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## **Section 1**

# **Why Did the Crisis Happen?**



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# The relationship between the recent boom and the current delinquencies in subprime mortgages

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*Recent US mortgage market troubles unsteadied the global economy. This article summarizes research analysing millions of loan applications to investigate the roots of the crisis. A credit boom may be to blame.*

Recent events in the market for mortgage-backed securities have placed the US subprime mortgage industry in the spotlight. Over the last decade, this market has expanded dramatically, evolving from a small niche segment into a major portion of the overall US mortgage market. Can the recent market turmoil – triggered by the sharp increase in delinquency rates – be related to this rapid expansion? In other words, is the recent experience, in part, the result of a credit boom gone bad? While many would say yes to these questions, rigorous empirical evidence on the matter has thus far been lacking.

## Credit booms

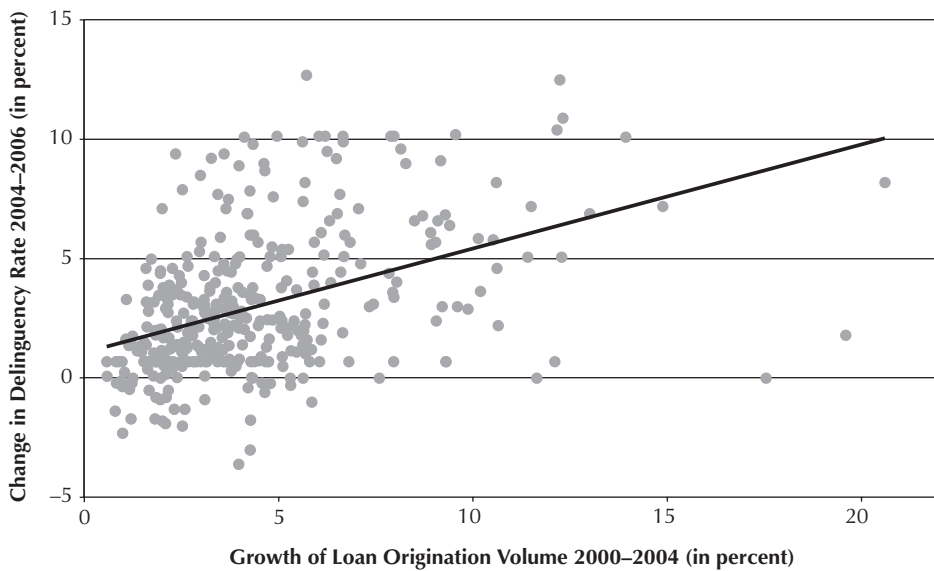
There appears to be widespread agreement that periods of rapid credit growth tend to be accompanied by loosening lending standards. For instance, in a speech delivered before the Independent Community Bankers of America on 7 March 2001, the then Federal Reserve chairman, Alan Greenspan, pointed to ‘an unfortunate tendency’ among bankers to lend aggressively at the peak of a cycle and argued that most bad loans were made through this aggressive type of lending.

Indeed, most major banking crises in the past 25 years have occurred in the wake of periods of extremely fast credit growth. Yet not all credit booms are followed by banking crises. Indeed, most studies find that, while the probability of a banking crisis increases significantly (by 50–75%) during booms, historically only about 20% of boom episodes have ended in a crisis. For example, out of 135 credit booms identified in Barajas et al. (2007) only 23 preceded systemic banking crises (about 17%), with that proportion rising to 31 (about 23%) if non-systemic episodes of financial distress are included. In contrast, about half of the banking crises in their sample were preceded by lending booms. Not surprisingly, larger and longer-lasting booms, and those coinciding with higher inflation and – to a lesser extent – lower growth, are more likely to end in a crisis. Booms associated with fast-rising asset prices and real-estate prices are also more likely to end in crises.

## The mortgage market

Reminiscent of this pattern linking credit booms with banking crises, current mortgage delinquencies in the US subprime mortgage market appear indeed to be related to past credit growth (Figure 1). In a new working paper, we analyse data from over 50 million individual loan applications and find that delinquency rates rose more sharply in areas that experienced larger increases in the number and volume of originated loans (Dell’Ariccia et al., 2008). This relationship is linked to a decrease in lending standards, as measured by a significant increase in loan-to-income ratios and a decline in denial rates, not explained by improvement in the underlying economic fundamentals.

**Figure 1** A credit boom gone bad?



In turn, the deterioration in lending standards can be linked to five main factors. Standards tended to decline more where the credit boom was larger. This is consistent with cross-country evidence on aggregate credit booms.

Lower standards were associated with a fast rate of house price appreciation, consistent with the notion that lenders were to some extent gambling on a continuing housing boom, relying on the fact that borrowers in default could always liquidate the collateral and repay the loan.

Changes in market structure mattered: lending standards declined more in regions where large (and aggressive) previously absent institutions entered the market.

The increasing recourse by banks to loan sales and asset securitization appears to have affected lender behaviour, with lending standards experiencing greater declines in areas where lenders sold a larger proportion of originated loans.

Easy monetary conditions seem to have played a role, with the cycle in lending standards mimicking that of the Federal Fund rate. In the subprime mortgage market most of these effects appear to be stronger and more significant than in the prime mortgage market, where loan denial decisions seem to be more closely related to economic fundamentals.

These findings are consistent with the notion that rapid credit growth episodes, due to the cyclical nature of lending standards, might create vulnerabilities in the financial system. The subprime experience demonstrates that even highly-developed financial markets are not immune to problems associated with credit booms.

## **Possible solutions**

What can be done to curb bad credit booms? Historically, the effectiveness of macroeconomic policies in reducing credit growth has varied (see, for example, Enoch and Ötoker-Robe, 2007). While monetary tightening can reduce both the demand and supply of bank loans, its effectiveness is often limited by capital-account openness. This is especially the case in small open economies and in countries with more advanced financial sectors, where banks have easy access to foreign credit, including from parent institutions. Monetary tightening may also lead to significant substitution between domestic and foreign-denominated credit, especially in countries with (perceived) rigid exchange-rate regimes. Fiscal tightening may also help reduce the expansionary pressures associated with credit booms, though this is often not politically feasible.

While prudential and supervision policies alone may prove not very effective in curbing credit growth, they may be very effective in reducing the risks associated with a boom. Such policies include prudential measures to ensure that banks and supervisors are equipped to deal with enhanced credit risk (such as higher capital and provisioning requirements, more intensive surveillance of potential problem banks and appropriate disclosure requirements of banks' risk management policies). Prudential measures may also target specific sources of risks (such as limits on sectoral loan concentration, tighter eligibility and collateral requirements for certain categories of loans, limits on foreign-exchange exposure and maturity mismatch regulations). Other measures may aim at reducing existing distortions and limiting the incentives for excessive borrowing and lending (such as the elimination of implicit guarantees or fiscal incentives for particular types of loans, and public risk awareness campaigns).

In response to aggressive lending practices by mortgage lenders, several states in the United States have enacted anti-predatory lending laws. By the end of 2004, at least 23 states had enacted predatory lending laws that regulated the provision of high-risk mortgages. However, research shows that these laws have not been effective in limiting the growth of such mortgages, at least in the United States (see, for example, Ho and Pennington-Cross, 2007). At the end of 2006, US federal banking agencies issued two guidelines out of concern that financial institutions had become overexposed to the real-estate sector while lending standards and risk management practices had been deteriorating, but these guidelines were too little, too late.

## **International concerns**

Other countries thus far seem to have avoided a crisis in their nonprime mortgage markets. The UK, for example, where nonprime mortgages also constitute an

increasingly large share of the overall mortgage market, has thus far avoided a surge in delinquencies of such mortgages (though in September 2007, the US subprime crisis indirectly did lead to liquidity problems and eventually a bank run on deposits at Northern Rock, the United Kingdom's fifth-largest mortgage lender at the time). Regulatory action on the part of the UK Financial Services Authority, resulting in the 2004 Regulation on Mortgages, which made mortgage lending more prescriptive and transparent in the UK, may have played a role. Of course, only time will tell how successful these actions have been. We would not be surprised to learn that lending standards have also deteriorated in mortgage markets outside the United States.

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Note: This article refers to CEPR Discussion Paper DP6683.

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# Why bank risk models failed

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4 April 2008

*Financial supervision arguably failed to prevent today's turmoil because it relied upon the very price-sensitive risk models that produced the crisis. This article calls for an ambitious departure from trends in modern financial regulation to correct the problem.*

Greenspan and others have questioned why risk models, which are at the centre of financial supervision, failed to avoid or mitigate today's financial turmoil. There are two answers to this, one technical and the other philosophical. Neither is complex, but many regulators and central bankers chose to ignore them both.

The technical explanation is that the market-sensitive risk models used by thousands of market participants work on the assumption that each user is the only person using them. This was not a bad approximation in 1952, when the intellectual underpinnings of these models were being developed at the Rand Corporation by Harry Markovitz and George Dantzig. This was a time of capital controls between countries, the segmentation of domestic financial markets and – to get the historical frame right – it was the time of the Morris Minor with its top speed of 59mph.

