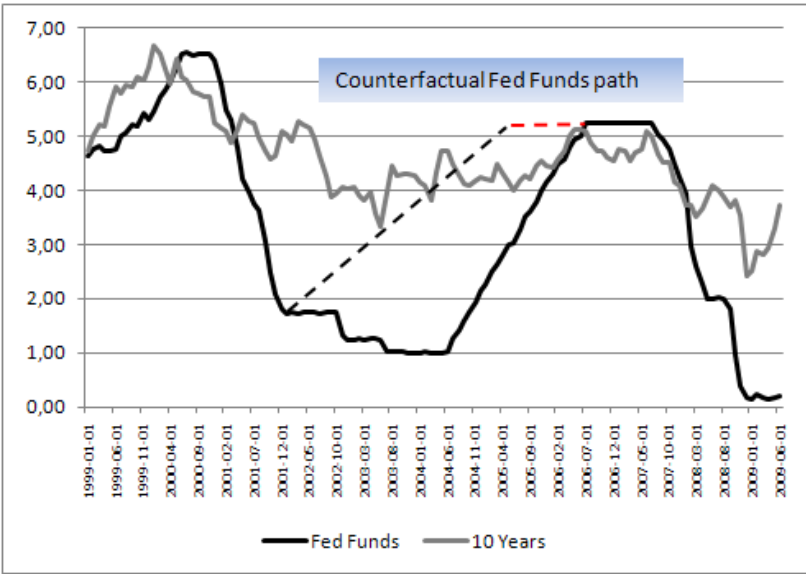
Although mutually compatible, those two explanations have quite different policy implications.

a. A failure of monetary policy?

A first explanation blames an exceedingly lax monetary policy, either in the US (Taylor, 2008) or globally (BIS, 2008). According to this view, monetary policy in the aftermath of the 2001 recession remained too lax for too long and this triggered both asset-price inflation, primarily but not exclusively on the US housing market, and a generalized leverage boom.

Figure 3 depicts the evolution of policy interest rates (the Fed Fund rates) and of 10-year Treasury interest rates from the late 1990s to the late 2000s. The dashed line, taken from Taylor (2009), represents the counterfactual Fed Funds evolution that would have been observed had the central bank followed a Taylor rule (see Section 2 below). The Fed would have tightened faster after the 2001 recession, instead of lowering interest rates further to counter perceived deflation risks. Accordingly, short-term rates would have been higher between 2001 and 2005, denting the housing price boom and making the subsequent bust less pronounced.

Figure 3 - US interest rates, 1999-2009



Source: Federal Reserve Bank of St Louis.

In retrospect, the Fed should have worried less about the deflation risk in 2003, when then board member Ben Bernanke famously outlined a contingency plan to avoid the repetition of the Japanese experience (Bernanke, 2002), and it should have worried more about the risks of a housing bubble, instead of claiming, as then-chairman Alan Greenspan did, that “*while local economies may experience significant speculative price imbalances, a national severe [housing] price distortion seems most unlikely in the United States.*” (Greenspan, 2004). This illustrates the difficult art of risk-management in economic policymaking: faced with these two equally improbable outcomes, the Fed may have overstated the former and disregarded the latter.

The question, however, is whether this explanation is *sufficient*:

- To start with, the Taylor rule can only give rough indications and cannot be taken as an undisputable benchmark. Consumer-price inflation remained rather subdued throughout the 2000-2006 period and accelerated only with the world commodity-price boom of 2007-2008. A reason for continued price stability was the flattening of the Phillips curve. Central-bank credibility, structural changes in the US labor market and the increase in the global labor force resulting from China's and India's increased participation in globalization all resulted in a containment of wage and price increases. A central bank dedicated to price stability (rather to a combination of inflation and the output gap, as in the Taylor rule) had therefore little reason to raise interest rates aggressively enough to prick the real-estate bubble;
- The question, therefore, is rather whether the Fed should have raised interest rates *in the name of financial stability*. John Taylor implicitly assumes that by following a Taylor rule it would have killed two birds with one stone – achieving both macroeconomic and financial stability. But there is no theoretical or empirical motive to believe that the two objectives are coincident: whether central banks should explicitly target asset prices when setting interest rates has been a matter for debate. Put simply, it implies that central banks stand ready to depart from their macroeconomic stability goal in the name of financial stability – not something they can consider lightly. On a more practical ground, whether the Fed could have steered interest rates delicately enough to engineer a soft landing of housing prices is dubious;
- Furthermore, from 2001 on, long-term interest rates remained remarkably stable at a low level (Figure 3) consistent with stable inflationary expectations. This stability, famously dubbed a 'conundrum' by Alan Greenspan (2005), contrasted with previous episodes when bond rates responded to movement in policy rates, and it suggests that, if the Fed had followed John Taylor's *ex-post* prescription, bond rates could have remained at a low level. This leads us to consider the structural reasons for the persistence of low long-term interest rates throughout the early 2000s.

b. A consequence of global imbalances?

An alternative macroeconomic explanation focuses on global imbalances rather than on purely domestic developments. According to this view, the increased demand for safe assets associated with capital flows into the US favored leverage and even provided incentives to manufacture purportedly AAA assets of actually dubious quality.

The starting point for this analysis is the observation of a massive inflow of foreign savings into the US. As the US came out of the 2001 recession, a new global saving-investment pattern emerged that characterized the 2002-2007 period.¹⁶ What became known as 'global imbalances' was the combination of an historically high, and growing US current-account deficit of the order of 1.5% of world GDP (average over the 2002-2007 period), and

¹⁶ As documented elsewhere in this book, the US current-account deficit goes back in fact to the very early 1980s. It had improved by the turn of the 1990s before deteriorating sharply in the second half of the decade.

corresponding surpluses in East Asia and later in the oil-producing countries. During this period foreign net purchases of US Treasury securities always represented more than 60% of net issues and for the entire period they amounted to 81% of total net issues.¹⁷

In the early 2000s, the traditional view of global imbalances – a view generally endorsed by Europeans - was that they were primarily driven by the US saving behavior – in other words that they resulted from a domestically rooted drop in the US saving rate. In the mid 2000s, however, Ben Bernanke put forward an alternative explanation, deemed the ‘global savings glut’ hypothesis (Bernanke, 2005). According to this view, the global savings-investment pattern originated in an increase in the rest of the world’s net saving rather than resulting primarily from US behavior.

However self-serving for the US, Bernanke’s provocative thesis rightly pointed out that financial globalization and the appetite of emerging countries for US Treasury bonds had to feature in the analysis of global imbalances. The question became: why was the rest of the world so keen on investing in US assets? Three main rationalizations have been offered for such behavior: the asset shortage, self-insurance and Bretton Woods 2 hypotheses.

The *asset-shortage hypothesis* presented in Caballero, Farhi and Gourinchas (2008) and Mendoza, Quadrini and Ríos-Rull (2008) highlights that financial underdevelopment in emerging countries led domestic agents to export their savings and invest them in [US] assets of higher safety and quality. This simultaneously resulted in a US financial account surplus (and a corresponding current account deficit) and in a lowering of long-term interest rates, as foreign savings increased the demand for financial assets. This intellectually attractive explanation has however not been tested extensively. There are other, more structural reasons for the higher demand for risk-free assets, such as the development of repos and over-the-counter derivative contracts which have brought about a massive demand for high-quality collateral (Gorton, 2009).

Furthermore, the *asset-shortage hypothesis* does not explain why the emerging countries’ investment in the US overwhelmingly came from central banks: according to the IMF’s COFER data (which are far from exhaustive as many central banks do not disclose the allocation of their reserves), the developing and emerging countries’ dollar reserves rose from \$258bn in 1999Q1 (in the immediate aftermath of the Asian crisis), to \$2,254bn in 2008Q2 (before the turmoil that followed the Lehman collapse), an almost tenfold increase in less than ten years.

One rationale for such accumulation was to avoid a repetition of the 1997 balance-of-payment Asian crisis and subsequent dependence on IMF financings, perceived as costly and humiliating: instead, international reserves were used as *self-insurance* against future crises. This rationalization, however, is not entirely satisfactory either: self-insurance may explain a one-off increase in foreign-exchange reserves but the continuous accumulation of low-yielding reserves involves a significant opportunity cost that is hard to justify from a social planner’s point of view (Rodrik, 2006).

¹⁷ Data here are taken respectively from the IMF’s World Economic Outlook and the US Flow of Funds statistics.

Another rationale, especially in China, was the export-oriented growth strategy that implied keeping the currency undervalued through repeated interventions on the foreign-exchange market. Dooley, Folkerts-Landau and Garber (2003) spoke of a ‘*Bretton Woods 2 regime*’ to describe the resulting web of explicit or implicit exchange-rate arrangements between the dollar and the developing and emerging countries’ currencies. The bulk of corresponding central-bank reserves was held in US Treasury bonds because they were the most liquid (and supposedly the safest) securities in the world and because the currencies were *de facto* pegged to the dollar).

Whether or not global imbalances were sustainable has been a matter for fierce debate within the economic profession. For some scholars (*e.g.* Engel and Rogers, 2006) the US current-account deficit was the perfectly natural result of intertemporal optimization by US consumers, while for others (Obstfeld and Rogoff, Blanchard, Giavazzi and Sa, 2005), it was unsustainable in the long run. The latter, however, generally expected a precipitous decline in the US-dollar exchange rate, possibly accompanied by a sell-off of US government bonds, not a *domestic* financial crisis.

After the event, the crisis revealed an unanticipated link between the foreign search for safe assets and US domestic risk-taking. Intuitively, the low level of long-term rates resulting from capital inflows led investors from the US and other industrialized countries to diversify away from ‘plain-vanilla’ US Treasury securities and look for higher-yield paper, thereby encouraging investment banks to manufacture securities that were granted AAA status by rating agencies but which offered a higher return than Treasury bonds. CDOs, or at least the degree of success of CDOs, were the product of this link. The US was playing its traditional role as the ‘world venture capitalist’,¹⁸ borrowing from risk-averse Asian investors and investing into risky assets. However, these were no longer productive investments but toxic leveraged products. Caballero and Krishnamurthy (2009) provide a simple model of such a link between global imbalances and US financial fragility and show how foreign demand for safe US assets could contribute to the rise of leverage and the fall in risk premiums (Box 6).¹⁹

The link between global imbalances, low long-term interest rates and leverage has, however, not been documented empirically. Blanchard and Milesi-Ferretti (2009) dispute it, at least implicitly. Instead of putting the emphasis on net savings flows (as the global-imbalances approach does), they prefer instead to emphasize the role of *gross* cross-border holdings of financial assets in the transmission of the crisis from the US to Europe. Both explanations, however, are compatible. Linkages between global imbalances, low long-term interest rates, leverage and the development of new financial products have not yet been assessed systematically. Warnock and Warnock (2009) explore the impact of foreign official capital inflows on US long-term interest rates and find that they may have depressed them by close to 100 basis points in 2005, which is not a trivial effect. In a broader perspective, Obstfeld and Rogoff (2009) discuss the impact of low interest rates on financial innovation and claim that global imbalances and the crisis had common causes.

¹⁸ The expression is borrowed from Pierre-Olivier Gourinchas and Hélène Rey (2007).

¹⁹ See also Brender and Pisani (2009).

Box 6 – Global imbalances and US financial fragility: a simple model

The model, adapted from Caballero and Krishnamurthy (2009), has three agents: domestic financial firms, domestic investors, and foreign investors.

Domestic financial firms generate a cash flow X_t per unit of time that comes from their portfolios of loans, e.g. mortgages. Let V_t be the present value of these future cash flows. The financial firms are leveraged and issue debt to the amount of B_t . The debt is deemed safe and pays the risk-free interest rate r . The equity value of the financial firms is therefore:

$$W_t = V_t - B_t \quad (6.1)$$

Domestic investors hold financial firms' equity and their wealth is therefore W_t . They consume a fixed fraction ρW_t of their wealth per unit of time, in conformity with a behavior optimally derived from log preferences.

Foreign investors are more risk-averse and hold only debt B_t (think of foreign central bank holdings). They invest a flow X_t^* and repatriate a fraction $\rho^* B_t$ of their wealth per unit of time.

These are crude assumptions intended to capture the behavior of US and foreign emerging countries' investors in the 2000s. It would not change the results to assume that the two categories of investors hold both equity and debt as long as they have a different preference for the two categories of assets.

The goods market equilibrium writes:

$$\rho W_t = X_t + X_t^* - \rho^* B_t \quad (6.2)$$

That is, domestic consumption equals the income stream from financial firms plus net capital inflows. This equation can be solved for the equity value of domestic financial firms:

$$V_t = \frac{X_t + X_t^*}{\rho} + \left(1 - \frac{\rho^*}{\rho}\right) B_t \quad (6.3)$$

The first term on the right-hand side indicates that foreign demand for *riskless* assets increases the equity value of financial firms, i.e. of domestic *risky* assets (and therefore the wealth of domestic residents W). This is because leverage brought about by the foreign demand for safe assets increases the value of equity. The second term indicates that the increase is stronger if foreign asset-holders have a lower propensity to consume (repatriate) their wealth than domestic asset holders.

In the same way it can be shown that if capital inflows are stable, then the foreign demand for safe assets lowers the risk premium on domestic risky assets.

1.6. The “Black Swan” syndrome

Complex systems are prone to accidents and the more integrated they are, the more catastrophic the accident can be. Financial markets are specialized in dealing with risk but are not prepared to face extreme events. When such events materialize, the whole system may collapse. “*Complexity got the better of us,*” wrote Goldman Sachs CEO Lloyd Blankfein in February 2009, adding that we should resist a response, however, that is solely designed around protecting us from the 100-year storm because “*taking risk completely out of the system will be at the cost of economic growth*” (Blankfein, 2009).

Very few observers, if any, go as far as saying that the crisis was purely a ‘Black Swan’, i.e. a large-impact, low-probability event against which any protection would be exceedingly costly.²⁰ But many give it a certain weight and use it to caution against the temptation to overprotect. It is also a challenging intellectual hypothesis that deserves to be explored.

²⁰ The black-swan metaphor is attributed to Nassim Nicolas Taleb (2007) and has its root in the observation by Karl Popper, the 20th century philosopher, that seeing no black swan was not a proof that black swans did not exist.

As already observed, the subprime crisis was in itself a relatively minor event. According to the IMF (2008), the losses on US non-prime mortgage loans that set in motion the dramatic chain of crisis events stood in October 2008 at some 100 billion dollars. This corresponded to just 0.7 percent of US GDP and 0.2 percent of world GDP, a small amount in comparison to eventual, global losses. Even the higher estimates of losses on related mortgage-based securities (500 billion dollars according to the same source) were second-order in comparison to losses incurred in the early 1990s with the US Savings and Loans crisis (about 700 billion dollars, equivalent to 1700 billion dollars in 2008 terms) and even more to those that resulted from the dotcom crash of 2001-2002. Similar comparisons could be made with the emerging markets crises of the 1990s. Yet the consequences of the previous episodes remained contained.