In today's flat world, market participants from Argentina to New Zealand have the same data on the risk, returns and correlation of financial instruments, and use standard optimization models, which throw up the same portfolios to be favoured and those not to be. Market participants do not stare helplessly at these results. They move into the favoured markets and out of the unfavoured. Enormous cross-border capital flows are unleashed. But under the weight of the herd, favoured instruments cannot remain undervalued, uncorrelated and low-risk. They are transformed into the precise opposite.

When a market participant's risk model detects a rise in risk in his or her portfolio, perhaps because of some random rise in volatility, and he or she tries to reduce his exposure, many others are trying to do the same thing at the same time with the same assets. A vicious cycle ensues as vertical price falls, prompting further selling. Liquidity vanishes down a black hole. The degree to which this occurs has less to do with the precise financial instruments and more with the depth of diversity of investors' behaviour. Paradoxically, the observation of areas of safety in risk models creates risks, and the observation of risk creates safety. Quantum physicists will note a parallel with Heisenberg's uncertainty principle.

Policy-makers cannot claim to be surprised by all of this. The observation that market-sensitive risk models, increasingly integrated into financial supervision in a prescriptive manner, were going to send the herd off the cliff edge was made soon after the last round of crises.<sup>1</sup> Many policy officials in charge today responded then that these warnings were too extreme to be considered realistic.

The reliance on risk models to protect us from crisis was always foolhardy. In terms of solutions, there is only space to observe that if we rely on market prices in our risk models and in value accounting, we must do so on the understanding that in rowdy times central banks will have to become buyers of last resort of distressed assets to avoid systemic collapse. This is the approach upon which we have stumbled. Central bankers now consider mortgage-backed securities as collateral for their loans to banks. But the asymmetry of being a buyer of last resort without also being a seller of last resort during the unsustainable boom will only condemn us to cycles of instability.

The alternative is to try to avoid booms and crashes through regulatory and fiscal mechanisms which counter the incentives that induce traders and investors to place highly leveraged bets on what the markets currently believe is a 'sure thing'. This sounds fraught with regulatory risks, and policy-makers are not as ambitious as they once were. We no longer walk on the moon. Of course, President Kennedy's 1961 ambition to get to the moon within the decade was partly driven by a fear of the Soviets getting there first. Regulatory ambition should be set now, while the fear of the current crisis is fresh and not when the crisis is over and the seat belts are working again.

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<sup>1</sup> Avinash Persaud (2000), 'Sending the Herd off the Cliff Edge: the Disturbing Interaction between Herding and Market-sensitive Risk Management Models', Jacques de Larosiere Prize Essay, Institute of International Finance, Washington, DC.

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# Blame the models

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8 May 2008

*In response to financial turmoil, supervisors are demanding more risk calculations. But model-driven mispricing produced the crisis, and risk models do not perform during crisis conditions. The belief that a really complicated statistical model must be right is merely foolish sophistication.*

A well-known US economist, drafted during the second world war to work in the US Army meteorological service in England, got a phone call from a general in May 1944 asking for the weather forecast for Normandy in early June. The economist replied that it was impossible to forecast weather that far into the future. The general wholeheartedly agreed but nevertheless needed the number now for planning purposes.

Similar logic lies at the heart of the current crisis.

Statistical modelling increasingly drives decision-making in the financial system, while at the same time significant questions remain about model reliability and whether market participants trust these models. If we ask practitioners, regulators or academics what they think of the quality of the statistical models underpinning pricing and risk analysis, their response is frequently negative. At the same time, many of these same individuals have no qualms about an ever-increasing use of models, not only for internal risk control but especially for the assessment of systemic risk and therefore the regulation of financial institutions.<sup>1</sup> To have numbers seems to be more important than whether the numbers are reliable. This is a paradox. How can we simultaneously mistrust models and advocate their use?

## What's in a rating?

Understanding this paradox helps understand both how the crisis came about and the frequently inappropriate responses to the crisis. At the heart of the crisis is the quality of ratings on SIVs. These ratings are generated by highly sophisticated statistical models.

Subprime mortgages have generated most headlines. That is of course simplistic. A single asset class worth only \$400 billion should not be able to cause such turmoil.

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<sup>1</sup> For example, see Nassim Taleb (2007), *Fooled by Randomness: the Hidden Role of Chance in Life and the Markets*, Harmondsworth: Penguin Books.

And indeed, the problem lies elsewhere, with how financial institutions packaged subprime loans into SIVs and conduits and the low quality of their ratings.

The main problem with the ratings of SIVs was the incorrect risk assessment provided by rating agencies, who underestimated the default correlation in mortgages by assuming that mortgage defaults are fairly independent events. Of course, at the height of the business cycle that may be true, but even a cursory glance at history reveals that mortgage defaults become highly correlated in downturns. Unfortunately, the data samples used to rate SIVs often were not long enough to include a recession.

Ultimately this implies that the quality of SIV ratings left something to be desired. However, the rating agencies have an 80-year history of evaluating corporate obligations, which does give us a benchmark to assess the ratings quality. Unfortunately, the quality of SIV ratings differs from the quality of ratings of regular corporations. A AAA for a SIV is not the same as a AAA for Microsoft.

And the market was not fooled. After all, why would a AAA-rated SIV earn 200 basis points above a AAA-rated corporate bond? One cannot escape the feeling that many players understood what was going on but happily went along. The pension fund manager buying such SIVs may have been incompetent, but he or she was more likely simply bypassing restrictions on buying high-risk assets.

## **Foolish sophistication**

Underpinning this whole process is a view that sophistication implies quality: a really complicated statistical model must be right. That might be true if the laws of physics were akin to the statistical laws of finance. However finance is not physics, it is more complex (Danielsson, 2002).

In physics the phenomena being measured do not generally change with measurement. In finance that is not true. Financial modelling changes the statistical laws governing the financial system in real time. The reason is that market participants react to measurements and therefore change the underlying statistical processes. The modellers are always playing catch-up with each other. This becomes especially pronounced when the financial system gets into a crisis.

This is a phenomena we call endogenous risk, which emphasizes the importance of interactions between institutions in determining market outcomes. Day to day, when everything is calm, we can ignore endogenous risk. In crisis, we cannot. And that is when the models fail.

This does not mean that models are without merits. On the contrary, they have a valuable use in the internal risk management processes of financial institutions, where the focus is on relatively frequent small events. The reliability of models designed for such purposes is readily assessed by a technique called backtesting, which is fundamental to the risk management process and is a key component in the Basel Accords.

Most models used to assess the probability of small frequent events can also be used to forecast the probability of large infrequent events. However, such extrapolation is inappropriate. Not only are the models calibrated and tested with particular events in mind, but it is impossible to tailor model quality to large infrequent events or to assess the quality of such forecasts.

Taken to the extreme, I have seen banks required to calculate the risk of annual losses once every thousand years, the so-called 99.9% annual losses. However, the fact that we can get such numbers does not mean the numbers mean anything. The problem is that we cannot backtest at such extreme frequencies. Similar arguments apply to many other calculations, such as expected shortfall or tail value-at-risk. Fundamental to the scientific process is verification, in our case backtesting. Neither the 99.9% models nor most tail value-at-risk models can be backtested, and therefore cannot be considered scientific.

## Demanding numbers

We do, however, see increasing demands from supervisors for exactly the calculation of such numbers as a response to the crisis. Of course the underlying motivation is the worthwhile goal of trying to quantify financial stability and systemic risk. However, exploiting the banks' internal models for this purpose is not the right way to do it. The internal models were not designed with this in mind and to do this calculation is a drain on the banks' risk management resources. It is the lazy way out. If we do not understand how the system works, generating numbers may give us comfort. But the numbers do not imply understanding.

Indeed, the current crisis took everybody by surprise in spite of all the sophisticated models, all the stress testing and all the numbers. I think the primary lesson from the crisis is that the financial institutions that had a good handle on liquidity risk management came out best. It was management and internal processes that mattered – not model quality. Indeed, the problem created by the conduits cannot be solved by models, but the problem could have been prevented by better management and especially better regulations.

With these facts increasingly understood, it is incomprehensible to me why supervisors are increasingly advocating the use of models in assessing the risk of individual institutions and financial stability. If model-driven mispricing enabled the crisis to happen, what makes us believe that future models will be any better?

Therefore one of the most important lessons from the crisis has been the exposure of the unreliability of models and the importance of management. The view frequently expressed by supervisors that the solution to a problem like the subprime crisis is Basel II is not really true. The reason is that Basel II is based on modelling. What is missing is for the supervisors and the central banks to understand the products being traded in the markets and have an idea of the magnitude, potential for systemic risk and interactions between institutions and endogenous risk, coupled with a willingness to act when necessary. In this crisis the key problem lies with bank supervision and central banking, as well as with the banks themselves.

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# The subprime crisis: observations on the emerging debate

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*16 August 2007*

*A basic principle of high uncertainty is to be careful. This principle also applies to analyses of the situation, even if decisiveness in the face of turmoil is at a premium. Better wait than make things worse. Here are a few observations to sort through the emerging debate.*

As financial anxiety keeps mounting worldwide, comments flourish and joyfully contradict each other. Central banks are bailing out dangerous gamblers, says one. They are skilfully preventing a 1929-style crash, says another one. Things are being gradually normalized, some assert. This is just the beginning of a vicious circle of unforeseen meltdown, just wait, warn others.

One thing all agree about is that uncertainty, which market participants with short memories – many of whom were teenagers or unborn the last big time around – thought was a thing of the past, has made a striking comeback. Uncertainty did not just hit markets all over the world, it is affecting our understanding as well, hence the wide disparity of opinions. A basic principle of high uncertainty is to be careful. This principle also applies to analyses of the situation, even if decisiveness in the face of turmoil is at a premium. Better wait than make things worse. Here are a few observations to sort through the emerging debate.

The origin of the problem is pretty well understood and adequately described in Stephen Cecchetti's 15 August 2007 Vox column 'Federal Reserve policy actions in August 2007: frequently asked questions'. As the US housing bubble is working its way out, mortgaged loans go sour. Since the institutions that granted these loans have promptly sold them on – this is the securitization process – to other institutions, which sold them on to others, and so on again and again, those who suffer losses are the ultimate holders. There are so many of them, all over the world, that no one knows where the losses are being borne. It could even be you, through your pension fund or some innocuous-looking investment.

The second observation that all agree about is that the total size of the now infamous subprime loans, even augmented by normal mortgages, does not add up to a huge amount. Normally, most financial institutions should be able to absorb them with much damage. Of course, a few may have bought too much of the stuff and they will go belly-up, but that is how things normally are. Most significant financial institutions should be able to absorb those particular losses.

Here comes the securitization story, and it is not controversial either. The dilution of risk is a good thing, no doubt about it. But it is generally the case that any good thing has some drawback. In this case the drawback is that no one knows who holds how much of these bad loans. Where things got bad is that, the same as many other human beings, and maybe a little more so, financiers are prone to mood swings. When all was going well, they trusted each other as if they had gone to the same schools, which in fact they did. When the situation soured, they went at light speed to the other corner and started to suspect that everyone else was more in trouble, especially those they knew best because they went to school together. So the interbank market froze.

This is where disagreements emerge. Did the central banks do the right thing? Some observers lament that they should act as lenders of last resort, which means intervening sparingly at punishing cost. The problem with that view is that central banks did not intervene as lenders of last resort. All central banks have the responsibility of assuring the orderly functioning of the financial markets. The interbank market is the mother of all financial markets, and it was drying up. So the central banks had no choice but to restart the interbank markets. In addition, modern central banks operate by announcing an interest rate, the interbank rate. If they do not enforce that rate, they destroy their own chosen strategy, which has served them well so far. This strategy allows them to change the interbank rate any time they wish. But until they do so, they have no choice but to make that rate stick. As for punishment, who were they supposed to punish? Not a particular bank, this time. The market, then? Collective punishment is generally a bad idea. In this case, it would be a terrible idea. If central banks punish the interbank market, they punish all financial markets, and therefore they punish all those who depend on these markets, which means almost all of humanity. Even Castro and Kim Jong Il.

The next big disagreement is whether things will become worse. It is easy to build scenarios that lead to disaster. Many excellent stories circulate and, like any good horror stories, they ring true. They usually describe hedge funds with serious exposure to subprime loans as quickly trying to restore solvency by selling their best assets, pushing their value down. Even hedge funds that are not exposed to bad loans may be fighting for their lives if their clients withdraw funds, either because they are worried or because they must, given their own regulations or rules. Rating agencies are then forced to downgrade loads of assets and funds whose fundamentals are perfectly safe, simply because they are being downloaded on the market. At that stage, 1929 starts looking heavenly in comparison with what happens next. Well, that could be what is in store. But note that it does not have to be so.

Remember first that, on its own, the mortgage crisis is small beer. Recall next that most serious financial institutions must have made adequate provisions to face this long-expected crisis; some call it normalization. Note that the large central banks have shown that they have learnt the lesson from past crisis and quickly moved to provide the interbank markets with the required liquidity. The situation is basically sound. But financial markets are always subject to self-fulfilling prophecies: if they believe that things will go wrong, things go wrong. That is where we stand now.

Isn't it very frustrating to find ourselves, once again, on the verge of disaster and realize that our well-being depends on the whims of a few financiers not

particularly known for being sedate? Why can't we prevent this once and for all? The sad thing is that armies of regulators and supervisors have been doing just that for years and years. Remember Basel II, meant to be even better than Basel I? Nowadays banks are so tightly regulated that it is almost not fun any more to be a banker. Well, almost. Banking is about lending, and lending is risky. In addition, as we all know, high risk means high (expected) return. Naturally, bankers have responded to regulation by carrying on with lending, risky and not risky, but they have been subcontracting the risk that they are not supposed to hold. The great securitization wave is partly a consequence of the great regulation operation.

The deeper moral is simple. Financial markets exist to do risky things. The more risk they take, the higher the (expected) returns. You can use regulation to squeeze risk out of a segment of the market, say banks, but you do not eliminate the risk, you just move it elsewhere. New segments, say hedge funds, emerge to take over the risk and the high (expected) returns that go with it. The problem is that little is known of the new segment and its players, so the armies of regulators and supervisors that protect us look in the wrong direction because they do not know where to look. There has been much talk about regulating the hedge funds; it might happen, so the game will move elsewhere. The only way to eliminate financial crises is to fully eliminate risk. Kim Jong Il knows how: eliminate financial institutions. But that means no (expected) returns.



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# The subprime series, part 1: Financial crises are not going away

**Stephen G. Cecchetti**

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26 November 2007

*This is the first in a series of four essays exploring the lessons from the subprime turmoil. It sets the stage for the series, arguing that financial crises are intrinsic to the modern economy, but both individuals and governments should make adjustments to reduce the frequency of financial crises and their impact on the broader economy.*

While the crisis may not be over, we can still pause and take stock. What lessons should we take away from the turmoil that began in early August 2007? Most of what I will discuss is not new. But recent events have brought some important issues into better focus. Reflecting on the central causes of the problems we currently face leads me to conclude: there will always be a next crisis.

Its centrality to industrial economic activity, combined with a potential for abuse, has made the financial system one of the most heavily regulated parts of our economy. Through a variety of regulators and supervisors with overlapping responsibilities, governments make voluminous rules and then set out to enforce them. The idea of a laissez-faire financial system makes no sense even to most ardent champions of the free market.

Even with intense oversight by the governmental authorities – in the United States we have the Office of the Comptroller of the Currency, the Federal Deposit Insurance Corporation and the Federal Reserve, as well as state banking authorities – crises continue to come. One reason for this is the natural tendency of officials to fight the last battle, looking for systemic weaknesses revealed by the most recent crisis. So, when complex automated trading schemes were thought to have contributed to the October 1987 stockmarket crash, circuit breakers were put in place that shut down computer-based order systems when indices move by more than a certain amount. In the aftermath of the Asian crisis, the IMF created new lending facilities in an attempt to address issues of contagion – in essence, to deal with countries that were innocent victims of problems created elsewhere. And when LTCM collapsed there was a flurry of activity to understand the potential impact of what were called highly leveraged institutions.

As necessary as each of these reforms may have been, we are not going to stop tomorrow's crises by looking backwards. Financial innovators will always seek out the weakest point in the system. Innovations will both exploit flaws in the regulatory and supervisory apparatus and manipulate the inherent limitations of the

relationship between asset managers and their investor clients. The 2007 crisis provides examples of both of these. Let us look at each in turn.

## **Innovations exploited flaws in the regulatory and supervisory apparatus**

Financial institutions have been allowed to reduce the capital that they hold by shifting assets to various legal entities that they do not own, what we now refer to as conduits and SIVs. (Every financial crisis seems to come with a new vocabulary.) Instead of owning the assets, which would have attracted a capital charge, the banks issued various guarantees to the SIVs, guarantees that did not require the banks to hold capital.

The purpose of a financial institution's capital is to act as insurance against drops in the value of its assets. The idea is that even if some portion of a bank's loan portfolio goes bad, there will still be sufficient resources to pay off depositors. Since capital is expensive, bank owners and managers are always on the lookout for ways to reduce the amount they have to hold. It is important to keep in mind that under any system of rules, clever (and very highly paid) bankers will always develop strategies for holding the risks that they want as cheaply as they can, thereby minimizing their capital.

## **Manipulation of the asset manager–client relationship**

But this is not the only problem. Financial innovators will also seek ways in which to exploit the relationship between the ultimate investor (the principal) and the managers of the investor's assets (the agent). The problem is that the agent acts primarily in his or her personal interest, which may or may not be the same as the interest of the principal. The principal–agent problem is impossible to escape.

Think about the manager of a pension fund who is looking for a place to put some cash.

Rules, both governmental and institutional, restrict the choices to high-rated fixed-income securities. The manager finds some AAA-rated bond that has a slightly higher yield than the rest. Because of differences in liquidity risk, for example, one bond might have a yield that is 20 or 30 basis points (0.20 or 0.30 percentage points) higher. Looking at this higher-yielding option, the pension-fund manager notices that there is a very slightly higher probability of a loss. But, on closer examination, he sees that this higher-yielding bond will only start experiencing difficulties if there is a system-wide catastrophe. Knowing that in the event of crisis, he will have bigger problems than just this one bond, the manager buys it, thereby beating the benchmark against which his performance is measured. I submit that there is no way to stop this. Managers of financial institutions will always search for the boundaries defined by the regulatory apparatus, and they will find them. After all, detailed regulations are a guide for how to legally avoid the spirit of the law. And the more detailed the rules, the more ingenious the avoidance. This brand of ingenuity is very highly rewarded, so I am sure these strategies will continue.