We have explained what role the use of securitized assets as collateral has played in the transmission of the shock. But the issue runs deeper. Andrew Haldane, the Bank of England's director for financial stability, has drawn interesting comparisons with collapse phenomena affecting other complex, network-based systems such as electricity grids and complex ecosystems, for example rainforests or fish stocks. Such systems exhibit strong non-linearities in response to shocks and, according to Haldane, they are at the same time both robust and fragile. Their complexity and connectivity makes them resilient to a wide range of shocks because *“the system acts as a mutual insurance device with disturbances dispersed and dissipated. Connectivity engenders robustness. Risk-sharing – diversification – prevails. But beyond a certain range, the system can flip the wrong side of the knife-edge. Interconnections serve as shock-amplifiers, not dampeners, as losses cascade. The system acts not as a mutual insurance device but as a mutual incendiary device”* (Haldane, 2009).

There is strong evidence that the very strategies that were intended to limit risk – especially securitization and insurance through derivative products – dramatically increased the complexity of the financial system and at the same time reduced its diversity, because all firms were following similar strategies and were making themselves vulnerable to the same events. *“In just about every non-financial discipline,”* Haldane observes, *“this evolution would have set alarm bells ringing. Based on their experience, complexity plus homogeneity did not spell stability; it spelt fragility.”*

So the black-swan hypothesis may be less reassuring than at first sight. Instead of being an unpredictable, once-in-a-century event, big crises may be an endogenous property of a robust-yet-fragile system in the same way collapses are an endogenous property of the robust-yet-fragile integrated electricity grids. If this is the case, responses should focus not on checking whether each and every part of the system is in good shape but on improving the stability of the whole. This may imply stress-testing the financial system, *i.e.* assessing the impact on banks' balance sheets of various scenarios involving the propagation of shocks across the financial system, and protecting vital elements of the financial system from the contagion of its riskier segments – as was done after the Great Depression with the introduction of the Glass-Steagall Act that separated investment banking from commercial banking – or giving to a specific institution the mandate to oversee global financial stability, over and above the mission industry regulators are entrusted with. We return to these issues in Section 3.

1.7. Lessons

It would be vain to try to determine which of the three approaches to the crisis reviewed above is the most relevant, or even to establish a hierarchy between these different sets of potential causes. The reason is that they touch upon different policy domains – financial regulation, monetary policy, international coordination – and they are mutually reinforcing. For instance, excess leverage due to insufficient regulation was encouraged by low interest rates. Why were interest rates so low? The Fed's monetary policy provides an immediate answer. But without international appetite for US Treasuries, the US dollar would have been weaker, triggering import-price inflation and forcing the Fed to increase interest rates. And at longer horizons, interest rates are determined by international capital markets rather than by local monetary policy. More directly, the global demand for US dollars spurred the production of dollar-denominated assets.

More generally, through its basic ingredients, this crisis resembles previous crises experienced throughout history: asset-price bubbles financed through leveraging followed by a market scramble. Why, then, was the crisis not anticipated? The reason is twofold.

First, as argued above, the roots of the crisis are to be found in different spheres. Robert Shiller of Yale warned against the risks of a US housing-price collapse. The IMF repeatedly pointed out the burgeoning US current-account deficit, and Nouriel Roubini of New York University anticipated a dollar crisis. Michel Aglietta of Paris-Nanterre and Claudio Borio of the BIS warned policy-makers against systemic risk developing in the banking sector (see Obstfeld and Rogoff, 2009, for an account of the various stages of the pre-crisis discussion). But few economists were able to embrace all dimensions of the crisis, from accounting and banking standards to global current-account imbalances, from the intricacy of ABS markets to off-balance banking conduits.

Second, after an unprecedented period of expansion, and a succession of eventually benign financial crises, the crisis found policy-makers and their advisors sleeping at the wheel. The crisis of the junk-bond market in 1989, the demise of LTCM in 1998, the bursting of the dot-com bubble in 2001 were all significant events in the financial sphere, but none of them resulted in a world recession. This created a false belief in the robustness of the system and a sense of complacency, which was proved wrong by the 2007-2008 crisis. More globally, crisis prevention faces the well-known hurdles of collective action: the change of behavior that is necessary to heed the various signals that are always available not only requires individual wisdom but makes sense only if it is implemented collectively. This is the role of politics.

2. EXTRAORDINARY TIMES

A clear pattern emerging from the evolution of policy thinking and policy making in the post-war period has been a guarded approach to government intervention. In the mid 2000s, virtually any minister, central banker or regulator in the world contemplating policy action started off by asking himself or herself whether public intervention was necessary and whether it would risk doing more harm than good. Even those who (like us) did not share a belief in the self-regulating character of markets acknowledged that government failures were probably as pervasive as market failures and that before embarking on public intervention a thorough examination of the pros and cons was needed.

Another, related, pattern of policy-making has been the increased emphasis on predictability. In accordance with the rational-expectation paradigm, economic policy came to be seen in late 20th century as a repeated game against intelligent players. The consequence was to lay stress on the clarity of objectives and the growing importance of policy rules – even when rules were intended to serve as benchmarks rather than strict guidelines. This pattern was especially apparent in Europe where policy by rules was enshrined in the EU treaty.

Crisis management, however, calls for a different kind of policy behavior. In the same way wartime governance departs from peacetime governance, it involves actions that break down the traditional boundaries between private and public domains and disregard rules-based guideposts. Instead of predictability it requires speed of action, flexibility and innovativeness. It thus brings policy-making onto entirely new territory where the usual compass is of little use beyond drawing attention to the inevitable day of reckoning when the full costs of heterodoxy need to be dealt with. This section is about this new territory.

2.1. Economic policy without the visual compass

Central banks embarked in August 2007 on providing wholesale liquidity to financial institutions – not knowing, at the time, how far the journey would take them. In October 2008, governments came to the rescue of ailing banks in order to avoid further bankruptcies and to revive the credit channel. Simultaneously, central banks lowered interest rates aggressively, soon reaching the zero bound, while fiscal policy turned expansionary.

a. The rescue of ailing banks

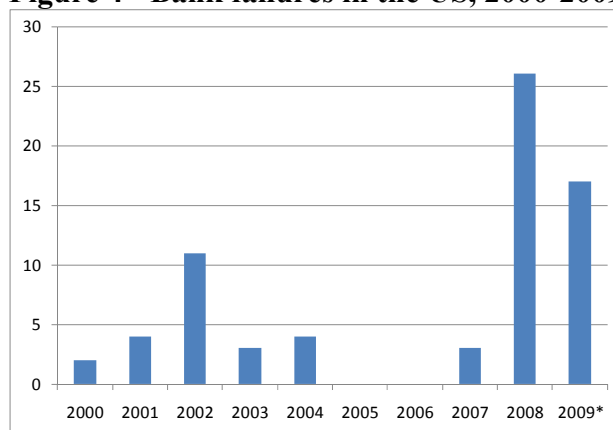
From the 1980s until the mid 2000s, privatization had been a policy motto in both developed and developing countries. Empirical research had supported the proposition that privately owned firms are more efficient and more profitable than otherwise-comparable state-owned firms (Megginson and Netter, 2001). Unless there was a clearly stated general interest argument, public ownership of commercial banks or non-financial companies was regarded as evidence of a lack of clear policy objectives and was even considered as a handicap as it confronted policy-makers with a conflict of interest between their role as shareholders and their role as regulators. Either banks benefited from privileged access to government support, which raised competition concerns, or they had to behave like private banks, which deprived public ownership of any purpose. In most countries consequences were drawn: the public banking sector was limited to general-interest institutions such as development banks, and when it

survived its privileges were eventually sacrificed on the altar of competition, as for the *Länder* guarantee of the borrowing of the German *Landesbanken**.²¹

In 2008, however, governments in most countries had hurriedly to reverse this stance and found themselves doing the opposite of what they had claimed was their doctrine. Capital injections into banks amounted in most cases to several percentage points of GDP (up to 5.1% in the Netherlands, a small country with two major international banks),²² either through outright participation and control of the bank, or by subscribing to preferred shares (see Box 7) to avoid taking control.

When a large bank is unable to roll over its debt in spite of short-term liquidity provision by the central bank and faces a threat of failure, the government can either let the bank fail – and possibly face the systemic consequences; or it can save the bank and in the process bail out its depositors and lenders, thereby creating moral hazard. Bank failures are not exceptional events. In 2008, 26 US deposit banks were allowed to fail, a number still small in historical terms (Figure 4).²³ Most of the time, the failed banks were small enough not to trigger a domino effect in the banking system.

Figure 4 - Bank failures in the US, 2000-2009



Source: FDIC

Lehman Brothers' failure could have been a salutary reminder to all holders of bank shares of the risk associated with the high returns on their holdings, thereby helping to keep moral hazard in check. In fact, it turned to disaster due to the size and interconnectedness of Lehman. Only three weeks after its failure, on 10 October 2008, G7 finance ministers announced an unequivocal change of course, saying that they would “*use all available tools to support systemically important financial institutions and prevent their failure*”.²⁴

²¹ The regional banks (*Landesbanken*) were forced by the European Commission to abandon their state guarantees because these represented a distortion of competition. This termination resulted in a borrowing spree before the expiration of the guarantee in 2005 and its proceeds gave rise to hazardous investment in high-yielding assets such as US mortgage-based securities to compensate for the loss of low-cost funding.

²² Panetta *et al.* (2009), table 1.2.

²³ More than 500 deposit banks failed in 1989, and up to 4,000 in 1934. See Gorton (2009).

²⁴ *Still, some analysts question the wisdom of that change and argue that letting Lehman fail was the best course of action (e.g. Steil, 2009).*

The question had moved from *whether* to intervene to *how* to intervene. In this respect, past crisis episodes have yielded two major lessons:

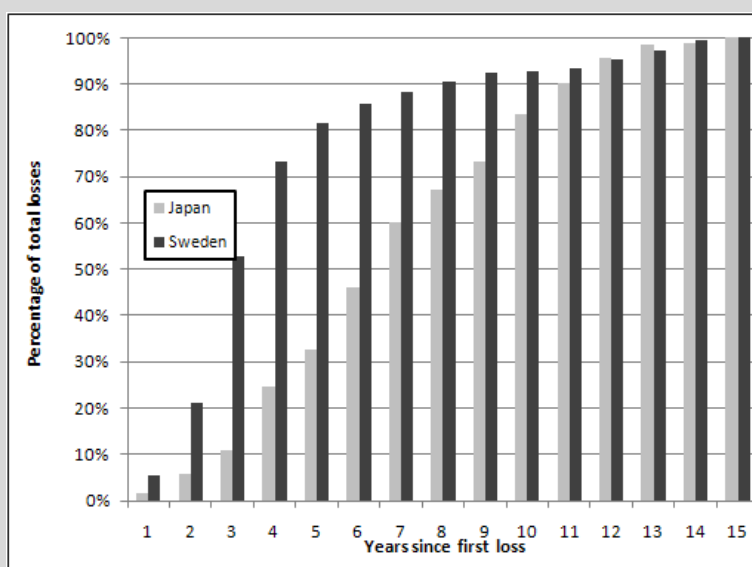
- It is of utmost importance to prevent the economy from sliding into paralysis and to avoid setting deflationary mechanisms in motion. The policy response needs to be of the ‘shock-and-awe’ type. Monetary and fiscal policies can be powerful in alleviating the impact of the crisis in the short and medium run; however, as shown by the Japanese example, there cannot be a sustained recovery as long as banks are paralyzed and unable to extend credit (Box 7);

Box 7 – A tale of two banking crises: Sweden and Japan

While the crisis that erupted in 2007 was the first global crisis of this sort since the 1930s, it was by no means the first banking crisis in modern times. On the contrary there was extensive international experience with such crises in developed and developing countries (Laeven and Valencia, 2008). Two examples were studied especially closely, those of Sweden in the early 1990s and Japan from the early 1990s to the mid 2000s. In both cases the country suffered from a severe banking crisis resulting in massive losses and the insolvency of a large part of the banking sector.

Measures introduced by the government were broadly similar: in a first phase, liquidity was extended to ailing banks, a blanket guarantee of deposits was introduced to avoid panic; banks were thereafter nationalized, recapitalized through the injection of public funds, restructured, merged, and eventually privatized; and non-performing assets were transferred to public asset-management companies in charge of selling them. But the timing was very different: the Swedish government acted swiftly and decisively to ward off the crisis and adopted a hands-on approach to bank rescue and restructuring, while several years passed until the reality of the crisis was recognized in Japan and even more before the problem was addressed. Three years into the crisis, 50% of the losses had been recognized in the accounts of the Swedish banks, against 10% in Japan (Figure 7.1).

Figure 7.1 -Cumulative bank write-downs: Sweden and Japan



Source: Hoshi and Kashyap (2008), Bank of Sweden, and Bruegel calculations.

As a consequence, the crisis lasted longer and was significantly more costly in budgetary terms in Japan (Table 7.1). The reason why the outcome was so different is that delaying restructuring does not add to the chances of spontaneous recovery, rather it generally leads to further losses. For instance, credit restrictions raise the failure rate of enterprises, thus changing healthy loans into non-performing ones. Then more capital needs to be injected into banks, creating more public debt while GDP – the denominator of the debt ratio – tends to stagnate. Japan thus seemingly managed to limit the short-term economic impact of the crisis as compared to Sweden, but at the price of a slow-growing potential GDP: 1,1% yearly growth on average between 1997 and 2006 for Japan, versus 1.7% and 2,6% over 1987-96 and 1997-2006 respectively for Sweden (source: OECD, Economic Outlook 85, June 2009).

Table 7.1 – Cost of the banking crisis: Sweden and Japan

	Sweden	Japan
Start	1991	1997 ^a
End ^b	1996	2005
Length (years)	≤ 5	≥ 8
Cost of bank recapitalization (% of GDP)		
- Gross	1.9	6.7
- Net	1.5	6.6
Gross public debt ratio increase (start to end, percentage points)	39	76
Output loss (first three years, cumulative, in percent of trend GDP) ^c	31	18

Notes: The Japanese banking crisis began to develop following the stock-market crash in 1990 and the decline in real-estate prices, but the onset of the banking crisis is generally considered to be the failures of Sanyo Securities and Yamaichi Securities in November 1997 and resulting disturbances on the interbank market. It is only at that time that the extent of the damage began to be recognized.

Date of removal of the blanket deposit guarantee (this tends to overestimate the duration of the crisis)

Sum of the differences between trend and actual GDP over three years, divided by trend GDP.

Source: Laeven and Valencia (2008), OECD data, and authors' calculations.

- Partial injections of capital into the banking sector are of limited effectiveness as long as assets of uncertain value remain on the banks' balance sheets. Creditors remain wary of the soundness of the bank, which in turn leads it to err on the side of caution and restrict credit. A comprehensive cleaning up of balance sheets, and transparency as to their content and resilience to stress scenarios, are preconditions for credit revival.

As a consequence, government should intervene both on the liability side of banks' balance sheets through capital injections, refinancing, and bank debt guarantees, and on the asset side by buying assets or guaranteeing their value. All these instruments are detailed in Box 8.

Box 8 – A primer on bank losses and rescue

To understand the impact of bank losses and the options for government rescue, it is best to start from a very simple example. Assume the balance sheet of a bank prior to the crisis looks as follows (see Table 8.1):

Table 8.1 - A bank balance sheet before the crisis

Assets		Liabilities	
Toxic assets	20	Equity	10
Other financial assets	20	Debt	50
Loans	50	Deposits	40
Cash	10		
Total	100	Total	100

On the asset side the bank holds cash, loans and standard financial assets as well as toxic assets supposedly worth 20. The term 'toxic assets' refers to assets whose market value is highly uncertain – although this may not be duly recognized in the absence of a crisis (for example, mortgage-backed securities whose yield depends on the stream of interests and repayments on mortgage loans to subprime creditors).