## Conclusions

So, what to do? Both individuals and government officials need to make adjustments. Individual investors need to demand more information and they need to get it in a digestible form. As individuals we should adhere to the same principle that President Ronald Reagan followed in agreements over nuclear weapons with the Soviet Union: trust, but verify. We should insist that asset managers and underwriters start by disclosing the detailed characteristics of what they are selling together with their costs and fees. This will allow us to know what we buy, as well as understand the incentives that our bankers face.

As for government officials, most of the lessons point to clarifying the relative riskiness associated with various parts of the financial system. Elsewhere I have suggested that at least some of the problems revealed by the current crisis can be ameliorated by increasing the standardization of securities and encouraging trading to migrate to organized exchanges.

## Next articles

In the next essays in this series I will continue along this theme. Part 2 discusses the lesson I have taken away from the Bank of England's recent experience: that a lender of last resort is no substitute for deposit insurance. In part 3, I address whether central banks should have a direct role in financial supervision, concluding that they should. And finally, in part 4, I examine whether central banks' actions have created moral hazard, encouraging asset managers to take on more risk than is in society's interest. My answer is no.

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Notes: Deposit insurance has a dramatic impact on the amount of capital a bank holds. With deposit insurance, depositors do not care about the assets on their bank's balance sheet. And without supervision from their liability holders (the depositors) there is a natural tendency to increase the risk that they take. The bank's owners and managers get the upside if the higher-risk loans and investments yield high returns, while the deposit insurer faces the downside if the risky assets fail to pay off. The response to this is to regulate banks and force them to hold capital.

The argument that follows is due to Joshua D. Coval, Jakub W. Jurek and Erik Stafford (2007), 'Economic Catastrophe Bonds', Harvard Business School Working Paper 07-102, (June).

I made this proposal initially in 'A Better Way to Organize Securities Markets', *Financial Times*, 4 October 2007, and provide more details in 'Preparing for the Next Financial Crisis' published initially at [www.eurointelligence.com](http://www.eurointelligence.com) on 5 November 2007, and reprinted at [www.voxeu.com](http://www.voxeu.com) on 18 November 2007.



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# The subprime series, part 2: Deposit insurance and the lender of last resort

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28 November 2007

*The second essay in this 4-part series discusses the lesson from the Bank of England's recent experience, arguing that a lender of last resort is no substitute for a well-designed deposit insurance mechanism.*

For decades a debate has been simmering over the advisability of deposit insurance. One side produces evidence that insuring deposits makes financial crises more likely.<sup>1</sup> These critics of deposit insurance as the first line of defence against bank panics go on to argue that the central bank, in its role as lender of last resort, can stem bank panics. Countering this is the view that, as a set of hard and fast rules, deposit insurance is more robust than discretionary central bank lending. In my view, the September 2007 bank run experienced by the British mortgage lender Northern Rock settles this debate once and for all – deposit insurance is essential to financial stability.

To understand this conclusion, we need to look carefully at experiences with central bank extensions of credit – discount lending – and at the varying experience with deposit insurance. Let's start with the lender of last resort.

## Lender of last resort

In 1873 Walter Bagehot suggested that, in order to prevent the failure of solvent but illiquid financial institutions, the central bank should lend freely on good collateral at a penalty rate.<sup>2</sup> By lending freely, he meant providing liquidity on demand to any bank that asked. Good collateral would ensure that the borrowing bank was in fact solvent, and a high interest rate would penalize the bank for failing to manage its assets sufficiently cautiously. While such a system could work to stem financial contagion, it has a critical flaw. For Bagehot-style lending to work, central bank officials who approve the loan applications must be able to distinguish an illiquid from an insolvent institution. But since there are no operat-

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1 This is the conclusion reached by Asli Demirgüç-Kunt and Edward Kane in their summary of international research on this issue. See their paper, 'Deposit Insurance around the Globe: Where does it Work?', *Journal of Economic Perspectives* 16 (2) (Spring 2002), pp. 175–95.

2 The original source is Walter Bagehot (1873), *Lombard Street: A Description of the Money Market*, London: Henry S. Kin & Co.

ing financial markets and no prices for financial instruments during times of crisis, computing the market value of a bank's asset is almost impossible. Because a bank will go to the central bank for a direct loan only after exhausting all opportunities to sell its assets and borrow from other banks without collateral, the need to seek a loan from the government draws its solvency into question.<sup>3</sup>

## Deposit insurance

Deposit insurance operates in a way that contrasts sharply with the lender of last resort. A standard system has an explicit deposit limit that protects the bank's liability holders – usually small depositors – from loss in the event that the bank fails. Guarantees are financed by an insurance fund that collects premiums from the banks. Logic and experience teach us both that insurers have to be national in scope and backed, implicitly if not explicitly, by the national government treasury's taxing authority. Funds that are either private or provided by regional governments are simply incapable of credibly guaranteeing the deposits in the entire banking system of a country.

But as I suggested at the outset, deposit insurance has its problems. We know that insurance changes people's behaviour. Protected depositors have no incentive to monitor their bankers' behaviour. Knowing this, bankers take on more risk than they would normally, since they get the benefits while the government assumes the costs. In protecting depositors, then, deposit insurance encourages creates moral hazard – something it has in common with the lender of last resort.

## Which is better?

How can we figure out whether the lender of last resort or deposit insurance works better? A physical scientist faced with such a question would run a controlled experiment, drawing inferences from variation in experimental conditions. Monetary and financial policy-makers cannot do this. Imagine a statement announcing a policy action beginning something like this: 'Having achieved our stabilization objectives, we have decided to run an experiment that will help us with further management of the economic and financial system...'

There is an alternative to irresponsible policy experiments: figuring out which policies are likely to work best requires us to look at the consequences of differences that occur on their own. Comparing the mid-September 2007 bank run experienced by a UK mortgage lender, Northern Rock, with recent events in the United States provides us with just such a natural experiment.

The US example is typical of how the loss of depositors' confidence, regardless of its source, can lead to a run. The Abacus Savings Bank serves large numbers of Chinese immigrants in New York, New Jersey and Pennsylvania. In April 2003 news spread through the Chinese-language media that one of the bank's New York

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<sup>3</sup> Another flaw in the Bagehot framework is that banks appear to attach a stigma to discount borrowing. For example, in over one-third of the days between 9 August and 21 November 2007 there were federal funds transactions reported at rates in excess of the discount lending rate. In one case, on 25 October 2007 when the lending rate was set at 5.25%, the Federal Reserve Bank of New York reported an intra-day high of 15%.

City managers had embezzled more than \$1m. Frightened depositors, unfamiliar with the safeguards in place at US banks, converged on three of the institution's branches to withdraw their balances. Because Abacus Savings was financially sound, having recently concluded its annual government examination, it was able to meet all requested withdrawals during the course of the day. In the end, as a US Treasury official observed, the real danger was that depositors might be robbed carrying large quantities of cash away from the bank. Leaving their funds in the bank would have been safer. But rumour and a lack of familiarity with government-sponsored deposit insurance – Federal Deposit Insurance insured every depositor up to \$100,000 – caused depositors to panic.<sup>4</sup>

Contrast this with the recent UK experience, where deposit insurance covers 100% of the first 2,000 and 90% of the next 33,000, and even then payouts can take months. Under these circumstances, the lender of last resort is an important component of the defence against runs.<sup>5</sup>

Central banks are extremely wary of taking on any sort of credit risk; in some cases there may be legal prohibitions against it. In lending operations, this translates into caution in the determining the acceptability of collateral. And here is where the problem occurs. In order to carry out their responsibility, central bankers must answer two important questions. First, is the borrower solvent? Second, are the assets being brought as collateral of sufficient value?<sup>6</sup>

The Northern Rock case brings the weaknesses of this system into stark relief. The broad outlines of the case are as follows. Northern Rock is a mortgage lender that financed its long-term lending with funds raised in short-term money markets. When, starting in mid-August 2007, the commercial paper markets came under stress, Northern Rock started having trouble issuing sufficient liabilities to support the level of assets on its balance sheet.

The natural move at this point was to seek funds from the Bank of England. But lending requires that the answer to the two questions about solvency and collateral quality are both yes. Were they for Northern Rock? I have no idea. Some combination of people in the Bank of England and the UK Financial Services Authority may have known, but I wonder. Since Northern Rock is rumoured to have had exposure to American subprime mortgages, securities for which prices were nearly impossible to come by, it is no exaggeration to suggest that no one was in a position to accurately evaluate solvency. As for the value of the collateral, again it was likely very difficult to tell.

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4 See James Barron (2003), 'Chinatown Bank Endures Run as Fear Trumps Reassurances', *New York Times*, 23 April.