On the liability side it receives deposits from customers and issues debt. In this simplified example the difference between the market value of its assets and that of its liabilities is its equity, that is, the value of the bank's shares. It is assumed that assets and non-equity liabilities are evaluated at market value (for a discussion of market valuation, see Section 3).

Suppose now that the toxic assets held by the bank lose half of their value. The total assets of the bank are now worth 90 instead of 100 but liabilities to creditors and depositors have not diminished. This implies a loss of 10 on its profit-and-loss account and therefore a write-down on its capital that brings its equity to zero (see Table 8.2). As a consequence it is bankrupt. It can repay its creditors and depositors by selling off its remaining assets (assuming they can be sold at their book value) but cannot remain in business.

Table 8.2 - The bank incurs losses on 'toxic' assets

Assets		Liabilities	
Toxic assets	10	Equity	0
Other financial assets	20	Debt	50
Loans	50	Deposits	40
Cash	10		
Total	90	Total	90

The bank can however refuse to recognize the extent of its losses and mark down its toxic assets at 15 instead of 10. This has two consequences:

First, it is vulnerable to creditors' suspicion: customers may withdraw their money because they fear an outright default (this is what happened in 2008 to Northern Rock, the British bank) and other banks may refuse to renew credit (this is what happened on the interbank market starting in August 2007). It is therefore likely to call on, and depend on, central bank credit as a substitute for private credit.

Second, it is undercapitalized, because the loss of 5 that it has recognized on its assets implies a corresponding write-down on its equity. As a consequence the bank needs to raise capital or to reduce both its assets and non-

equity liabilities to a level consistent with its remaining capital. This results in a non-renewal of existing loans to clients and in a reduction of the volume of new loans.

‘Zombie banks’ of this sort are a dangerous species. First, they may at any time fail to meet their obligations and trigger a chain of defaults and therefore make the entire financial system more fragile. Second, they are inclined to ration credit and therefore impose costs on the non-financial sector. This is why swift government intervention is necessary to force banks to recognize their losses and operate a triage between the profitable, the viable and the bankrupt ones.

Governments can intervene either through the liability or through the asset side of the balance sheet. In the first case the most straightforward way to proceed is to nationalize the bank at no cost (since the value of its equity is zero) and inject new capital in the form of equity. In the absence of outright nationalization the government can inject capital through other channels such as preferred stocks or preferred shares.^a Assuming the government injects both equity and preferred stock, the balance sheet now looks as follows (Table 8.3):

Table 8.3 - The bank is recapitalized by government

Assets		Liabilities	
Toxic assets	10	Equity	5
Other financial assets	20	Preferred stock	5
Loans	50	Debt	50
Cash	20	Deposits	40
Total	100	Total	100

Another way to proceed, if the government does not want to nationalize banks, is to purchase toxic assets at an inflated price (Table 8.4). For example, toxic assets can be isolated by setting up a bad bank.^b This is another way to inject cash into the bank, but with very different distributional consequences. Instead of buying up a bank at zero cost (and possibly making a profit on its resale) the government buys toxic assets above market value and therefore makes a sure loss. The value of private shareholders’ equity is thus indirectly subsidized, whereas they would be wiped out in the case of nationalization. These distributional consequences stand as political-economy arguments against setting up bad banks, even though this may be an effective solution to deal with toxic assets.

Table 8.4 - Toxic assets are bought by government above market value

Assets		Liabilities	
Toxic assets	0	Equity	10
Other financial assets	20	Debt	50
Loans	50	Deposits	40
Cash	30		
Total	100	Total	100

a. Preferred stocks are stocks which deliver a higher yield but which carry no voting rights. In case of bankruptcy, preferred stockholders are paid before stockholders and after bondholders.

b. A ‘bad bank’ is a temporary, public-funded financial structure designed to manage a set of assets taken out of ailing banks in order for the latter to be able to restart exposure to new risks through lending and to qualify as ‘good banks’.

All types of intervention have been used to varying degrees during the crisis. A radical combination used by Sweden in the 1990s was to nationalize, remove toxic assets from banks’ balance sheets, sell the banks back to the private sector and use the proceeds to compensate for losses suffered on toxic assets. The ultimate net fiscal cost of the Swedish rescue plan was small: 1.5% of GDP as compared to 6.6% of GDP in Japan (Box 7). However, only four banks were concerned at that time. Generalizing such a scheme to many banks in many countries was deemed impossible, notably when taking political constraints into account. Furthermore, in Europe, nationalizing banks with large cross-border activities would have required a level of coordination which could not be attained in the heat of battle and given the subsequent need to decide on how the fiscal burden would be shared.

Rather, bank recapitalization plans were carried out on a country-by-country basis, with striking differences of degree and procedure (Table 2).

Table 2 – Bank rescue measures adopted in 2008-2009 in selected countries (% of GDP)

	France	Germany	Switzerland	Netherlands	UK	US
Broadening of deposit insurance		Y	Y		Y	Y
Capital injections	1.4	0.9	1.1	5.1	3.4	2.1
Debt guarantees	3.7	5.2	0	6.8	7.2	2.4
Asset insurance	0.2	0		4.7	33.4	2.5
Asset purchases		0	7.6			0.3
Nationalizations		Y		Y	Y	Y

Source: Panetta et al. (2009, table 1.2) and BIS Annual Report 2009 (table VI.2). Data cover the September 2008 – June 2009 period. A blank cell (Y) means that the measure was not part of the rescue package (was part of it). 0 means that the measure is part of the rescue package but that there was no outlay during the period covered. Figures represent outlays and are given in percentage of GDP.

A first reason for differences is the divergence in initial situations. In Spain, banks had been prevented by the supervisor from buying mortgaged-backed securities and forced to build-up strong capital buffers during the housing market boom. They were affected by the collapse of housing prices but not by the subprime crisis. In Germany, regional banks had a weaker capital base and had invested heavily in structured assets. In the UK, mortgage refinancing by short-term borrowing on financial markets had been a flourishing business model that was destroyed by the crisis. In emerging economies, banks were hardly exposed to structured assets and were only hit by the subsequent economic crisis.

A second reason lies in the structure of the banking system: in continental Europe, commercial banks with strong deposit bases were dominant, while investment banks led the game in the US.

A third reason has to do with political-economy constraints, which played a major role in determining the nature of the responses, both at a national and at an international level:

- At a national level, there is a trade-off between efficiency and equity. By providing generous recapitalization with little constraint in terms of governance, or by purchasing toxic assets at an inflated price, governments could quickly restore bank solvency and encourage private investors to invest in and lend to banks again. But the cost would then be borne by the taxpayer, while it should primarily be borne by the bank's shareholders, who had reaped generous revenues in the years before the crisis and had accepted the accompanying risk. Alternatively, refraining from rescuing banks, or imposing a large cost on shareholders or, worst, on employees, would preserve the taxpayer in the short run but might fail to fix the problem, thereby inflating the final cost to the taxpayer. The US case illustrates this discussion. The Bush, then Obama administrations had a hard time convincing Congress to use taxpayer money to support banks in the midst of a recession, and had to limit themselves to the initial 700 billion dollars allocation. As a consequence, they did not aim to maximize the return on public cash injections but to maximize the effect of injecting a given amount of public cash;

- At an international level, the absence of *ex-ante* arrangements on sharing the fiscal cost of bank rescues makes it even more difficult to design them. As Charles Goodhart (2009, p.16) has said, “cross-border banks are international in life, but national in death”. In such a context, tight international coordination on the supervision of cross-border institutions and on bank resolution regimes is called for (see Section 3).

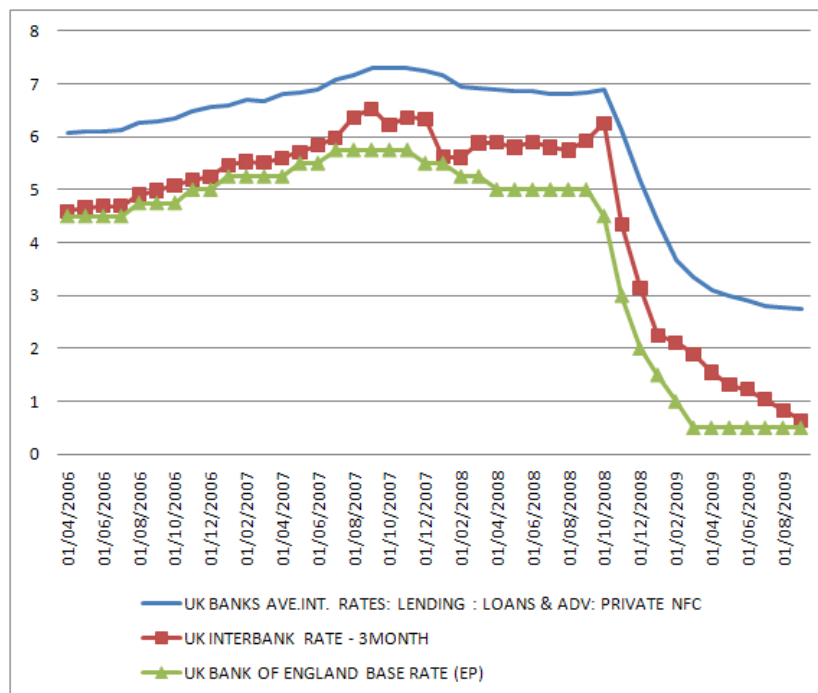
b. Unconventional monetary policy

The Taylor rule can be used to provide a rough benchmark for setting the short-term interest rate. A standard formula relates this rate to the “equilibrium” real interest rate, the inflation rate and the output gap. Application of this benchmark rule would have resulted in significantly negative *nominal* interest rates in 2009 in the United States, the euro area and Japan. As already stated in Section 1, monetary policy during the crisis thus encountered the *zero-bound problem*: while the Taylor rule would have recommended a negative interest rate, this is not possible to achieve, because asset-holders are not prepared to pay for keeping deposits with the banks (they would rather buy safes and keep cash at home).

In the 1990s, the Japanese experience with deflation and the liquidity trap prompted fresh thinking on the options still available when the interest rate cannot be lowered any further. The Fed especially studied this episode extensively and reached the conclusion that monetary policy could still be used and be effective. This was the origin of what became known as the *zero interest-rate policy* or *ZIRP*.

Another reason why unconventional methods are called for in a financial crisis is that the traditional transmission of policy rates to lending rates is hampered by the dysfunctional state of money markets. This happens at two levels: first, the interbank rate (the rate at which banks lend liquidity to each other) diverges from the central bank’s policy rate because banks fearing counterparty default price risk accordingly; second, the spread between the commercial banks’ lending rate and the interbank rate increases both because of higher risk premiums and because banks seek to increase their profits. Both phenomena were apparent in 2007-2008 as illustrated by Figure 5 for the UK: prior to summer 2007 there was barely any difference between the BoE policy rate and the interbank rate but the spread widened in 2007-2008 and reached 175 basis points in autumn 2008; simultaneously, the spread between the interbank rate and the banks’ lending rate widened from 80 basis points in summer 2007 to 160 in spring 2009. The net result was that only four-fifths of the 525 basis points policy rate cut was passed on to non-financial agents. Furthermore, quantitative restrictions were commonplace as the volume of interbank credit dropped sharply and lending to non-financial customers slowed down markedly. So recourse to unconventional methods may be needed even before the policy rate hits the zero bound.

**Figure 5 – Three-month interest rates in the UK, 2006-2009
(annualized, in percent)**



Source: Bank of England.

To understand ZIRP it is best to start with a simple thought experiment. Imagine that the central bank prints vast amounts of banknotes and drops them above big cities from helicopters. Surely, individuals receiving banknotes from heaven would feel suddenly richer and would spend at least part of this money (especially if they have heard about monetarism and fear that relying on the printing press will in the end result in inflation). Demand would pick up and inflation would follow later on with the consequence that the short-term real interest rate would decrease, leading to a further increase in demand.

What this thought experiment demonstrates is that the central bank's exclusive power to create money remains effective whatever the interest rate level and the state of money markets. Despite the fact that it does not provide actual means to conduct monetary policy, it gives indications about what it can be. Surely, there must be more practicable ways to channel money to private agents than dropping banknotes from helicopters. Policy thinking about unconventional policies was still fragmentary when the crisis hit (there had been debates and reflections about the Japanese experience but no systematic doctrine had been formulated, let alone a generally accepted definition of unconventional policy). Several approaches and partially overlapping concepts were therefore put forward in 2007-2008 (Bernanke, 2009 and King, 2009 provide practitioners' rationalizations. Meier, 2009, gives a systematic account of the evidence).

The *large-scale provision of liquidity to financial institutions*, beyond the scale of normal operation of the discount window, is arguably more an adaptation of standard central-bank practice than a genuinely unconventional policy. Starting in summer 2007, all central banks

extended wholesale liquidity to domestic financial agents. At an international level, liquidity provision also involved swap agreements between central banks such as those entered into by the Fed with partner central banks in developed and emerging countries (Box 9). Such agreements served a useful purpose to supply banking systems with US dollars, while highlighting the lack of international coordination of last-resort liquidity provision (Obstfeld, 2009), an issue we will address in Section 3.

The reason why, although truly exceptional, such initiatives do not fundamentally depart from standard monetary policy, is that they essentially aim at substituting the interbank market when it is clogged. Although they result in an increase in the size of the balance sheet of the central bank, they may leave constant the amount of money held by non-financial agents. In other words, the supply of base money (the central bank's balance sheet) has to increase because the ratio of money held by the public to base money (the *money multiplier*) has dropped due to reduced credit extended by commercial banks. This is what the Fed had failed to grasp during the Great Depression, thereby aggravating the crisis. Central banks this time fully offset the drop in the multiplier, without actually increasing money held by financial agents (von Hagen, 2009).

Box 9 – International swap agreements

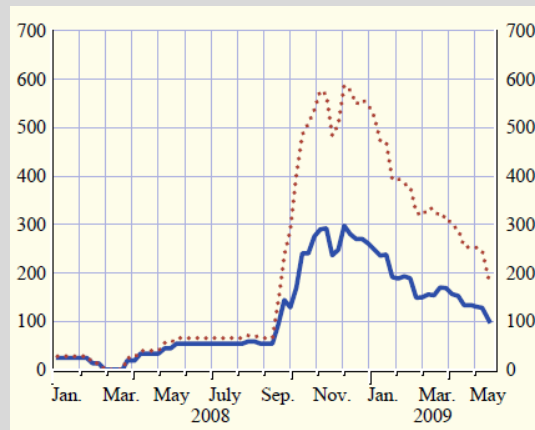
Swap agreements entered into by major central banks enable partner central banks to provide commercial banks and other financial market participants with liquidity in foreign currency that they cannot obtain on the market anymore.

A currency swap is a contract between two parties to exchange an asset in one currency for an asset of equal value denominated in another currency. When the Fed enters into a swap agreement with the ECB it supplies the latter with US dollars and takes an equivalent amount of euros in exchange. Swaps are entered into for a time-bound period.

In autumn 2008 existing US Federal Reserve swap agreements with the ECB, the Swiss National Bank, the Bank of England and the Bank of Japan were adjusted to unlimited amounts and new swap lines were extended to the central banks of Brazil, Korea, Mexico, New Zealand and Singapore.^a The Fed's intention was to make sure that financial market participants operating in dollars on non-US markets could access dollar liquidity in spite of the clogging of interbank markets. The amount drawn by partner central banks peaked at 600 billion dollars in December 2008 (Figure 9.1).

In Europe the Swedish central bank has entered into similar agreements with partners in Iceland and in central and eastern Europe (Latvia and Estonia). The ECB has remained more cautious: it has established swap lines with central banks in Denmark, Sweden and Switzerland but not with countries of central and eastern Europe.

Figure 9.1 – US dollars provided through swap lines by the ECB and the Fed, in US billions



Source: ECB Monthly Bulletin, July 2009.

^aThe Fed also has swap lines with central banks in Australia, Canada, Denmark, Norway and Sweden.

According to Meier (2009), genuinely unconventional policies involve two types of actions:

- Announcements and / or refinancing operations designed to affect the yield curve at longer-than-usual horizons;
- Outright asset purchases, generally known as quantitative easing or credit easing, to reduce the spread between interbank and lending rates.

Central banks normally only target the short end of the yield curve, leaving the determination of longer-term interest rates to market mechanisms. In a situation of near-deflation, however, expectations of positive interest rates and very low or negative inflation may combine to fuel a deflationary spiral. For this reason central banks can commit to keep policy rates low for an extended period and enter into refinancing operations with extend maturity, possibly at a fixed rate and with unlimited amounts, thereby imposing a ceiling on interest rates at the corresponding horizon. This may imply committing, implicitly or explicitly, to higher inflation in the future, in order to lower expected real interest rates and encourage borrowing and investment.

These techniques, first suggested by Paul Krugman (1998a) and then scholar (and later central bank governor in Cyprus) Athanasios Orphanides (2004) in the context of the Japanese crisis, have been used to varying extents by central banks, though none has gone as far as following Krugman's prescription and "committing to being irresponsible". For example, the US Federal Open Market Committee's statement of August 2009 included, as in previous months, the announcement that "the Committee continues to anticipate that economic conditions are likely to warrant exceptionally low levels of the federal funds rate for an extended period". The ECB used a different channel to lengthen the agents' horizon: in June 2009 it provided 12-month collateralized loans to the banks at a fixed 1% rate and for an unlimited amount (*ex post*, the banks' borrowing amounted to about 5% of GDP), but without committing to a repeat of this transaction.

Rather than aiming at affecting the overall yield curve through expectations of future rates, the central bank can directly affect yields on certain categories of assets through outright purchases. These can be either debt instruments issued by non-financial agents or government bonds. The rationale here can be to unfreeze clogged segments of financial markets, to help non-financial agents to get access to better and cheaper credit, and to affect long-term bond rates directly.

Meier (2009) provides a categorization of such operations, distinguishing between qualitative easing (sterilized interventions that do not involve an increase in the central bank’s balance sheet) and quantitative easing (unsterilized interventions implying an increase in base money). Table 3 summarizes these various options and indicates what major central banks actually engaged in. The ECB stands apart for not contemplating quantitative easing (although its purchase of covered bonds may not be sterilized entirely, the amounts potentially involved are a mere 0.6% of GDP). The BoE, the BoJ and the Fed engaged in significant quantitative easing with announced amounts of 8.6%, 5.2% and 14.7% of GDP respectively. Finally, the Swiss National Bank stands out as the one that relied on unsterilized currency intervention.

Table 3 - Categories of unconventional monetary policy operations involving asset purchases

	No expansion of base money (qualitative easing)	Expansion of base money (quantitative easing)
Purchase of private assets (credit easing)	ECB	BoE, BoJ, Fed, SNB
Purchase of government bonds		BoE, BoJ, Fed
Purchase of foreign-currency assets (forex intervention)		SNB

Source: Meier (2009), on the basis of announcements made by end-June 2009.

Direct purchases of government bonds have a special status as they break the separation between monetary policy and fiscal policy and evoke debt monetization. They can be an effective tool when short-term interest rates are close to zero and longer-term rates well into positive territory: government bond purchases can be effective in flattening the yield curve, which benefits all long-run borrowers, including corporations and foreign borrowers. Still, such a policy is normally taboo as it comes close to a direct financing of the government by the central bank – hence a monetization of the public debt as feared by Sargent and Wallace. In the euro area, for example, the provision by central banks of credit facilities to governments or the direct purchase of government debt instruments are prohibited by Art 101 of the EC Treaty.²⁵ This taboo was broken in the US and the UK, as it was in Japan in the early 2000s.

²⁵ This is somewhat hypocritical since the Eurosystem does purchase European government bonds for investment purposes (on the secondary market and in limited amounts), and since there is little economic

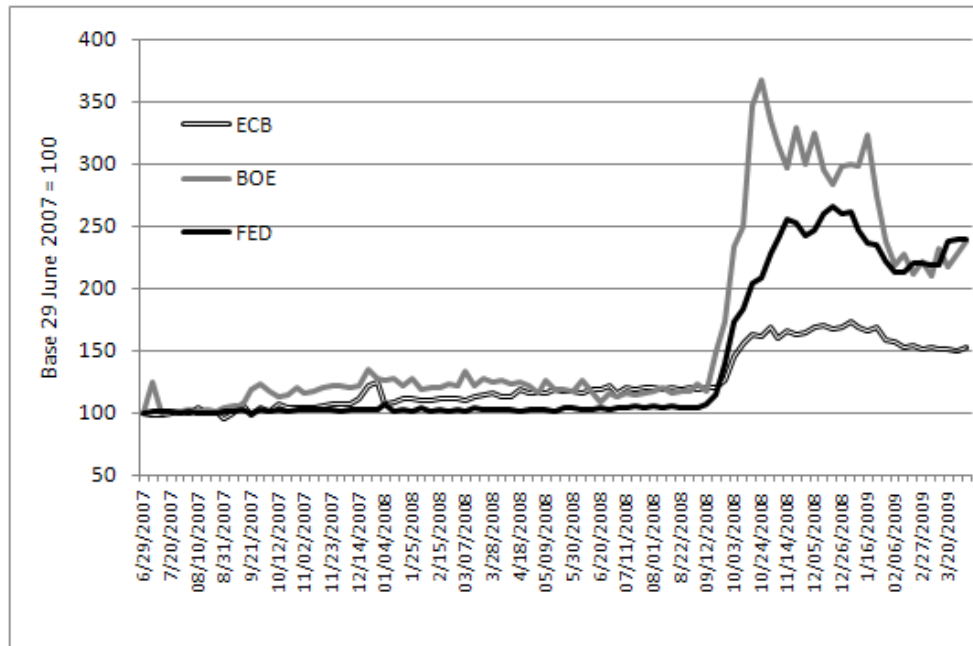
Overall, liquidity provision and unconventional policies resulted in an unprecedented increase in the size of the central banks' balance sheets (Figure 6). In Spring 2009, assets held by the Federal Reserve and the Bank of England were more than twice as high as in spring 2007, and they were about 50% higher for the ECB.

Unconventional policies are necessary in exceptional circumstances, but they are not without risks:

- The direct inflation risk is less significant than often argued. The expansion of base money does not in itself create an inflation risk if it is undertaken in response to a reduction in the money multiplier. It can be reversed easily in response to a revival of direct interbank lending. Exceptional liquidity provision does not imply a more expansionary monetary policy;
- Through liquidity provision, the composition of central banks' assets has been massively skewed towards riskier assets. In principle, central banks apply an appropriate *haircut* (discount) to the collateral they take in order to account for the risk. Furthermore, the collateral remains the property of the banks and only serves as a guarantee for the central bank's loan. However in times of crisis the frontier between liquidity provision and subsidization is a thin one and - if, for example, the risk is not adequately priced or if the market for the assets taken as collateral is paralyzed - the central bank can *de facto* become a *quasi-fiscal agent*, in effect blurring the distinction between monetary and budgetary policies. In particular, a loss on the assets bought by central banks could necessitate an intervention of the Treasury to recapitalize it, thus endangering its independence;
- Commitments that affect the yield curve beyond the usual very short-term horizon, or assets purchases that have the same goal, may involve an inflation risk. For the central bank, committing credibly to keeping interest rates at near-zero levels for an extended period amounts by definition to taking an inflation risk. This may be the price to pay for lowering *ex-ante* real interest rates;
- By the same token, such policies break with the tradition that only the very short end of the yield curve is policy-determined and that the rest of it is market-determined. This may at a later stage make it difficult to return to a policy of non-intervention in the formation of medium and long-term interest rates.

difference between an outright purchase of a government bond and a liquidity tender with the same bond used as collateral, which can be rolled over as many times as needed.

Figure 6 - Total assets of selected central banks, 2007-2009



Source: IMF.

c. Large-scale discretionary fiscal stimulus

Prior to the crisis the effectiveness of fiscal policy was the subject of fierce debate. In the European Union, conventional wisdom was that countercyclical fiscal policy was useful but should only rely on automatic stabilizers. Due to implementation delays and/or political cycles, discretionary fiscal policy was not considered an effective stabilization instrument. On each of the three criteria of flexibility, speed of action and reversibility, it was outperformed by monetary policy. Even within the euro area where monetary policy was no longer available to respond to country-specific shocks, automatic stabilizers were considered large enough to stabilize country-specific shocks, provided public accounts were kept ‘close to balance or in surplus’ in the medium run and were allowed to exceed the 3% deficit threshold in case of ‘exceptional circumstances’. This explains why, when the crisis hit, many were not at ease with the very principle of a fiscal stimulus. Prominent policy-makers such as Jean-Claude Juncker, the president of the Eurogroup, kept insisting that “you cannot fight debt with new debt and deficits with new deficits”²⁶.

Yet, unlike monetary policy, government demand for goods *directly* affects spending, thereby complementing rather than stimulating private demand. It can therefore be especially effective in situations when monetary policy effectiveness is hampered by a series of obstacles. Furthermore, in time of deep recession, many of the usual counter-arguments to discretionary fiscal policy do not apply:

²⁶ *Financial Times*, 4 April 2009.

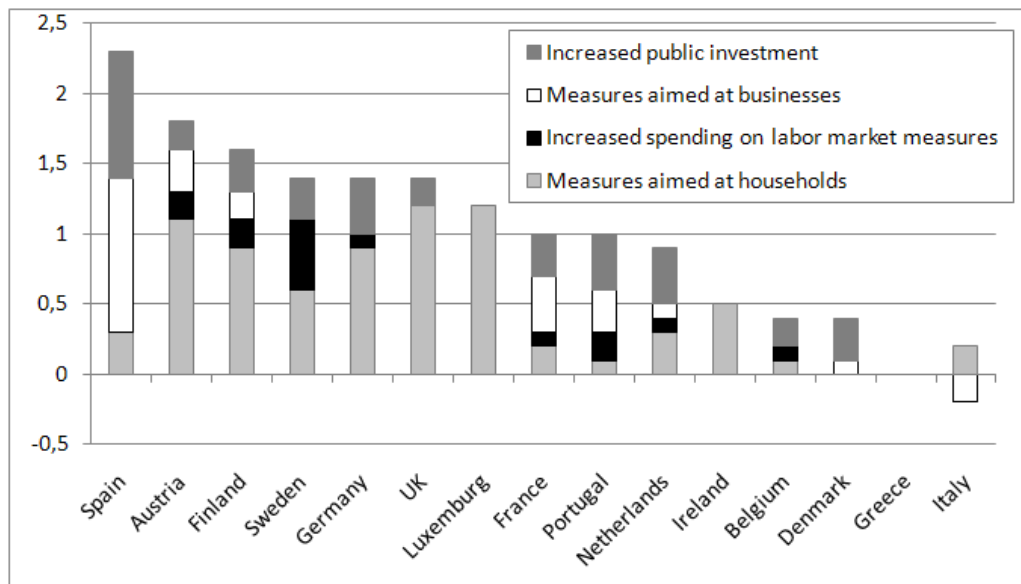
- The magnitude of the drop in demand implies that there is virtually an excess supply of all goods and services in all countries and that inflation is decreasing. As a consequence, the supply curve can be considered flat (*i.e.* the supply can increase without any upward pressure on prices), the traditional crowding out effects on investment and trade do not apply;
- As financial markets are dysfunctional, private agents are not able to borrow freely and engage in intertemporal optimization. More of them are liquidity constrained, as in the textbook Keynesian model;
- With unlimited credit supply by the central bank, there is no risk that public borrowing crowds out private borrowing;
- Cross-country externalities, whose signs are ambiguous under normal conditions, turn positive because spillovers through product markets dominate spillovers through capital markets.

In other words the macroeconomic conditions at end-2008 when the stimulus programmes were launched were exactly those in which discretionary fiscal policy could be expected to be effective – provided that funds were disbursed swiftly enough. This was recognized by long-time advocates of fiscal policy ineffectiveness:

“Under normal circumstances, I would oppose this rise in the budget deficit and the higher level of government spending. When an economy is closer to full employment, government borrowing to finance budget deficits can crowd out private investment that would raise productivity and the standard of living. Budget deficits automatically increase government debt, requiring higher future taxes to pay the interest on that debt. The resulting higher tax rates distort economic incentives and thus weaken future economic performance.... Nevertheless, I support the use of fiscal stimulus in the US, because the current recession is much deeper than and different from previous downturns.” Martin Feldstein (2009).

In Europe in November 2008, governments and the European Commission engineered an exceptional coordinated stimulus of about 1.5% of GDP. At about the same time the IMF advocated a 2% of GDP stimulus in all countries in a position to engage in such an action. In the US, the Obama administration introduced a two-year package amounting to 787 billion dollars shortly after taking office in January 2009. China also announced a massive stimulus programme. As the whole, the IMF (2009a) estimated in the spring of 2009 that G-20 countries would provide a discretionary impulse of 0.5% of GDP in 2008 and 1.2% in 2009.

Figure 7 - Size and composition of fiscal stimulus plans in the EU15



Source: European Commission (2009).

As regards the composition of the stimulus (Figure 7), many countries put emphasis on public investment (both infrastructure building and incentives to private investment, especially “green” investments). The idea was to maximize the Keynesian multiplier and increase public assets simultaneously with public debts (so that net public debt would not rise too much). However there are often delays in the implementation of public investment plans. For instance, the US Congressional Budget Office calculated in June 2009 that US expenditures on infrastructure building within the *American Recovery and Reinvestment Act* passed in February 2009 would peak in 2010 and 2011.²⁷ Conversely, some countries such as the UK relied primarily on tax cuts, which are very rapid to implement but may not translate into higher demand if private agents choose to save or, in the case of the British VAT cut, may result in limited pass-through on prices if competition conditions allow suppliers of goods and services to retain the benefit of the cut. Additionally, tax cuts may be politically difficult to reverse.