5 For an exhaustive description of deposit insurance systems in the EU see Robert A. Eisenbeis and George G. Kaufman (2006), 'Cross-Border Banking: Challenges for Deposit Insurance and Financial Stability in the European Union', Federal Reserve Bank of Atlanta Working Paper 2006-15 (October).

6 As an episode 20 years ago demonstrates, the Federal Reserve turns out to have substantial discretion in answering these questions. On 20 November 1985, a software error prevented the Bank of New York (BONY) from keeping track of its Treasury bond trades. For 90 minutes transactions poured in, and the bank accumulated and paid for US Treasury bonds, notes and bills. Importantly, BONY promised to make payments without actually having the funds. But when the time came to deliver the securities and collect from the buyers, BONY employees could not tell who the buyers and sellers were, or what quantities and prices they had agreed to – the information had been erased. By the end of the day, BONY had bought and failed to deliver so many securities that it was committed to paying out \$23 billion that it did not have. The Federal Reserve stepped in and made an overnight loan equal to that amount, taking virtually the entire bank – buildings, furniture and all – as collateral. See the discussion in Stephen G. Cecchetti (2008), *Money, Banking and Financial Markets*, 2nd edn, Boston, MA: McGraw-Hill, Irwin.

## **Problem with last-resort lending**

So, here is the problem: discount lending requires discretionary evaluations based on incomplete information during a crisis. Deposit insurance is a set of pre-announced rules. The lesson I take away from this is that if you want to stop bank runs – and I think we all do – rules are better.

This all leads us to thinking more carefully about how to design deposit insurance. Here, we have quite a bit of experience. As is always the case, the details matter and not all schemes are created equal. A successful deposit-insurance system – one that insulates a commercial bank's retail customers from financial crisis – has a number of essential elements. Prime among them is the ability of supervisors to close preemptively an institution prior to insolvency. This is what, in the United States, is called 'prompt corrective action', and it is part of the detailed regulatory and supervisory apparatus that must accompany deposit insurance.

In addition to this, there is a need for quick resolution that leaves depositors unaffected. Furthermore, since deposit insurance is about keeping depositors from withdrawing their balances, there must be a mechanism whereby institutions can be closed in a way that depositors do not notice. At its peak, during the clean-up of the US savings and loan crisis, American authorities were closing depository institutions at a rate of more than two per working day – and they were doing it without any disruption to individuals' access to their deposit balances.

Returning to my conclusion, I will reiterate that this episode makes clear that a well-designed rules-based deposit insurance scheme should be the first step in protecting the banking system from future financial crises.

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# Subprime series, part 3: Why central banks should be financial supervisors

**Stephen G. Cecchetti**

*Bank for International Settlements and CEPR*

30 November 2007

*The third essay in this four-part series argues that central banks should have a direct role in financial supervision.*

Central bankers regularly describe price stability as an essential foundation for maximum sustainable growth. Well, financial stability is another one. In fact, without a stable, well-functioning financial system, there is no way that an economy can flourish. A well-functioning financial system is like the plumbing. When it works we take it for granted; when it does not, watch out. But, as we have seen recently, financial markets and institutions can malfunction at a moment's notice. To prevent this, governments regulate and supervise financial institutions and markets. And best practice dictates that financial stability is one of the primary objectives of the central bank.

## Central banks and financial supervision

For over a decade there has been a debate over how to structure government oversight. What responsibilities should reside in the central bank? Different countries resolve this question differently. In places like Italy, the Netherlands, Portugal, the United States and New Zealand, the central bank supervises banks. By contrast, in Australia, the United Kingdom and Japan, supervision is done by an independent authority. Is one of these organizational arrangements better than the other? Does one size fit all?

The events of the summer and autumn of 2007 shed new light on this question, and my conclusion is that there is now an even stronger argument for placing supervisory authority inside the central bank. As events unfolded through August and September, it became increasingly clear that having the bank supervisors separated from the liquidity provider placed added stress on the system.<sup>1</sup>

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<sup>1</sup> The chronology of events is now well known, so I will not repeat them here. For a discussion of the initial stages, see my description at 'Market Liquidity and Short-term Credit: the Financial Crisis of August 2007'.

## Pros and cons of separation

To understand this conclusion let me very briefly summarize the traditional arguments for and against separation of the monetary and supervisory authorities.<sup>2</sup> Starting with the former, the most compelling rationale for separation is the potential for conflict of interest. The central bank will be hesitant to impose monetary restraint out of concern for the damage it might do to the banks it supervises. The central bank will protect banks rather than the public interest. Making banks look bad makes supervisors look bad. So, allowing banks to fail would affect the central banker/supervisor's reputation.

In this same vein, Goodhart<sup>3</sup> argues for separation based on the fact that the embarrassment of poor supervisory performance could damage the reputation of the central bank. Monetary policy-makers who are viewed as incompetent have a difficult time achieving their objectives.

Turning to the arguments against separation, there is the general question of whether a central bank can deal effectively with threats to financial stability without being a supervisor. There are a variety of reasons why the answer might be no.

First and foremost, as a supervisor, the central bank has expertise in evaluating conditions in the banking sector, in the payments systems and in capital markets more generally. During periods when financial stability is threatened, when there is the threat that problems in one institution will spread, such evaluations must be done extremely quickly.

Importantly, the central bank will be in a position to make informed decisions about the tradeoffs among its goals, knowing whether provision of liquidity will jeopardize its macroeconomic stabilization objectives, for example. They are in the best position to evaluate the long-term costs of what may be seen as short-run bailouts. Put another way, appropriate actions require that monetary policy-makers and bank supervisors internalize each others' objectives. Separation makes this difficult.

Second, separation can lead central bankers to ignore the impact of monetary policy on banking-system health. A simple example of this is the potential for capital requirements to exacerbate business-cycle fluctuations. Granted, this seems unlikely, but regardless, the argument goes as follows: when the economy starts to slow, the quality of bank assets decline. This, in turn, reduces the level of capital, increasing leverage. Banks respond by cutting back on lending, slowing the economy even further. Combatting this requires that monetary policy-makers take explicit account of banking-system health when making their decisions. And, without adequate supervisory information, there is concern that they might not.

Most relevant to the recent experience is the fact that in their day-to-day interactions with commercial banks (and other financial institutions) central bankers need to manage credit risk both in the payments system and in their lending operations. In the United States, for example, the Federal Reserve allows banks what

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2 For a detailed and very thought-provoking discussion see both the text and the references in Ben S. Bernanke, 'Central banking and Bank Supervision in the United States', speech delivered at the Allied Social Science Association Annual Meeting, Chicago, Illinois, 5 January 2007.

3 See Charles Goodhart (2000), 'The Organizational Structure of Banking Supervision', Occasional Papers, no.1, Basel, Switzerland: Financial Stability Institute (November).

are known as daylight overdrafts on their reserve accounts. That is, the Fed extends very short-term credit to banks that makes payments with insufficient balances.<sup>4</sup>

As the lender of last resort, central banks worldwide take on credit risk. To do so responsibly requires information about the borrower. The evidence suggests that this is nearly impossible without having fast and complete access to supervisory information. An example will help to illustrate the problem policy-makers face.

## **An example**

On 20 November 1988 a computer software error prevented the Bank of New York from keeping track of its US Treasury securities trading.<sup>5</sup> For 90 minutes orders poured in and the bank made payments without having the funds as normal. But when it came time to deliver the bonds and collect from the buyers, the information had been erased from the system. By the end of the day, the Bank of New York had bought and failed to deliver so many securities that it was committed to paying out \$23 billion that it did not have. The Federal Reserve, knowing from its up-to-date supervisory records that the bank was solvent, made an emergency \$23 billion loan taking the entire bank as collateral and averting a systemic financial crisis. Importantly, only a supervisor was in a position to know that the Bank of New York's need to borrow was legitimate and did not arise from fraud.

A central bank needs to manage credit risk both in the operation of the payments system and in lending operations. In short-term lending it relies heavily on supervisory information. While this can normally be obtained from the supervisor, when an institution comes under stress it can be essential to have people in the central bank who know what is going on.

We can summarize the argument against separation as being about efficiency in the production and use of timely information on the one hand, and the ability to internalize the tradeoffs on the other. Separation means something akin to the children's game of 'telephone' or 'Chinese whispers', where a message is whispered from one child to the next, getting distorted at each step along the way. Internalization of the tradeoffs means that the central bank is best positioned to decide whether actions aimed at calming financial markets today forsake macro-economic stabilization objectives tomorrow.

I find all of this persuasive. But for those people who do not, recent events add another argument for central banks retaining supervisory powers. Looking at the Northern Rock episode, one has to wonder whether individuals would have behaved the way that they did if they had all been working inside the same institution. Recall what happened in mid-September. Shortly after the governor of the

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4 Because reserve balances are not remunerated in the US system – that is, there is no interest paid on the balances banks hold at the Fed – there is an incentive to economize on the level of reserves held. This has created a system in which banks regularly overdraw their accounts early in the day, making payments prior to receiving them. The Fed has announced that starting in 2011 it will start paying interest on reserve balances, at which point daylight overdrafts seem likely to disappear.

5 At the time, computers could store only 32,000 transactions at a time. When more transactions arrived than the computer could handle, the software's counter restarted at zero. Since the counter number was the key to where the trading information was stored, the information was effectively erased. Had all the original transactions been processed before the counter restarted, there would have been no problem. See the discussion in Stephen G. Cecchetti (2008), *Money, Banking and Financial Markets*, 2nd edn, Boston, MA: McGraw-Hill, Irwin.

Bank of England, Mervyn King, sent a letter to the Treasury Committee of the House of Commons,<sup>6</sup> the UK Financial Services Authority (FSA) made it known both that Northern Rock was on the verge of collapse, and that supervisors had known this for some time. Contrary to widespread perception of the position taken just a few days earlier in the governor's letter, the Bank of England was forced to make a substantial emergency loan, greatly tarnishing their public image.

## **Northern Rock lessons**

I have no special knowledge of the merits of this particular case. Should Northern Rock have been extended this loan or forced into bankruptcy? Could the FSA have taken preemptive action to avoid reaching this point? What was in the best long-term interests of the UK public in this specific case? It will take some time to sort out the answers to these questions and determine whether specific legal changes are needed. What I will say is that things surely would have gone more smoothly had the Bank of England had supervisory authority so that the officials with intimate knowledge of Northern Rock's balance sheet would have been sitting at the table on a regular basis with the management of the central bank.

Operations in a middle of a financial crisis are more like manoeuvres during a war. And in the heat of a battle, it is essential that a single person be in charge. That is why the military is organized with a clear chain of command. Separation of supervision from the central bank is like having two generals with potentially different objectives giving orders to the same army. It is hard to see how this could possibly work.

So, as I consider the lessons that we should take away from the financial turmoil of 2007, one of them is that it makes sense to place at least some supervisory authority inside the central bank.

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<sup>6</sup> Mervyn King (2007), 'Turmoil in Financial Markets: What Can Central Banks Do?', paper submitted by the Governor of the Bank of England to the Treasury Committee of the UK Parliament (12 September).

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# Subprime series, part 4: Does well-designed monetary policy encourage risk-taking?

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3 December 2007

*The final essay examines whether central bank actions have created moral hazard, encouraging asset managers to take on more risk than is in society's interest; the answer is no.*

Yes, but isn't that what it is supposed to do? In order to meet the objectives of high, stable growth and low, stable inflation, monetary policy-makers must insulate the real economy from financial-sector shocks. That is, central bankers strive to keep credit-market disturbances problems from spreading to the economy at large. This, I submit, is the most important lesson we have learned from analysing the monetary-policy failures that led to the Great Depression of the 1930s.<sup>1</sup>

Analysis of the 2007 financial crisis has been filled with comments about moral hazard and the 'Bernanke put'. The thrust of these criticisms is that recent monetary-policy actions by the Federal Reserve provided ex-post insurance to institutions that engaged in reckless behaviour. It is claimed that such bailouts designed by policy-makers underwrite risk-taking that leads, inevitably, to the next financial crisis.

In the first essay in this series, I explain why financial crises of the sort that we have been experiencing recently have been, and are likely to continue to be, a repeated consequence of the interaction of incentives and innovation.<sup>2</sup> Here, I argue that a central bank that takes an appropriate risk-management perspective is a stabilizing force, strengthening rather than weakening the financial system.

## Moral hazard

To understand this conclusion, it is useful to begin with a few definitions. Let us start with moral hazard. To nineteenth-century insurers, a moral hazard was a person who was unusually susceptible to the temptations created by insurance. That is, someone whose character made them predisposed to carelessness and fraud.<sup>3</sup>

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1 This is the essential insight of Bernanke's path-breaking work collected in *Essays on the Great Depression*, Princeton, NJ: Princeton University Press, 2004.

2 See part 1 above.

3 For a fascinating history of the term 'moral hazard' see Tom Baker (1996), 'On the Genealogy of Moral Hazard,' *Texas Law Review* 75 (2) (December), pp. 237–92.

Modern (neoclassical) economics steers clear of such normative connotations, defining moral hazard as the risk that a borrower, or someone who is insured, will behave in a way that is not in the interest of the lender, or the person selling the insurance.<sup>4</sup>

As a general rule, the existence of insurance is a good thing, both providing diversification for individuals who cannot obtain it otherwise, and allowing risk to go to those able to bear it. The fact that people can purchase fire insurance for their homes is what makes mortgages possible. This is just one example among many of how the modern financial system improves the efficient operation of the economy.

It is important to accept that insurance changes incentives. But that is an argument for careful design, not for elimination.<sup>5</sup>

### **Bernanke put or fire insurance?**

The term ‘Bernanke put’ is the descendant of the ‘Greenspan put’. My favourite source for conventional wisdom, Wikipedia, defines the latter as the ‘perceived attempt of then-chairman of the Federal Reserve Board, Greenspan, of ensuring liquidity in capital markets by lowering interest rates if necessary.’ (I did not write this entry.)<sup>6</sup> The term was coined in 1998 after the Fed lowered interest rates following the collapse of the investment firm LTCM. The effect of this rate reduction was that investors borrowed funds more cheaply to invest in the securities market, thereby averting a potential downswing in the markets.<sup>7</sup>

I believe that critical interpretations of these actions get it exactly wrong. As Bernanke said on 31 August 2007, ‘It is not the responsibility of the Federal Reserve – nor would it be appropriate – to protect lenders and investors from the consequences of their financial decisions.’<sup>8</sup> It is, however, the responsibility of the Federal Reserve, and all central banks, to make sure very bad things do not happen; protecting the public from adverse consequences of financial turmoil and reducing the volatility in the economy as a whole. That is, something exactly analogous to fire insurance.

Does it create moral hazard to make the worst possible economic outcomes extremely unlikely? The answer is surely no. We should not be forced to buy insurance against things that policy-makers can keep from happening in the first place. What should happen, however, is that individuals who take more risk face the possibility of more pain.

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4 For a detailed discussion of the implications of moral hazard in finance see Chapter 11 of Stephen G. Cecchetti (2008), *Money, Banking and Financial Markets*, 2nd edn, Boston, MA: McGraw-Hill Irwin.

5 For an excellent discussion of why traditional concepts of moral hazard are not applicable to the current circumstance see Lawrence Summers (2007), ‘Moral Hazard Fundamentalists’, *Financial Times* (23 September).

6 A textbook definition of a put option goes something like this: ‘A contract that confers the right, but not the obligation, to sell a financial instrument at a predetermined price prior to the expiration date of the option.’ For someone who plans to sell the asset in the future, a put option ensures that the price at which the asset can be sold will not go down.

7 The result of the Greenspan put was that equity investors experienced substantial losses as US stock market capitalization fell from \$20 trillion at the 2001 peak to \$11 trillion a mere two years later. A 45% loss hardly seems like iron-clad insurance.

8 ‘Housing, Housing Finance, and Monetary Policy’, speech presented at the Federal Reserve Bank of Kansas City’s Economic Symposium, Jackson Hole, WY.

Returning to the current instance, we can now ask two questions. First, have central bankers' actions reduced the likelihood of the worst possible outcomes? Second, have individuals and institutions that took more risk paid a higher price?

It seems to me that the answer to both of these questions is unequivocally yes. The purpose of the Federal Reserve's actions – reducing the federal funds rate target by a total of 75 basis points and the discount rate by 125 basis points – have been aimed at making sure very bad things do not happen.<sup>9</sup> And, if my reading of the news is accurate, losses are being distributed based on how much risk people have taken.

## Conclusions

I have suggested we consider four concrete remedies:

- **Trust, but verify:** investors should insist that asset managers and underwriters start by disclosing both the detailed characteristics of what they are selling and their costs and fees. This will allow us to know what we buy and understand our bankers' incentives.
- **Standardization and trading:** Governments could help clarify the relative riskiness of assets by fostering the standardization of securities and encouraging trading on organized exchanges.
- **Deposit insurance:** a well-designed, rules-based deposit-insurance scheme is essential for protecting the banking system from future financial crises. Lender of last-resort actions are no substitute for deposit insurance.
- **Central banks should be financial regulators:** they should have a direct role in financial supervision. In times of financial crisis – as in times of war – good policy-making requires a single 'general' directing the operations.

My final conclusion is negative. Some observers worry that recent central bankers' responses to the subprime crisis of 2007 will encourage asset managers to take on more risk than is in society's interest. I believe that this is wrong. Punishment is being meted out to many of those whose risky behaviour led to the problems, while central banks' actions have, so far, reduced the collateral damage that this crisis could have inflicted on the economy.

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<sup>9</sup> Some people characterized these interest-rate reductions as a bailout. But since every debt instrument has both a buyer and a seller, when interest-rate changes create transfers, someone wins and someone loses. And, the winnings exactly cancel the losses. So, when the Federal Open Market Committee reduces the federal funds rate target, whether you win or lose depends on whether you had an existing fixed-rate loan (lenders win and borrowers lose) or either an existing adjustable-rate loan or a new loan (borrowers win and lenders lose). I cannot see how such transfers, which always exist whenever interest rates change, create a bailout.