Not all governments and central banks were able to turn expansionary. Central and eastern European countries were hit by ‘sudden stops’ of capital inflows that forced them to reduce domestic demand through fiscal retrenchment and a tight monetary policy, even though they were supported by IMF and EU loans.²⁸ Developing countries which had resisted the crisis but which could no longer borrow from international markets were encouraged to carry out countercyclical fiscal policies with the financial support of multilateral and bilateral

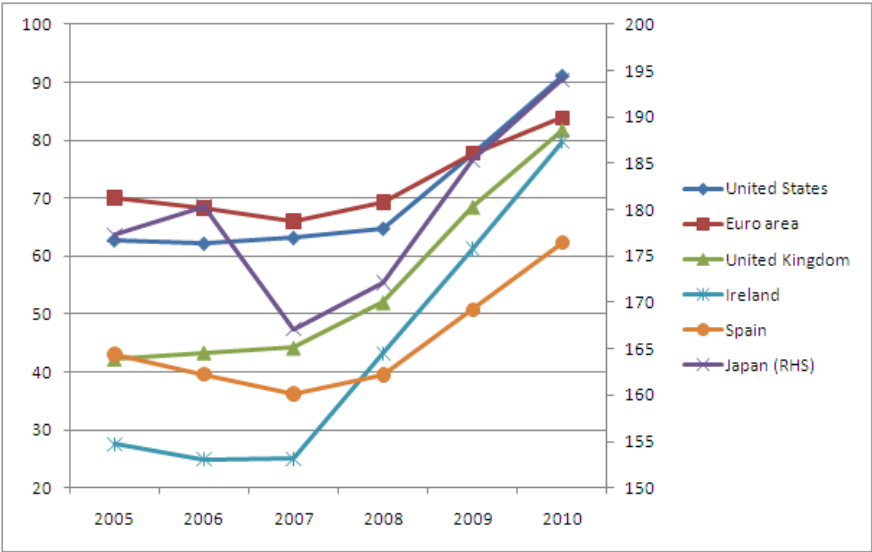
²⁷ China did not experience such a delay because many infrastructure projects had been halted before the crisis when the government was aiming to slow down the economy. These were ready to be implemented when the crisis arose.

²⁸ The countries on a fixed-peg regime also chose to defend their exchange rates through high interest rates.

development banks such as the World Bank and the Asian Development Bank²⁹ and some of them were awarded the newly created ‘flexible credit line’ by the IMF, a contingent financing facility. IMF-subsidized loans to low-income countries were doubled. This was the first time official financing was extended as a support to countercyclical policies. More broadly, for the first time, the IMF vocally advocated large fiscal stimulus and bank rescue plans.³⁰

Reliance on large-scale stimulus, coming on top of the cost of large-scale bank bailouts and of the recession-induced fall in tax receipts, led to a sharp increase in public debt ratios (Figure 8).

Figure 8 - Gross public debt ratios in selected countries (% of GDP)



Source: European Commission spring forecasts, May 2009.

The Irish case is especially dramatic since the tripling of the gross-debt ratio was accompanied by public guarantees extended to banks which were worth 200% of GDP. This case is by no means exceptional, though. Again, experience from past crises is unequivocal. The Japanese gross public-debt ratio rose from 64% in 1991 to 175% in 2005 as a consequence of the financial crisis and a series of stimulus packages (see also Box 7). More generally, financial crises have been found to have large-scale consequences on public debt (Reinhart and Rogoff, 2009a,b).

Bond markets started at the end of 2008 to discriminate more between euro area sovereign borrowers, while rating agencies downgraded several of them. These moves in part reflected an across-the-board re-pricing of risk after the collapse of Lehman Brothers, in part a general lack of liquidity which favored the most liquid debts, such as Germany and France, but in part also genuine sustainability concerns over public-finance sustainability in specific countries.

²⁹ The International Financing Corporation (a branch of the World Bank group) and the European Bank for Reconstruction and Development also provided direct support to private sectors in developing countries, e.g. by providing fresh capital to banks.

³⁰ See, for instance, Blanchard *et al.* (2008).

Such concern was especially worrying for members of the euro area, which have lost the ability to monetize public debts. In countries with independent currencies such as in the United States, the concern over debt sustainability rapidly changed into a concern over inflation in the medium run. These two opposite cases can be seen as potential illustrations of the ‘game of chicken’ depicted in the ‘unpleasant monetary arithmetics’ model of Sargent and Wallace (Box 4.11): in countries in a monetary union, fiscal policy would give in to monetary policy while the opposite would hold for countries with independent monetary policies.

To prevent such unpleasant outcomes while providing the required budgetary support in the short run, two-handed policies are called for: they need at the same time to sustain significant spending programmes as long as the recovery is not solidly under way and to ensure sustainability in the medium run through credible commitments to reverse course in the medium run and bring public finances back to balance. In fact, analysis of the requirements of fiscal-policy effectiveness suggests that the more sustainability is guaranteed for the medium run, the more stimulus packages are effective in the short run. So there is no contradiction but rather complementarity between providing Keynesian support and adhering to fiscal discipline. Still, such discipline is difficult to define in a credible way in the midst of a crisis. We will come back to this challenge in the next section.

2.2. The aftermath

a. Exit strategies

Exceptional challenges require exceptional responses, with the risk of building up distortions and disequilibria calling for later adjustment. There are many examples: consolidation in the banking sector may hamper competition, inflated central-bank balance sheets may undermine confidence in price stability, stimulus packages and guarantees extended to the private sector may lead to an unsustainable build-up of public debt. Such concerns are of second order in the midst of the crisis but they gain prominence along the recovery path.

The *exit strategy* issue raises difficult and related questions as to when, to what extent, at what pace and in what order to unwind the unorthodox macroeconomic and financial policies undertaken in response to the crisis.

- Rather than being time-contingent, exit strategies must be state-contingent. Public participation in the capital of banks and other support measures need to be maintained as long as banks remain too fragile to elicit confidence in capital markets. The experience of past crises shows that budgetary and monetary support should be sustained as long as the recovery has not gained sufficient autonomous traction. Earlier mistakes are telling: in 1936, the Fed severely tightened monetary policy by raising reserve requirements in order to check the expansion of credit. This killed the recovery that had started in 1933 and led to the 1937-38 economic contraction³¹. Japan also experienced a failed exit in 1997 (see below). Finding the right timing for policy reversal may, however, be tricky when the impact of the crisis on potential output is uncertain (see the discussion below on the

³¹ For an account, see Friedman and Schwartz (1963). See also Kroszner (2009).

legacy of the crisis). If potential output has been lastingly dented by the crisis, then the output gap is smaller in absolute value. There is less need for demand stimulation and more need for supply-oriented reforms, without which inflationary pressures may build up sooner than expected;

- There is little debate over the need for fiscal policy to get back to normality. But not all support measures can be easily reversed and there is a risk of ending up with a permanently higher level of public expenditure. As regards monetary policy, while wholesale liquidity support needs to be unwound, the very definition of the objectives and operational guidelines of policy is bound to be modified by the crisis. So there is for sure an exit, but not exactly to the *status quo ante*. This is even truer for the micro-interventions: exit from government ownership requires that regulation be reformed and reinforced. Hence, a successful exit strategy is not a reversal to the *ex-ante* policy framework.
- Finally, the *sequencing* question is the most daunting challenge. In principle it is advisable to start by removing the most distortionary components of the rescue packages, *i.e.* their micro-components, then remove the fiscal support (as it involves significant costs to public finances) and finally remove the monetary support. However political-economy considerations suggest the reverse order is more likely, because central banks will be keen on getting back on track, and governments will be willing and under pressure to limit the rise in public debt, whereas pressures to retain pervasive state intervention in the financial sector may remain strong – at least in countries where banks have political clout.

Exiting also means ending the confusion of roles between monetary and fiscal policies. As already mentioned, central banks have inflated (sometimes doubled or tripled) their balance sheets during the crisis and skewed their composition towards riskier assets. Ending implicit monetary subsidization requires recognizing potential losses on central banks' balances sheets and, when needed, presenting the bill to taxpayers.

Finally, there are issues of international cooperation. Countries may exit the recession at a different pace depending on their initial situation, policy responses and exposures to the global shock. This calls for differentiated exit strategies – except where the crisis response affects internationally integrated market segments. This obviously applies to intervention on international capital markets (such as central-bank purchase of bonds and other securities) but also to government support to highly competitive sectors such as the car industry. Europe is a special case: for example, early fiscal adjustment in a country may hamper the recovery of its partners; conversely, lack of adjustment in a large country or group of countries may lead to higher interest rates and exert negative externalities. By the same token, restoring a level playing field in the banking sector will require ending public support in a coordinated manner.

b. The legacy

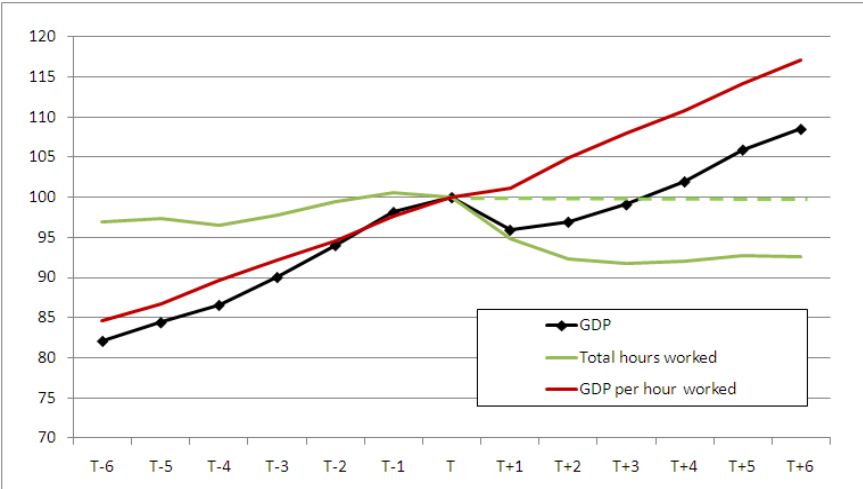
International experience with financial crises suggests that there is a high risk of permanent potential output reduction. At a first stage the sudden fall in output translates into bankruptcies, a rise in unemployment as well as workers exiting the labor market, and lower

capital expenditures translating into a lower capital stock. Depending on economic institutions and on policies implemented in the aftermath of the crisis, the shock may in turn result in a permanently lower employment rate or a permanently lower stock of capital and technologies. Post-crisis policies should aim to limit the extent of this permanent damage.

Potential output

Returning to pre-crisis GDP levels requires several years of growth: three years on average for the industrialized countries that experienced major financial shocks in recent times – Finland (1991), Japan (1997), Korea (1997) and Sweden (1991) (Figure 9). In these cases, the recovery was largely driven by productivity gains,³² whereas employment lagged behind. In Finland, the unemployment rate of males jumped from 3.5% in 1990 to 7.9% in 1991. It peaked at 17.9% in 1993 and 1994 and was still 9% ten years after the beginning of the crisis, according to the OECD. Hence, while GDP recovered relatively quickly, the crisis had a long-lasting effect on unemployment. This illustrates the risk of *hysteresis* of high-unemployment periods: in the process idle workers lose some of their skills or they cannot update them; those near the retirement age withdraw from the labor market; and the crisis first wipes out weaker industries, potentially aggravating low-skill worker unemployment.

Figure 9 - GDP profile through financial crises: Finland, Japan, Korea and Sweden
Average of four countries; 100 = level on the first year of crisis



Source : Pisani-Ferry and Van Pottelsberghe (2009) on the basis of national data.

The crisis will have lasting effects on the financial industry. Fewer actors and therefore less competition in the banking sector compounded with higher regulatory capital requirements will translate into higher borrowing costs, hence less investment and lower potential output. Risk-aversion may be durably higher, which may be helpful to prevent similar crises

³² The increase in GDP per hour worked evidenced by Figure 8.12 can be partly due to a composition effect, since low-productivity workers are the first victims of a recession.

occurring, but detrimental to venture capital in innovative industries. Fluid capital markets are key to ensuring factor reallocation and risk-sharing in the innovation process; pre-crisis capital markets may have been too fluid, but a clogged financial system will not help either. If this is compensated by tougher supervision and higher capital requirements, one result of the crisis would be higher capital costs, hence slower capital accumulation.

In some countries a shrinking financial sector could in itself reduce potential output. In Ireland, for instance, financial intermediation represented 10% of GDP in 2005.³³ Before production factors are reallocated to other sectors, a 20% reduction in value added in this sector would thus translate into a 2% fall in potential output. Additionally, the pace of potential output may have been overestimated during the pre-crisis boom, for instance due to overinvestment. Hence, in Ireland GDP may not recover its pre-crisis level for many years.

The ability to reallocate labor and capital will be essential in order to limit the permanent consequences of the crisis. If successful, such reallocation could in principle *increase* potential output in the medium term (this is Schumpeter's 'creative destruction'). Traditionally, Anglo-Saxon countries are more successful than those of continental Europe in reallocating labor across sectors and also geographically. The high unemployment in continental Europe in the 1980s and the 1990s has been ascribed to the interaction of adverse shocks and rigid labor market institutions (Blanchard and Wolfers, 2000). In these countries, further labor-market reforms will therefore be needed to bring unemployment rates back to their pre-crisis levels. The problem is that structural reforms are costly in the short run and may be politically difficult to implement in the aftermath of a crisis. Finally, large-scale reallocation of capital to new industries necessitates well-functioning financial markets and banks. It may be hampered by convalescent, more risk-averse banks. This is why some forms of active, internationally coordinated industrial policy may temporarily be needed.

Public debt

Already burdened with inflated debts, governments will still face the cost of ageing, a cost that itself has been magnified by the crisis. The net cost of ageing for public finances is still valued at several percentage points of GDP.³⁴ Parametric reforms of pension systems such as longer working periods are necessary.

This already existing challenge is compounded by the effects of the crisis. First, according to the IMF (2009b), the loss incurred by US and UK pension funds in 2008 amounts to 22 and 31% of GDP, respectively (excluding losses on toxic assets). Depending on how financial markets recover, there will be effects on public finances, both direct (because of unbalanced public pension funds or public bail-outs of private schemes) and indirect (through pressures for more generous pensions from the pay-as-you-go pillars to compensate for the reduction of funded pensions, and higher unemployment among older workers, making pension reforms more difficult to engineer). Second, lower potential output makes it even more difficult to consolidate public finances. Let us suppose that industrialized countries have permanently lost

³³ Source: EUKLEMS database, 2005 figure. The same year, financial intermediation represented 25% of GDP in Luxembourg, 8% in the UK and in the Netherlands, but only 2% in Finland.

³⁴ Equivalent to an increase in the fiscal deficit of 2.9% of GDP from 2005 to 2050 in the United States, 3.4% in the United Kingdom, 3.8% in Australia, 7.7% in Canada and up to 13.4% in Korea (see IMF, 2009b).

5% of potential GDP as a result of the crisis (an arbitrary guess, but of the right order of magnitude). With government revenues amounting to around 35% of GDP, this implies a permanent revenue loss equivalent to 1.75% of potential GDP, hence a structural deficit which is permanently higher by the same amount. In plain English, the fiscal hurdle is now much higher. Lastly, and *in addition to the previous mechanisms*, lower growth speeds up debt accumulation by increasing the fiscal surplus required to stabilize the debt-to-GDP ratio³⁵.

Globalization

Finally, the post-crisis world will have to cope with possible ‘de-globalization’ and rising protectionist tensions.

The sharp drop in trade in goods and services observed in late 2008 and early 2009 can be explained by the fall in world output, the shift of global demand away from capital goods (that happen to be traded more than consumption goods), the shortage of trade finance and relative price effects.³⁶ Despite anecdotal evidence of rising tariff or non-tariff barriers, genuine protectionism has not emerged as a response to the crisis (in contrast to the 1930s). Nevertheless, a failure of governments to curb unemployment could later on give rise to serious protectionist pressures that could significantly affect the globalization process at work during the 1990s and 2000s. Additionally, a sustained recovery of world growth will be much dependent on the ability of large, emerging countries to substitute for the US as a world growth engine. This means less outward-oriented growth models. For instance, China would need to lower its savings rate and develop its domestic market³⁷.

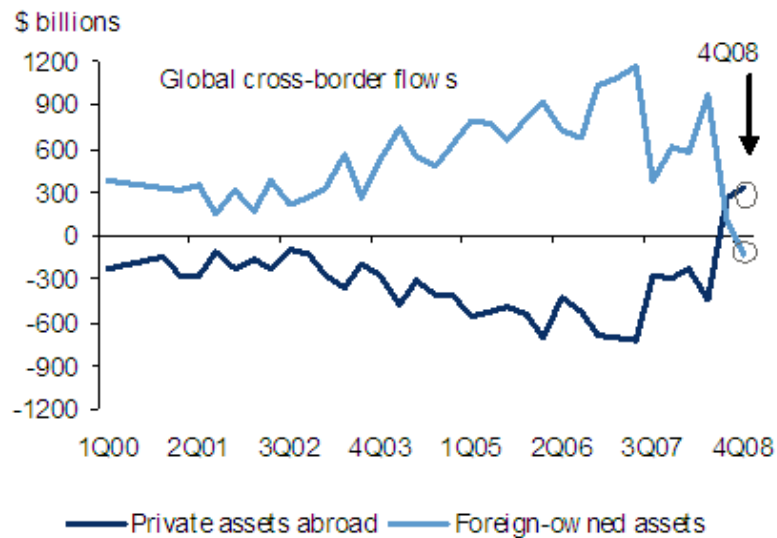
On the financial side, large cross-border financial institutions will be less fashionable, since they are difficult to supervise and even more difficult to close when they go bankrupt. Small countries will be more reluctant to host them, given the cost of a rescue in terms of their own GDP (the ‘too-big-to-save’ syndrome). Also, the crisis has led to a dramatic reduction in cross-border investments (Figure 10). Developing countries have been especially hurt. Reviving international capital flows and recreating North-South and South-South flows to finance development will be a major challenge. For this purpose, emerging countries could diversify their foreign-currency holdings out of US Treasury bills and into ‘strategic’ investments in energy, agriculture, manufacturing and finance, using sovereign wealth funds as their instruments. This would be consistent with their climb up the quality ladder and the adjustment of their production structure. Such a transition would however require a large exchange-rate adjustment and may raise protectionist concerns in developed countries.

³⁵ Adverse debt dynamics can be mitigated to some extent by lower interest rates as a result of higher savings.

³⁶ See Bénassy-Quéré, Decreux, Fontagné and Khoudour-Castéras (2009).

³⁷ This means not only the reconstruction of social safety nets (to make it possible for households to save less), but also more incentives for domestic entrepreneurs to work for the domestic market (*e.g.* a halt to tax incentives for exports and a more robust legal framework for business domestically) and increased incentives for domestic banks to lend to domestic entrepreneurs rather than (as they have been doing again under the fiscal stimulus plan) to lend primarily to public enterprises and local governments.

Figure 10 - Financial de-globalization



**Sum of assets invested abroad and foreign-owned assets of the largest 30 countries by portfolio volume.
Source: Broda et al. (2009).*

2.3. Lessons

Before the crisis, policy discussion in advanced economies tended to favor rules over discretion, to downplay the role of fiscal policy as a way to stimulate aggregate demand and to refrain from interfering with market signals. In sharp contrast, governments during the crisis held policy rules in abeyance, engineered massive bank rescues and industry-level support (such as in the car sector), launched fiscal stimulus plans and took direct control of entire segments of the economy. As for central banks, they promptly played their role as lenders of last resort, brought refinancing rates to zero and embarked upon previously untested unconventional monetary easing.

This course of action proved highly successful in comparison with the Great Depression – at least in the short run. The long run consequences are not yet tested.

The crisis has shown the importance of economic policy rules going together with escape clauses that allow policy-makers to revert to discretion in exceptional times. But it may also leave its imprint on the rules themselves. To provide but a few examples: the Stability and Growth Pact will not rein in government deficits in Europe without additional rules to cope with the higher cost of ageing, and the crisis has re-opened the debate on asset prices and monetary policy rules. The shape of the post-crisis world is the subject of the next section.

3. IN SEARCH OF A NEW REGIME

We have analyzed in Section 1 why the crisis can be attributed to microeconomic and macroeconomic factors, as well as to a lack of resilience of the system as a whole. We have described in Section 2 the immediate reaction of policy-makers to its outbreak. We now turn to the global reform agenda, that is, to the changes that are needed to reduce the risk of similar crises in the future.

This agenda was first defined in a series of meetings of the G-20 leaders. In an unprecedented exercise of international coordination they met in Washington, London and Pittsburgh (Pennsylvania) in 2008 and 2009.³⁸ While a large part of these meetings was devoted to crisis management and financial regulatory reform, the reform of international financial institutions and the creation of a framework for international coordination ranked high on the agenda in order to “lay the foundation for reform to help to ensure that a global crisis, such as this one, does not happen again.”³⁹ Specialized institutions such as the BIS, the IMF or the Financial Stability Board (FSB) actively participated in the search for a better international financial and macroeconomic system.

This section presents the steps taken during these hectic times and discusses those that are still a matter for debate. We begin with the financial system and continue with the macroeconomic and monetary policy regime before introducing a number of policy issues that are being debated among academics but are not (or not yet) part of the policy agenda.

3.1. The financial system

As explained in Section 1, the crisis revealed four major failures of the financial system:

- Excess confidence in self-regulation and a lack of regulation of some financial institutions (special investment vehicles, hedge funds...);
- Ill-designed regulation leading to excessive risk-taking and procyclical behavior;
- Gaps in financial infrastructures (*e.g.* lack of organized credit default-swap markets) and institutions (*e.g.* a lack of preparation for bank failures, especially cross-border bank failures);
- The lack of a systemic view of financial vulnerabilities.

Solutions were suggested to tackle each of these various failures of the system at the national, regional and international levels.

a. Close the gaps in regulation

³⁸ The scope and intensity on international coordination contrasts starkly with the response given to the crisis in the 1930s. Then, the one major attempt to organize a common response, the London conference of 1933, ended in disagreement, not least because Franklin Roosevelt deliberately torpedoed it.

³⁹ Declaration of the Washington summit, November 2008.

“We all agree that at the heart of the modern enterprise challenge is minimising regulatory concerns [...] The better, and in my opinion the correct, modern model of regulation – the risk-based approach - is based on trust in the responsible company, the engaged employee and the educated consumer, leading government to focus its attention where it should: no inspection without justification, no form-filling without justification, and no information requirements without justification, not just a light touch but a limited touch.” UK Prime Minister Gordon Brown speech at the Confederation of British Industry, 28 November 2005.

“No longer can we allow Wall Street wrongdoers to slip through regulatory cracks. No longer can we allow special interests to put their thumbs on the economic scales.” President-elect Barack Obama (2009).

Prior to the crisis, regulation was often regarded as a hindrance to business and international competitiveness, and great trust was put in *self-regulation*. Examples of such confidence can be found in the Basel II capital standards, which partially rely on in-house assessment of risks (see Box 2), in the loopholes in banking supervision (such as the shadow banking system and US mortgage originators), in the high leverage ratios investment banks were allowed to maintain in spite of capital requirements, or in the leniency of regulators vis-à-vis the credit-rating agencies, whose performance was not monitored and whose conflicts of interest were not addressed.⁴⁰ These are only examples.

One clear manifestation of self-regulation failure, noted by Persaud (2009), was that, prior to the crisis, the equity of banks that were either bailed out or bankrupted during the crisis such as Northern Rock, Bear Stearns, Fortis and Lehman Brothers, exhibited higher price-earnings ratios than those of more resilient banks such as HSBC or JP Morgan-Chase. The risks taken by the former group of banks were apparently not priced in.

Regulatory loopholes are probably the most straightforward root of the crisis. Banks escaped capital regulations by using off-balance-sheet special investment vehicles (SIVs) to buy asset-backed securities while financing these investments through short-term asset-backed commercial paper (ABSs). However, the corresponding risk was not transferred since banks extended guarantees to their SIVs, or even held asset-backed securities while transferring their loans to SIVs in order to reduce on-balance-sheet risk. In brief, this is as if banks themselves had bought ABSs without capital. When in the wake of the crisis the short-run funding dried up, ABSs (then called ‘toxic assets’) had to be transferred back to banks’ balance sheets, where capital requirements apply, leading to sudden undercapitalization of the banking sector and to the subsequent disruptions in financial markets.⁴¹

Having understood the responsibility of regulatory gaps in the crisis, policy-makers soon declared their intention to regulate all significant financial actors and markets. Advocates of free markets objected that bureaucrats are ill-placed to know what is good for the market and that there was a risk that excess regulation would hinder innovation and growth. However this objection can be circumvented by (i) delegating supervision and oversight to independent, technically able specialized agencies, and (ii) retaining elements of self-regulation in the

⁴⁰ Credit-rating agencies were not subject to regulation in the EU and had only to be registered in the US.

⁴¹ Acharya and Richardson (2009).

standard-setting process, while giving responsibility for *enforcement* to independent supervisors.⁴²

Closing the gaps in regulation requires comprehensive reform of the financial regulatory architecture, such as that proposed in 2008 in India by a reform committee chaired by former IMF chief economist Raghuram Rajan, in the US by the Treasury Department (Department of the Treasury, 2009), and in the European Union by the De Larosière report, subsequently endorsed by the European Council (De Larosière, 2009). One way to proceed has been to address regulatory fragmentation, which favors *regulatory competition* both within national borders (*e.g.* in the US) and across countries (*e.g.* in the European Union):

- In the US, as many as five institutions – the Federal Reserve, the Federal Deposit Insurance Corporation, the Office of Thrift Supervision, the Office of the Controller of the Currency and the Securities and Exchange Commission - were responsible for banking supervision. Fragmentation favored regulatory arbitrage, especially as agencies were competing with each other for business. This number has been reduced to three (the Fed, the FDIC and the new National Bank Supervisor) in the Obama reform proposals of 2009;
- In the EU, cross-border institutions were supervised by banking supervisors, market regulators and insurance regulators of all 27 member states. Following the De Larosière report, legislation is being considered that would transform existing committees of supervisors into three EU-wide bodies with extensive responsibilities.

In the decades before the crisis, *international regulatory competition* had become widespread, resulting in less regulation. Attracting financial business was an integral part of competitiveness policies in a country like the UK, where light-touch regulation was viewed as a way to create and attract jobs. This logic was pushed to the extreme in *regulatory havens*, or *non-cooperative jurisdictions*, *i.e.* countries or territories which operate a financial industry and do not enforce the standards produced by IOSCO or the Basel Committee on Banking Supervision. In the aftermath of the crisis, G-20 countries agreed to put pressure on these countries.⁴³

Regulatory coordination also helps contain *regulatory (and supervisory) capture*. National authorities may be excessively lenient towards domestic institutions, either because they favor national champions or because of a blurring of political and business interests. The case of France, where political elites often push expansion of domestic banks in the name of the national interest; of Germany, where politicians sit on the boards of *Landesbanken*; or of Italy, where central bank governor Antonio Fazio was forced to resign in 2005 after it became clear that he had used financial stability arguments to protect the business interest of certain

⁴² Credit rating agencies (CRAs) are an example of such an approach. Following extensive consultation with the industry, the International Organization of Securities Commissions (IOSCO) has elaborated a code of conduct for CRAs to address conflict of interest between investor information and credit structuring advice, and to ensure transparency of rating performance. CRAs now have to register with the market regulator, and they will be de-registered if they do not comply with the IOSCO code of conduct.

⁴³ Although the two concepts partially overlap, regulatory havens should not be confused with tax havens. The G-20 also took fierce measures against the latter, but the rationale there was to repatriate tax bases at a time when tax receipts were experiencing a steep fall.

Italian banks, all show that such practices are a fact of life. International regulatory harmonization and cooperation helps limit their extent.

There will always remain free riders. Contrary to rogue nuclear states, some of them have good excuses: offshore finance is sometimes their only specialization. A way out of this problem is to blend cooperation and incentives, *e.g.* through internationally sponsored technical assistance to improve their regulatory capacities and to help them change their model, and of suasion, *e.g.* by making it more costly for international banks to do business in recalcitrant territories.

A related, though not identical, problem is the assignment of supervisory responsibility. Banks are generally supervised by the authorities of the country where they are headquartered, at least when they operate through branches and not legally independent subsidiaries. But financial stability is the responsibility of *host*-country authorities. It has therefore been suggested that responsibility for supervision should switch from home to host country. This would require banks to operate through subsidiaries rather than branches, with each subsidiary being regulated and supervised by the host country. An additional advantage of such an approach would be to help each host country engineer macro-prudential supervision in relation with its own credit cycle. The danger, however, is potential financial fragmentation, possibly opening the way to financial protectionism.⁴⁴

b. Correct incentives

On the top of regulatory loopholes, the pre-crisis period was characterized by regulations that did not prevent financial institutions from taking more risk and behaving in a procyclical way (or even in some instances that gave them incentives to behave in this way). There are many ways to correct the incentives of bankers, most of which have to do with the internal organization of banks: strong risk control departments, clear understanding by the bank's top management of the risks being taken; due diligence on clients' financial literacy to avoid the mis-selling of risky products, etc. It should have been the responsibility of shareholders to align the managers' incentives with their own interests and ensure that the right governance arrangements were in place. But the crisis has revealed that shareholders have often been too short-sighted to care, implying that supervisors have had to step in.

In order to correct incentives, three complementary routes have been followed:

- *Capital requirements*: in order to reduce the risk of bank failures, the idea is to raise capital requirements, to modulate them depending on liquidity mismatch between assets and liabilities and to supplement them with limits on total leverage. The problem with tighter capital requirements, however, is their cost, since they amount to immobilizing capital that could usefully be employed elsewhere in the economy. A way not to waste capital would be Kashyap, Rajan and Stein's (2008) *capital insurance* proposal. Under this scheme, banks would pay an ongoing premium to a 'capital insurer' which would commit to inject capital into it in the event of a crisis. Candidate capital insurers would be long-term investors with a strong capital basis and no regulatory capital requirements,

⁴⁴ An intermediary solution decided in 2008 was to set up *supervisory colleges** to discuss the risk profile of large cross-border financial institutions.

such as sovereign wealth funds, pension funds, or even governments. The advantage of this scheme would be to free up capital for productive use, rather than freezing it in banks' accounts.