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# The subprime crisis: Greenspan's legacy

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23 August 2007

*The subprime crisis has its origin in Greenspan's low interest rate policy. His successor should take care to reassure the markets in the short run without laying the foundations for a new overreaction 'à la Greenspan'.*

It is difficult to predict how long the crisis in the world's financial markets will last. Its dynamics recalls that of previous crises, such as that of 1998 (the Russian default and the collapse of LTCM), which have by now been forgotten by many. An excess of liquidity (i.e. an abundance of loans at low cost) has suddenly been transformed into a dearth of liquidity; many dealers find it hard to sell the assets in their portfolios. The present crisis bears little resemblance to the 1929 Great Depression, contrary to what some politicians and commentators assert. Fortunately the Fed president, Bernanke, has studied the Great Depression in depth. According to the analysis he did as an academic,<sup>1</sup> the Great Depression was unleashed by a collapse of production and consumption, amplified by a drastic reduction in the supply of bank credit which came about largely because the Fed failed to act as a lender of last resort. Exactly the opposite is happening today. The world economy continues to grow at sustained rates since central banks have so far fulfilled their roles of supplying the necessary liquidity to the market. The only (perhaps non-negligible) aspect that the current crisis shares with the Great Depression is that its epicentre is the United States.

## **Back to the present**

It is useful to disentangle the causes of the crisis. Three factors contribute to the current crisis, that was triggered by the expectation of defaults on subprime mortgages in the United States.

- The low financial literacy of US households;
- The financial innovation that has resulted in the massive securitization of illiquid assets; and

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<sup>1</sup> Ben Bernanke (1983), 'Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression', *American Economic Review* 73, pp. 257–76.

- The low interest rate policy followed by Greenspan's Fed from 2001 to 2004.
- The third cause is by far the most important. Without Greenspan's policy, the present crisis probably would have never occurred.

## **Low financial literacy**

The first ingredient of the crisis is a blend of bad information, financial inexperience and the myopia of consumers and investors. They fell for the prospect of getting a mortgage at rates never seen before and then extrapolating these rates out for 30 years. This myopia was encouraged and indeed exploited by banks and other lenders eager to attract and retain clients. This is surprisingly similar to what has been seen in the past when banks and intermediaries have advised their clients to invest in financial assets ill-suited to their ability to bear risk. In both cases, a biased adviser is the reflection of a clear conflict of interest in the financial industry. Financial literacy is low not only in financially backward countries (as one would expect), but also in the United States. Only two out of three Americans are familiar with the law of compound interest; less than half know how to measure the effects of inflation on the costs of indebtedness. Financial literacy is particularly low among those who have taken out subprime mortgages. The intermediaries exploited this financial illiteracy.

## **Securitization**

The second ingredient is the pace of financial innovation during the last ten years and the securitization that it produced. Today it is easy to liquidify [[liquefy?]] a portfolio of illiquid credits (typically a combination of bank loans or mortgages) so that they can be packaged into investor portfolios. Any bank with distressed loans has used this technique to securitize its own credits. Like all financial innovations, this too has pros and cons. The advantage is that by making an illiquid credit liquid, one can achieve important efficiency gains; investors can take longer-term positions and so earn a higher return. It also spreads the risk of insolvency across a much wider group, reducing the level of risk exposure of any individual agent. But securitizations also have their disadvantages. They weaken the incentives of financial intermediaries to monitor the behaviour of the original borrower. In addition, since a credit that has become risky can be liquidated more easily, banks have less incentive to screen borrowers carefully. This opens the credit-markets doors to poor-quality borrowers.

## **Low interest rates**

The first two factors are not new. Without the third factor – the legacy of the 'central banker of the century' – the crisis probably would have never occurred. The monetary policy of low interest rates – introduced by Greenspan in response to the post-9/11 recession and the collapse of the new economy bubble – injected an

enormous amount of liquidity into the global monetary system. This reduced short-term interest rates to 1%, their lowest level in 50 years. What is more, Greenspan spent the next two years maintaining interest rates at levels significantly below equilibrium.<sup>2</sup> Interest rates were kept at low levels for a long time, and were often negative in inflation-adjusted terms. The result was no surprise. Low returns on traditional investments pushed investors and lenders to take bigger risks to get better returns. Financial intermediaries, in search of profits, extended credit to families and companies with limited financial strength. Investors with varying degrees of expertise duly reallocated their portfolios towards more lucrative but riskier assets in an attempt to increase their wealth and preserve its purchasing power. The low borrowing rates for both short- and long-term maturity attracted throngs of borrowers, families (above all) who were seduced by the possibility of acquiring assets that had always been beyond their means. At the same time, house prices soared, ultimately encouraging the additional extension of credit; the value of real estate seemed almost guaranteed.

### **The song of the Keynesian sirens**

Thanks, Alan! Today we are paying the cost of your overreaction to the 2001 recession. The ECB was wisely prudent and only let itself be partially tempted by Keynesian arguments for reduced interest rates (which were already absurdly low) as a tool for attacking European stagnation. Many would like the ECB to lower rates now, arguing that to avoid a new Great Depression Europe needs Keynesian policy of the type followed in the United States, the United Kingdom and Germany after the 1929 collapse.

We think it is far better to avoid repeating Greenspan's error, and to avoid monetary policies that are too accommodating for too long. At present, central banks are acting correctly by injecting liquidity into the system. In such crises, one must be afraid of fear. Expectations can unleash downward spirals that make the most pessimistic prophecies come true. In addition, the market crisis hits everyone indiscriminately – even those who did not make money by extending mortgages too readily. Last Friday's (17 August 2007) press release of the Federal Open Market Committee (FOMC) did not clarify whether the half-point cut in the discount rate was intended to merely prevent a downward expectations spiral or whether it was the prelude to yet another overreaction to the market crisis. It is important to show soon that the lesson of Greenspan's error has been learned. We should not overreact, as has happened so many times in the past, by sowing the seeds of a future crisis today.

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2 See M. Lombardi and E. S. Sgherri (2007), '(Un)naturally Low? Sequential Monte Carlo Tracking of the US Natural Interest Rate', ECB Working Papers, No. 794 (August): ECB.



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# The impact of short-term interest rates on risk-taking: hard evidence

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12 October 2007

*Do low levels of short-term interest encourage risk-taking that can be considered excessive? Do low interest rates imply higher credit risk in the short run? In the medium run? New empirical research suggests that the answers are a resounding yes, a subtle no and a qualifying 'it depends'.*

In the heat of the summer turmoil in the global financial markets, observers immediately argued that the low levels of short-term interest rates during the 2002–5 period created the conditions for excessive risk-taking and were consequently one of the main causes of these almost unprecedented credit market convulsions.<sup>1,2</sup> Despite the theoretical appeal and widespread resonance of this contention,<sup>3</sup> no detailed empirical evidence – as far as we are aware – has established a clear and direct link from monetary policy to bank risk-taking.<sup>4</sup>

To analyse the impact of short-term interest rates on bank risk-taking is not straightforward. Monetary policy is endogenous: when financial stability is jeopardized, for example, monetary authorities may react by lowering interest rates, making any econometric identification extremely difficult. After the collapse of LTCM in 1998, for example, the Federal Reserve reduced the federal funds rate during the ensuing period of high financial uncertainty.

An excellent setting to econometrically identify the impact of short-term interest rates on bank risk-taking is Bolivia. In recent years, the boliviano was pegged

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1 For details see V. P. Ioannidou, S. Ongena and J. L. Peydró (2007), 'Monetary Policy and Subprime Lending: A Tall Tale of Low Federal Funds Rates, Hazardous Loans, and Reduced Loan Spreads', CentER - Tilburg University/ECB, mimeo. For complementary and supportive evidence using European data for over more than 20 years, see G. Jiménez, S. Ongena, J.-L. Peydró and J. Saurina (2007), 'Hazardous Times for Monetary Policy: What Do Twenty-Three Million Bank Loans Say About the Effects of Monetary Policy on Credit Risk?', CEPR DP 6514. Any views expressed are only those of the authors and should not be attributed to the ECB or the eurosystem.

2 See for example 'How Credit Got so Easy and Why It Is Tightening', front page, *Wall Street Journal*, 7 August 2007, and the VoxEU.org column by Tito Boeri and Luigi Guiso (2007), 'Subprime Crisis: Greenspan's Legacy'.

3 See K. Matsuyama (2007), 'Credit Traps and Credit Cycles', *American Economic Review* 97; G. Dell'Ariccia and R. Marquez (2006), 'Lending Booms and Lending Standards', *Journal of Finance* 61; R. Rajan (2006), 'Has Finance Made the World Riskier?', *European Financial Management* 12; C. Borio and P. Lowe (2002), 'Asset Prices, Financial and Monetary Stability: Exploring the Nexus', BIS Paper No. 114.