- An objection is that too-big-to-fail, systemic financial institutions are already implicitly guaranteed by governments without paying an insurance premium. As noted by Alan Blinder, the analogy with insurance may not hold because the risk of a financial crisis is not diversifiable⁴⁵. As for liquidity, the scheme could be to weight regulatory capital not only based on risk but also on liquidity, or by setting aside liquidity reserves. The problem here is that a liquid market can suddenly dry up, prompting an increase in liquidity buffers. Hence liquidity requirements can be procyclical – see Lanoo and Casey (2005) for a discussion.
- *Countercyclical buffers*: capital requirements force banks to raise capital or to extend less credit in troubled times, as already shown in Box 1. To correct this procyclical feature of capital requirements, it has been suggested to introduce time-variant *capital buffers*: under such a scheme, banks would be required to increase their regulatory capital or to set aside provisions⁴⁶ when credit accelerates and to dispose of them when losses have materialized, or are about to materialize. A scheme of this sort was put in place by the Bank of Spain in the 2000s after the country joined the euro, so as to mitigate the impact of the low euro-area interest rates on domestic credit expansion.⁴⁷
- *Compensation*: performance-based bonuses have been identified as a source of risk-taking and pro-cyclical behavior since they have incited bank management to inflate balance sheets in bull markets and sometimes to shrink them in bear markets. Accordingly, G-20 leaders agreed to smooth them over longer time-spans and to introduce claw-back clauses (*i.e.* to cancel part of the bonus in the case of *ex-post* underperformance), so that management bears responsibility for the full gamut of risks.

c. *Infrastructure and institutions*

The same argument which holds for *actors* also holds for *markets*. Contrary to organized markets such as stock exchanges, which were tightly regulated to protect against market abuse, insider trading, etc., and were required to disclose information on prices and orders, *over-the-counter markets* (*i.e.* decentralized markets without a central counterpart or a clearing house) were not. At the apex of the crisis, no one could monitor the market for corporate *credit-default swaps* (CDS)⁴⁸, where *counter-party risk* (*i.e.* the risk that the counter-party is unable to honour their contracts) could not be evaluated by market actors,

⁴⁵ “The insurance premium is going to be extremely high, because you’re making people pay in times when they don’t want to pay,” quoted in “Capital Ideas,” *The Economist*, August 28, 2008.

⁴⁶ This is called *through-the-cycle provisioning** or *dynamic provisioning**.

⁴⁷ The difference between capital and provisions is that provisions dent operating profits, and are therefore more painful for shareholders.

⁴⁸ Credit-default swaps (CDS) are financial products that provide insurance against the risk of default of a private or public borrower. They are issued and traded by market participants. Lenders can use them to hedge against the risk of default of the borrower, and they can also be used for speculative purposes.

which resulted in a drying up of the market. Consequently, it was decided at the G-20 Pittsburgh summit that CDS markets should have a central counterparty to net out positions.

On the institutional side, the failure of Lehman Brothers was made more dramatic due to the difficulty in identifying and compensating the bank's counterparties, since Lehman Brothers was not only 'too big to fail', but also 'too interconnected to fail'. This points to the lack of comprehensive schemes to tackle large bankruptcies in the banking sector. Ironically, the crisis has spurred mergers and acquisitions that have led to an even larger number of systemically important institutions whose activities are spread over numerous countries.

One way to deal with this issue, proposed by the US Treasury, is to admit that systemic banks will always be bailed out by governments, and as the price for this insurance scheme impose stricter and more conservative prudential standards on these institutions in terms of capital and liquidity ratios and risk-management standards. Another possibility is to force the biggest banks to pre-plan their own demise by writing 'living wills'. This should not only make bank resolutions easier and faster, but in the process of planning their own resolutions banks would be encouraged to better track their exposure and possibly simplify their legal structure.⁴⁹ Like supervisory scope, tackling 'too-big-to-fail' institutions is made difficult by the willingness of national governments to attract financial activities and to promote national champions. On the top of this, bailouts may involve delicate burden-sharing across countries – a potential source of conflict, as exemplified in the case of Icelandic banks in the UK.

d. Organize macro-prudential supervision and regulation

The concept of *macro-prudential regulation and supervision* dates back to the 1970s and has long been championed by the Bank for International Settlements⁵⁰, but it has gained steam only when the crisis had erupted. In a nutshell, it consists of supplementing monetary policy by another instrument that allows the authority in charge to recommend or enforce measures that prevent financial instability. The discussion in the 2000s of asset prices and monetary policy was, inadvertently, about macro-prudential regulation. The lack of consensus on how to implement macro-prudential regulation⁵¹ suggests avoiding a rule-based approach and giving discretion to a supervisory authority. This can also be viewed as a learning process.

This leads us to the *who* question. There is consensus that macro-prudential oversight should involve central banks, because they are technically equipped both for macro-financial and for micro-financial analysis, and because they should anyway be prepared to act as lenders of last resort when systemic risks materialize. But macro-prudential regulation also requires a bird's-eye view of systemic risk in the global financial system – something the EU achieved in 2009 by creating a *European Systemic Risk Board* following the De Larosière report, and a role which has been taken over by the Federal Reserve in the US. But the feedback from macro-variables to micro-regulations and standards raises tricky questions. How can a central bank, or a related body, enforce regulatory changes in spite of not having competence on regulatory

⁴⁹ Another proposal would be that, when a financial institution becomes insolvent, the regulator has the right to convert its debt into equity, see Snower (2009).

⁵⁰ See Borio (2009), "The Macroprudential Approach to Regulation and Supervision", Vox, April 14, and Borio (2003).

⁵¹ See the BIS 79th Annual Report; Goodhart (2009); and Repullo, Saurina and Trucharte (2009).

matters? The vagaries of the Stability and Growth Pact, another macro-based regulatory framework, should caution against excessive faith in output gaps and sophisticated through-the-cycle incentive schemes.

Finally comes the *what for* question. Giving central banks a macro-prudential instrument implies that they know when to use it, as opposed to using their interest-rate instrument. A simple answer is to say that the interest rate should be used to target goods-price inflation and the macro-prudential instrument to target asset-price inflation or credit growth. However this may lead to situations when a central bank does one thing with the right hand and another with the left. If central banks are to be given a second objective and a second instrument, this calls for an in-depth reexamination of the pre-existing policy consensus and the elaboration of a new policy doctrine.

While the tasks of central banks have been vastly expanded during the crisis, their constitutional mandate and governance model have not been revisited. Even if some of these tasks are discontinued when the crisis is over, this raises a dilemma. If the central bank retains a purely advisory role, it risks losing its credibility by being held responsible for outcomes which in effect it cannot control. Think of housing bubbles: a central bank responsible for financial stability (say, the ECB in its role as chair of the European Systemic Risk Board) may urge governments to take regulatory or tax action to cool down the housing market but damage its own credibility if they do not comply. But if it is devolved the instruments to enforce financial stability, the central bank will have many instruments in its hand and many objectives to achieve. In the absence of a clear mission statement, it will soon experience conflicts of interest and make mistakes. And it may well be challenged politically as too powerful and as in control of instruments whose use requires parliamentary oversight. This would be all the more likely because central banks could be, through the setting of cyclical capital buffers, at the origin of the need for bank bail-outs. During the crisis itself the independence of the Fed started being questioned by Congress. Giving central banks too many objectives could eventually result in a loss of independence and hence less capacity to achieve price stability.⁵²

3.2. The macroeconomic policy regime

In the wake of the crisis the macroeconomic focus was on remedial action rather than longer-term reform. As regards national measures, global summits and other international gatherings put emphasis first on stimulus measures and financial regulation, then on exit strategies and on resources and governance of international organizations. However, a number of macro-issues emerge.

a. A new view on rules versus discretion?

As developed in Section 2, rule-based policy-making was largely put aside during the crisis. The EU fiscal policy is a case in point. The Stability and Growth Pact (SGP) was constructed on the assumption that the general government deficit in a given country would move up and

⁵² On macro-prudential supervision and central bank independence, see John Taylor, “Fed needs better performance, not powers,» *Financial Times*, 10 August 2009.

down within a limited range along the business cycle, but in 2009-2010 the EU fiscal deficit widened by 5% of EU GDP and more than 20 of the 27 EU Member States were considered by the European Commission to have an excessive deficit. The SGP includes an escape clause for exceptional and temporary circumstances, but it does not set out the principles to be applied on such occasions.

On the one hand, contingent policy rules in case of crisis are difficult to specify because all crises are different, and because unexpected shocks and rapidly unfolding events are best addressed by discretionary action. On the other hand, letting policy-makers depart too easily from rules they have themselves defined undermines the credibility and the very effectiveness of these rules. Hence the need for policy rules to include well-formulated *escape clauses* in order to make room for temporary discretion and centralization, but also to be specific on which circumstances qualify as extraordinary.

Escape clauses are no ‘free lunch’: as illustrated by the experience of fixed exchange-rate regimes, to leave open the possibility of departure from the stated rules leads markets to price in the corresponding risk – for example through higher risk premiums on government debt. But it may be a cost worth paying. Similarly, some countries, most notably Germany, have concluded that tighter fiscal rules in normal times are a desirable *quid pro quo* for flexibility in crisis times and have reformed their constitution accordingly.

b. International coordination and surveillance

International coordination may not be confined to prudential issues, since macroeconomic factors have also played a role in the crisis. But it took time before G-20 statements started to address global imbalances, and they fell short of pronouncements on monetary policies and the international monetary system.

The reason is that governments (i) do not agree on where the responsibility for the crisis lies and (ii) are reluctant to commit to abiding by rules that would put constraints on their economic policy decisions. As illustrated by the discussion on the ‘global savings glut’ of Section 1, global imbalances can be considered the result of either excessively low saving in the US or excessively high net saving abroad; or they may result from emerging countries willingness to self-insure against future sudden stops in capital inflows by accumulating foreign-exchange reserves. In fact, global imbalances are a general equilibrium outcome whose policy roots are hard to pin down (see the model of Blanchard, Giavazzi and Sa, 2005, and Obstfeld and Rogoff, 2009, for a discussion).

At the Pittsburgh summit of September 2009, G-20 leaders established a ‘Framework for Strong, Sustainable, and Balanced Growth’ and asked finance ministers and governors to “set out objectives, put forward policies to achieve these objectives, and together assess [their] progress”. This revival of coordination contrasts with at least twenty years of emphasis on independent national policy-making. In the 1990s and the 2000s, exchange-rate surveillance, a core mission of the IMF, could not be exercised effectively (Independent Evaluation Office of the IMF, 2006). The IMF was neither able to influence US policy nor even to express a public view on China’s exchange-rate policy.

For IMF surveillance to be credible it requires even-handedness, which in turn calls for a reform of the Fund’s governance. Currently the US retains veto power on all important

decisions (which require a 85% majority) and Europe is globally overrepresented with about a third of total voting rights. China, which before the crisis had fewer votes than France, and India, which ranked behind Italy, could not accept a stronger IMF say unless this came with a major power shift. The Pittsburgh declaration committed members to agreeing on a redistribution of power of 5 percent of total voting rights. Even when this is achieved, whether or not surveillance can constrain national policies will remain an open issue. The European experience is not very encouraging in this respect.

c. Self-insurance or collective insurance?

One reason why East-Asian countries went into current account surpluses in the 2000s was their desire to accumulate foreign-exchange reserves in order to be able to cushion capital-flow reversals. Their experience during the crisis of 1997-98 and what they perceived as a western bias in IMF decisions led them to insure themselves through reserve accumulation instead of relying on IMF support in the event of a balance-of-payments crisis. Such self-insurance behavior was costly in at least two respects: the fiscal cost of sterilizing the induced rise in domestic liquidity, and the political cost of being accused of currency manipulation by trading partners which let their exchange rates float freely.

Together with IMF governance reform, a series of G-20 decisions – the tripling of IMF resources from 250 to 750 billion dollars, the weaker policy conditionality of its programmes and the introduction of a new, unconditional *Flexible Credit Line* (FCL) - were intended to address these concerns and relax the constraint of reserve accumulation⁵³. Post-crisis history will tell whether these measures were sufficient or if a universal device for liquidity provision should have been sought. As noted by Maurice Obstfeld (2009), the world lacks a global lender of last resort: the IMF would be a natural candidate.

⁵³ The FCL was extended in 2009 to Mexico, Poland and Colombia for a total amount of 77.9 billion dollars.

CONCLUSION

As discussed in Section 1, there are still several explanations to the crisis. Even though they are not mutually exclusive, they result in different sets of policy recommendations, all of which combine the overhaul of financial regulation, supervisory reform, changes in the monetary policy framework, and some of which also involve reform of the international monetary system and the remit and governance of international organizations. The G-20, relying on specialized international bodies such as the IMF and FSB, as well as on national and regional authorities, has addressed some of them. Some crucial issues, however, have been left unaddressed, both on the regulatory and the macro-financial fronts.

a. The remaining regulatory challenge

Four issues stand out as unresolved challenges:

- First, moral hazard was magnified by the crisis because of the post-Lehman G-7 decision not to let any further financial institution of systemic significance collapse. Large and interconnected institutions, as well as their shareholders, know now that they will be rescued if threatened with default. This entails a significant danger of excessive risk-taking – the very same danger the whole apparatus of regulation is intended to avert. However, there is no limit to bank size, the failing banks' creditors have not been penalized in the rescue operations and even shareholders have not borne the full brunt of their responsibility. This is in striking contrast with the Asian crisis of the late 1990s, when private sector 'involvement' (sharing the losses) was the name of the game.
- Second, beyond size, the question of the separation of bank activities between retail and investment banking – along the lines of the *Glass Steagall Act* which regulated US banking between 1933 and 1999, or along different lines – has not been much discussed in international forums. The question here is whether the utility-like business of providing banking services to customers should be better protected against the risk of failure and therefore separated from the more risky business of investing and arbitraging. Paul Volcker, a former Federal Reserve chairman, has advocated such a direction for reform (Volcker, 2009). Implementing it would certainly raise significant difficulties, because the business boundaries of the 1930s cannot simply be replicated. But the more fundamental question is whether the benefits of having a single interconnected financial system are worth the potential costs.⁵⁴
- Third, the desirable size of the financial sector has barely been discussed. As illustrated by its employees' generous compensation (Philippon and Reshef, 2008), the banking sector seems to have succeeded in capturing a rent, which implies that allocating more and more resources to this sector could end up being detrimental to overall economic efficiency. Furthermore, as illustrated by the Icelandic meltdown, a large financial sector in a small-

⁵⁴ The US intended distinction between 'systemically important financial institutions' and other institutions goes some way in this direction but does not address the issue, as systemically important financial institutions may be either hedge funds or standard commercial banks.

or medium-sized country entails the risk of incurring proportionally very large public-finance costs in the event of a bail-out. Lord Turner, the head of the UK's Financial Services Authority, has advocated taxing the financial sector in order to tame its development, but no government is seriously considering following his advice.

- Last but not least, the trade-off between financial stability and the cost of capital has not been really addressed. Many of the financial stability measures on the official agenda will result in increasing the cost of capital. This is for example the case for compulsory capital adequacy ratios: increasing them is likely to make investment more costly for non-financial companies, with adverse consequences for capital expenditure and technological innovation. The question here is what price society is willing to pay as a counterpart to financial stability: is a more unstable economy acceptable, if it is the condition for faster growth? The answer to this fundamental question, which relates to collective preferences, is unlikely to be the same across countries. This suggests that regulatory discrepancies are here to stay.

b. Open macro-financial issues

Turning to the macro-financial dimensions, three items deserve a mention:

- *Stress-testing economic policy.* The crisis has been a reminder that economic policy involves a strong risk-management dimension. This was understood before the crisis by corporations (although risk-management measures were admittedly too crude), but hardly at all by governments. Governments do not assess risk properly and they seldom disclose margins of error for their own evaluations. More importantly, they do not implement the kind of *stress-testing* financial institutions are required to run, *i.e.* assessments of the robustness of their solvency to extremely unlikely combinations of events: what if the stock market crashes by more than $x\%$, oil prices rise by $y\%$, and recovery rates on loans are less than $z\%$? Admittedly, stress-testing is even more difficult for a government than it is for a company because it cannot be conceived as a partial equilibrium exercise and requires an assessment of the robustness of the whole economic and financial complex. However, economic policy-makers should learn from robustness assessments such as the one routinely undertaken in complex industrial and IT systems.
- *A new framework for monetary policy.* By the mid 2000s many countries in the world (though not all) were converging on a monetary policy framework that gave a primary role to flexible inflation targeting. Even the central banks whose mandate encompassed growth (like the Fed) or those which claimed to preserve a role for the monetary aggregates (like the ECB) were *de facto* moving in this direction. The crisis has called into question this framework, but no consensus has yet emerged on its reform or replacement.
- *What reform of the international monetary system?* For those who believe that the Chinese current-account surplus and the US deficit played an important role in creating the conditions for financial instability, the key question is how to engineer a reduction of these imbalances. Beyond the reform of surveillance mentioned in the previous section, a discussion has started on the reform of international monetary

arrangements. In March 2009, Chinese central bank governor Zhou Xiaochuan called for the creation of “an international reserve currency that is disconnected from individual nations and is able to remain stable in the long run, thus removing the inherent deficiencies caused by using credit-based national currencies”.

This open challenge to the monopolistic role of the US dollar as an international currency – and the resulting lack of incentives to US discipline - was an invitation to re-open an international monetary discussion that had been stagnant since the demise of the Plaza-Louvre agreements. However the obstacles to redefinition of the global rules of the monetary game are even more formidable than those to a strengthening of surveillance. The SDR could hardly replace the dollar as the international currency. The renminbi will surely play a role at some point in time, but full convertibility is a precondition. At any rate, there is currently no challenger to the international role of the dollar (Pisani-Ferry and Posen, 2009; Eichengreen, 2009).

REFERENCES

- Acharya, Viral and Matthew Richardson, eds. (2009), *Restoring Financial Stability: How to Repair a Failed System*, Wiley, March.
- Adrian, Tobias and Hyun Song Shin (2009), "The Shadow Banking System: Implications for Financial Regulation," Federal Reserve Bank of New York Staff Reports No. 382, July.
- Adrian, Tobias and Hyun Song Shin (2008), "Liquidity and Leverage," *Federal Reserve Bank of New York Staff Reports* No. 328, May.
- Bank for International Settlements (2008), *78th Annual Report*.
- Bebchuk, Lucian (2009), *Written Testimony Submitted to the Committee on Financial Services, US House of Representatives*, 11 June.
- Bénassy-Quéré, Agnès, Decreux, Yvan, Fontagné, Lionel, and David Khoudour-Castéras (2009), "Economic crisis and global supply chains," CEPII working paper No. 2009-15, July.
- Bernanke, Benjamin (2002), "Deflation: Making Sure 'IT' Doesn't Happen Here," *Remarks Before the National Economists Club*, 21 November, available on the Federal Reserve Board website.
- Bernanke, Benjamin (2005), "The global savings glut and the US current account deficit," Sandridge Lecture, Virginia Association of Economics, March 10.
- Bernanke, Benjamin (2009), "The Crisis and the Policy Responses," At the Stamp Lecture, London School of Economics, London, England, 13 January.
- Berndt, Antje and Anurag Gupta (2009), "Moral Hazard and Adverse Selection in the Originate-to-Distribute Model of Bank Credit," unpublished manuscript, available at SSRN: <http://ssrn.com/abstract=1290312>.
- Blanchard, Olivier and John Simon (2001), "The long and large decline in US output volatility," *Brookings Papers on Economic Activity*, 1, pp. 135-164.
- Blanchard, Olivier, Giavazzi, Francesco and Filipa Sa (2005), "International Investors, the US Current Account, and the Dollar," *Brookings Papers on Economic Activity*, 2005-1, pp. 1-49.
- Blanchard, Olivier, Cottarelli, Carlo, Spilimbergo, Antonio and Steve Symansky, (2008), "Fiscal policy for the crisis," IMF Staff position note SPN/08/01, December 29.
- Blanchard, Olivier and Gian Maria Milesi-Ferretti (2009), "Global Imbalances: Past, Present, and Future," mimeo, IMF, September.

- Blanchard, Olivier and Wolfers, Justin (2000), “The Role of Shocks and Institutions in the Rise of European Unemployment: The Aggregate Evidence,” *Economic Journal*, 110, pp 1-33.
- Blankfein, Lloyd (2009), “Do not destroy the essential catalyst of risk,” *The Financial Times*, 8 February.
- Boeri, Tito, Bovenberg, Lans, Coeuré, Benoît and Andrew Roberts (2006), *Dealing with the New Giants: Rethinking the Role of Pension Funds*, Geneva: ICMB and CEPR.
- Borio, Claudio (2003), “Towards a macroprudential framework for financial supervision and regulation?,» *CEifo Economic Studies*, vol 49, no 2/2003, pp 181–216. Also available as BIS Working Papers, no 128, February.
- Brender, Anton and Florence Pisani (2009), *La Crise de la Finance Globalisée*, Repères, Paris: La Découverte.
- Broda, Christian, Ghezzi, Piero and Eduardo Levy-Yeyati (2009), “The new global balance: Financial de-globalisation, savings drain, and the US dollar,” *Vox*, May 22.
- Buiter, Willem H. (2007), *Lessons from the 2007 Financial Crisis*, CEPR Policy Insight No. 18 (December), London; Centre for Economic Policy Research.
- Caballero, Ricardo, Farhi, Emmanuel and Pierre-Olivier Gourinchas (2008), “An Equilibrium Model of Global Imbalances and Low Interest Rates”, *American Economic Review*, 98 (1), pp. 358–393.
- Caballero, Ricardo J. and Arvind Krishnamurthy (2009), “Global imbalances and financial fragility”, *American Economic Review*, 99 (2), 584-88.
- Cerra, Valerie and Sweta Chaman Saxena (2007), “Growth dynamics: the myth of economic recovery,” BIS Working Paper No 226, March.
- Coval, Joshua, Jurek, Jakub and Erik Stafford (2009), “The Economics of Structured Finance,” *Journal of Economic Perspectives*, vol. 23, No. 1, pp. 3-25.
- De Larosière, Jacques (2009), *Report of the High-Level Group on Financial Supervision in the EU*, February.
- Department of the Treasury (2009), *Financial Regulatory Reform: A New Foundation. Rebuilding Financial Supervision and Regulation*, June.
- Dooley, Michael P., Folkerts-Landau, David and Peter Garber (2003), “An Essay on the Revived Bretton Woods System,” NBER Working Paper, No. 9971.
- Eichengreen, Barry (2009), “The dollar dilemma”, *Foreign Affairs*, 88 (5), pp. 53-68.

Eichengreen, Barry, and Kevin H. O'Rourke (2009), *A Tale of Two Depressions*, www.voxeu.org, June.

European Commission (2009), "Public Finance in EMU 2009," provisional issue, June.

Engel, Charles M. and John H. Rogers (2006), "The US Current Account Deficit and the Expected Share of World Output," *Journal of Monetary Economics*, 53, pp. 1063–1093.

Feldstein, Martin (2009), "The case for fiscal stimulus," Project Syndicate, www.project-syndicate.org.

Financial Services Authority (2009), *The Turner Review: A regulatory response to the global banking crisis*, Financial Services Authority, London, March.

Friedman, Milton and Anna J. Schwartz (1963), *A Monetary History of the United States, 1867-1960*. Princeton: Princeton University Press (for the National Bureau of Economic Research).

Goodhart, Charles (2009), "Procyclicality and Financial Regulation," *Revista de Estabilidad Financiera*, No. 16, Banco de España, May.

Gorton, Gary (2008a), "The Panic of 2007," Working Paper 14358, Cambridge, MA: National Bureau of Economic Research.

Gorton, Gary (2008b), "The Subprime Panic," Working Paper 14398, Cambridge, MA: National Bureau of Economic Research.

Gorton, Gary (2009), "Slapped in the face by the invisible hand: banking and the panic of 2007," paper prepared for the Federal Reserve Bank of Atlanta's 2009 Financial Markets Conference: Financial Innovation and Crisis, May 11-13.

Gourinchas, Pierre-Olivier and Hélène Rey (2007), "From World Banker to World Venture Capitalist: US External Adjustment and the Exorbitant Privilege," in: Clarida R. (ed.), *G7 Current Account Imbalances: Sustainability and Adjustment*, National Bureau of Economic Research, pp.11-66.

Greenspan, Alan (2004), "The mortgage market and consumer debt," Remarks at America's Community Bankers Annual Convention, Washington, D.C., 19 October.

Greenspan, Alan (2005), Testimony before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, 16 February.

Haldane, Andrew G. (2009), "Rethinking the financial network," speech at the Financial Student Association, Amsterdam, 28 April.

Hellwig, Martin (2008), "The Causes of the Financial Crisis," *CESifo Forum 4/2008*, pp. 12-21.

Hildebrand, Philipp (2008), "Is Basel II Enough? The Benefits of a Leverage Ratio," Financial Markets Group Lecture, London School of Economics, 15 December.

Holmström, Bengt (2008), "Discussion of 'The Panic of 2007' by Gary Gorton," in Federal Reserve Bank of Kansas City, *Maintaining Stability in a Changing Financial System*.

Hoshi, Takeo and Anil K. Kashyap (2008), "Will the US bank recapitalization succeed? Lessons from Japan," Working Paper No. 14401, National Bureau of Economic Research.

Independent Evaluation Office of the IMF (2006), *Evaluation of IMF Multilateral Surveillance*, IEO Report.

International Monetary Fund (2008), *Global Financial Stability Report*, October.

International Monetary Fund (2009a), *Global Financial Stability Report*, April.

International Monetary Fund (2009b), "Fiscal Implications of the Global Economic and Financial Crisis," Staff Position Paper, Fiscal Affairs Department, SPN/09/13, June 9.

Kashyap, Anil K., Rajan, Raghuram G. and Jeremy C. Stein (2008), "Rethinking capital regulation," Paper prepared for the Federal Reserve Bank of Kansas City symposium on "Maintaining Stability in a Changing Financial System," Jackson Hole, Wyoming, 21-23 August.

King, Mervyn (2009), Speech at the CBI Dinner, Nottingham, 20 January.

Kroszner, Randall (2009), "Central banks must time a 'good exit'," *The Financial Times*, August 11.

Krugman, Paul R. (1998a), "Will Asia Bounce Back?" March, <http://web.mit/krugman/www/>

Krugman, Paul R. (1998b), "The Confidence Game: How Washington Worsened Asia's Crash," *The New Republic*, October 5.

Laeven, Luc and Fabian Valencia (2008), "Systemic Banking Crises: A New Database," *IMF Working Paper* No 08/224, November.

Lannoo, Karel and Jean-Pierre Casey (2005), "Capital Adequacy vs. Liquidity Requirements in Banking Supervision in the EU", *CEPS Policy Brief* No. 84, October.

Mandeville, Bernard (1714 [1989]), *The Fable of the Bees: Or Private Vices, Publick Benefits*, Penguin Classics.

Meggison, William and Jeffry Netter (2001), "From State To Market: A Survey Of Empirical Studies On Privatization," *Journal of Economic Literature*, Vol. 39, No. 2, pp 321-389.

Meier, André (2009), “Panacea, curse or nonevent? Unconventional monetary policy in the United Kingdom,” IMF working paper 09/163, August.

Mendoza, Enrique G., Quadrini, Vincenzo and Jose-Victor Ríos Rull (2008), “Financial Integration, Financial Development and Global Imbalances,” mimeo, July.

Obama, Barack (2009), Address at George Mason University in Fairfax, Virginia, January 8.

Obstfeld, Maurice (2009), “Lenders of Last Resort in A Globalized World,” University of California, Berkeley, mimeo, June.

Obstfeld, Maurice and Kenneth Rogoff, K. (2005), “The Unsustainable US Current Account Position Revisited,” *Brookings papers on Economic Activity* No , pp.

Orphanides, Athanasios (2004), “Monetary policy in deflation: the liquidity trap in history and practice,” Finance and Economic Discussion Series, 2004-01, Board of Governors of the Federal Reserve System.

Panetta, Fabio, Faeh, Thomas, Grande, Giuseppe, Ho, Corinne, King, Michael, Levy, Aviram, Signoretti, Federico M., Taboga, Marco and Andrea Zaghini (2009), “An assessment of financial sector rescue programmes,” BIS Papers No. 48, Basel: Bank for International Settlements.

Panetta, Fabio and Paolo Angelini eds., (2009), “Financial Pro-cyclicality: Lessons from the Crisis,” *Questioni di Economia e Finanza* No 44, Banca d’Italia, April.

Persaud, A. (2009), “Macro-prudential regulation: fixing fundamental market (and regulatory) failures,” paper prepared for the Bruegel-Cepii-Icrier conference on *International Cooperation in Times of Global Crisis: Views from G20 Countries*, New Delhi, 14-15 September.

Philippon, Thomas and Ariell Reshef (2008), “Wages and Human Capital in the US Financial Industry: 1909-2006,” mimeo, December.

Pisani-Ferry, Jean and Bruno Van Pottelsberghe (2009), “Handle with care: post-crisis growth in the EU,” *Bruegel Policy Brief* No 2009/02, April.

Pisani-Ferry, Jean and Adam Posen (2009), *The euro at Ten: The Next Global Currency?*, Bruegel/Peterson Institute for International Economics.

Reinhart, Carmen M., and Kenneth S. Rogoff (2009a), “The aftermaths of financial crises,” *American Economic Review*, May.

Reinhart, Carmen M. and Kenneth S. Rogoff (2009b), *This Time is Different: Eight Centuries of Financial Folly*, Princeton University Press.

Repullo, Rafael, and Javier Suarez (2008), “The Procyclical Effects of Basel II,” *CEPR Discussion Paper*, No. 6862, June.

Repullo, Rafael, Saurina, Jesús and Carlos Trucharte (2009), "Mitigating the procyclicality of Basel II," CEMFI Working Paper No. 0903.

Romer, Cristina (1999), "Change in business cycles: evidence and explanations", *Journal of Economic Perspectives*, 23-44.

Rodrik, Dani (2006), "The social cost of foreign exchange reserves," *International Economic Journal*, 20 (3), 253-266.

Smith, Adam (1776 [1977]), *An Inquiry into the Nature and Causes of the Wealth of Nations*, University Of Chicago Press.

Snowder, Dennis (2009), "The impact of the global financial crisis on Europe and Europe's responses," AAEF conference, Kiel, July 7-8.

Taleb, Nassim Nicholas (2007), *The Black Swan: The Impact of the Highly Improbable*, Random House, New York.

Taylor, John (2008), *Getting Off Track: How Government Actions and Interventions Caused, Prolonged, and Worsened the Financial Crisis*, Hoover Institution Press, Stanford, March.

Volcker, Paul A. (2009), *Statement before the Committee on Banking and Financial Services*, US House of Representatives, 24 September.

Von Hagen, Jürgen (2009), "The monetary mechanics of the crisis," Bruegel policy contribution No. 2009/08, August.