4 In contrast, the effects of monetary policy on the volume of credit have been widely studied and documented: B. S. Bernanke and A. S. Blinder (1992), 'The Federal Funds Rate and the Channels of Monetary Transmission', *American Economic Review* 82; B. S. Bernanke and M. Gertler (1995), 'Inside the Black Box: the Credit Channel of Monetary Policy Transmission', *Journal of Economic Perspectives* 9; A. K. Kashyap and J. C. Stein (2000), 'What Do a Million Banks Have to Say about the Transmission of Monetary Policy', *American Economic Review* 90.

to the US dollar and the financial system was highly dollarized. During this period, the proper measure of short-term interest rates in Bolivia was the US federal funds rate, which is exogenous to Bolivian economic conditions. Hence, using the Bolivian credit registry, we analyse on a loan-by-loan basis the impact of the US federal funds on risk-taking and credit risk. The registry contains detailed contract information on all loans issued by any bank operating in the country as well as several measures of bank risk-taking such as ex-post loan performance, internal credit ratings, loan rates and borrower credit history. The analysis draws from the 1999–2003 period, when the funds rate varied between 0.98% and 6.5%, and the boliviano was pegged to the US dollar.

We find that short-term interest rates affect risk-taking and credit risk. In particular, low interest rates encourage ex-ante risk-taking. Prior to loan origination, low interest rates imply that banks soften their lending standards for new loans: banks give more loans to borrowers with lower credit score and/or with bad credit history. Not only do banks take loans with higher ex-ante risk but also grant new loans that have higher ex-post credit risk, which we measure using a loan's hazard rate, that is, the default rate per unit of time. In addition, banks do not seem to price these extra risks they take. This finding suggest that our results are not driven by a higher demand for loans from risky firms (vis-a-vis less risky firms) when interest rates are low.<sup>5</sup> All in all, low short-term interest rates seem to increase the banks' appetite for risk.

We also find that banks which are less-well monitored and disciplined (i.e., subject to more moral hazard) not only take on more risk but they especially take it when interest rates are low. Low rates therefore imply excessive risk-taking. When rates are low not only do these banks take on more risk, but loan spreads are further reduced at these banks despite the higher ex-post realization of credit risk.

We also analyse in a duration model how the stance and the path of interest rates affect credit risk. We find that the hazard rate increases with lower interest rates at loan origination but also increases as a result of higher rates during the life of the loan. Consequently, there is a completely different impact of lower interest rates on the credit risk of new vis-a-vis outstanding loans. In the short-term, lower interest rates reduce the total amount of credit risk of the banks, since the volume of outstanding loans is larger than the volume of new loans. In the medium term, however, very low interest rates worsen credit risk, especially if interest rates rise at least back to the 'normal' levels and the banks' portfolios are loaded with riskier loans from the era of cheap money.

## Some policy implications

We find that the level of short-term interest affects bank risk-taking and the amount of credit risk in the system. Banks remain at the core of the financial system and credit risk is the most important risk banks face. Consequently, the stance and the path of monetary policy significantly affect financial stability. Indeed, very low interest rates for too long make the reversal to higher 'normal' rates haz-

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<sup>5</sup> In J. Stiglitz and A. Weiss (1981), 'Credit Rationing in Markets with Imperfect Information', *American Economic Review* 71, the demand for funds from risky borrowers increases when interest rates are higher.

ardous. Therefore, prudential supervision cannot act independently of the stance of monetary policy. (In fact, empirical evidence suggests that the two functions may affect and even complement the behaviour of the monetary authority.<sup>6</sup>) When short-term interest rates are too low and there is excessive liquidity in the financial markets, prudential standards may have to be tightened, through dynamic and forward-looking capital requirements and/or provisioning, for example.

The critical moment for financial instability comes when short-term interest rates have been unusually low for a long time and then return at least, for example, to their 'normal' levels. In fact, we find that the lower the interest rates were and the higher they move up afterwards, the worse credit risk will be. During this critical period of transition to higher interest rates, liquidity requirements should increase to offset the higher instability. When interest rates rise, in contrast, we find that bank risk-taking is reduced as lending standards get tougher. Hence, capital requirements should not be tightened then, it is too late. Regulatory capital should have been higher before this moment of rising interest rates, when the rates were low and risk-taking excessive.

All in all, our findings suggest first that prudential supervision cannot act independently of the stance and path of monetary policy; second, that wide and fast variations from low to high interest rates have a negative impact on financial stability; and third, that cheap money is not a free lunch.

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6 See for example, J. Peek, E. S. Rosengren and G. M. Tootell (1999), 'Is Bank Supervision Central to Central Banking', *Quarterly Journal of Economics* 124; V. P. Ioannidou (2005), 'Does Monetary Policy Affect the Central Bank's Role in Bank Supervision?', *Journal of Financial Intermediation* 14.



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# Why did bank supervision fail?

**Guido Tabellini**

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19 March 2008

*The recent financial trouble has prompted much examination of private financial institutions, but few have asked why regulatory supervision did not prevent the crisis. This article argues that supervisory failure was also due to regulatory competition between national authorities and calls for a consolidated EU authority.*

The ongoing financial turmoil is spurring a large number of reports on what went wrong and how to avoid future relapses. A clear picture of why major financial institutions made big mistakes and of systematic distortions in their incentive structures is now emerging. But on a key question there is a deafening silence: why did bank supervision fail? This is worrying, because with hindsight it is becoming increasingly obvious that supervisory authorities too made some big mistakes. Understanding why this occurred is important, if we want to avoid future repetitions.

A particularly comprehensive and lucid analysis of the deep causes of the ongoing crisis is contained in the Interim Report of the Financial Stability Forum presented by Italian Central Bank Governor Mario Draghi at the G7 meeting in Tokyo. The report draws attention to three specific problems (besides the poor and fraudulent practices in the US subprime market):

- shortcomings in firms' risk management practices, in particular, too little understanding of exposure to liquidity and market risk;
- poor due diligence practices, including excessive and misplaced reliance of credit rating agencies;
- imperfect public disclosure of the links between on- and off-balance sheet items.

Of course, these are only proximate causes, and the report asks: 'Why did financial institutions make these major mistakes?' The answer given is twofold. On the one hand, poor judgement was almost certainly involved. The rapid pace of financial innovation meant that even sophisticated investors did not always fully understand the risk properties of the complex structures that were built. The systemic implications of these financial arrangements were even more poorly understood. Probably, although the report does not say this, investors were fooled into collectively overestimating the resilience of global financial markets.

On the other hand, there were systematic incentive distortions. First, the ‘originate and distribute’ business model entails obvious moral hazard problems. Second, credit-ratings agencies face a conflict of interest. Third, management compensation schemes reward myopic risk-taking behaviour; it is rational for me to under-insure against the occurrence of rare disruptive events, if my bonus only depends on short-term performance indicators.

All this is good and sound – and far from trivial. But it is only part of the story. The other part is that banking supervision did not prevent these shortcomings from occurring. Each one of the proximate causes listed above could have been prevented or at least discouraged by better and more proactive financial supervision. Supervisory authorities did not discourage the build up of off-balance sheet risk exposure, although it was often induced by regulatory arbitrage. They did not seem to care about, or they simply ignored, the implicit contingent liabilities that this entailed for banks’ balance sheets. The relevance of liquidity and market risk (as opposed to default risk) was neglected.

Insuring adequate risk management of modern complex financial institutions is a joint responsibility of the management of such institutions and of the supervisory authorities. If risk management proves inadequate, it is a joint failure, not just a management failure. Asking why supervision failed is just as relevant as asking what went wrong inside the private financial institutions.

### **Why did supervision fail?**

Two answers can be given. The first one is bureaucratic inertia together with poor judgement. Just as it happened with sophisticated investors, the rapid pace of financial innovation may have led astray well-intentioned supervisory authorities. No one, from the top banker to the last employee of government bureaucracies, fully understood the huge risks that were piling up in these complex financial structures. Moreover, while bank regulators and supervisors are traditionally worried about capital adequacy ratios, they were just too slow to adapt their priorities and practice to the new dangers: lack of liquidity and market risk. They were also unlucky, because the financial turmoil hit them right in the transition between Basel I and Basel II. We cannot rule out that in a year or so financial supervision would have been in a position to identify and remedy the weak points in the system. Finally, light supervision might also have reflected excessive confidence in the self-regulating abilities of modern financial institutions and an ideological conviction that over-regulation was the more relevant danger to be avoided.

This explanation of why supervision failed is plausible and likely to contain important elements of truth. But it is incomplete. Much information was actually available, and there were mounting signs of concerns of too much complacency, from both individual investors and public officials. Yet the information was not acted upon. This suggests that other forces were at work.

The second possible answer is distorted incentives. Bureaucratic organizations respond to incentives, just like financial institutions and their top managers. The main suspect here is regulatory competition. Imposing sound risk management procedures raises costs. It is quite likely that the lax supervisory standards and practice also reflected the concern that the domestic industry would be hurt rela-

tive to foreign-based competitors or the fear that some institutions would shift part of their business to regulatory heavens.

What can be done to remedy these incentive problems and achieve an effective international coordination of banking supervision? To some extent, the answer can only be provided by the supervisory authorities themselves, with reference to specific and concrete details. But whatever is done, it will not completely solve the problem. The Basel frameworks have been designed to prevent this kind of harmful regulatory competition. But while Basel I is based on hard numbers, the more flexible supervision under Basel II can be implemented with different degrees of stringency at the authorities' discretion. This means that the distortions caused by regulatory competition will not go away. It is not enough to agree that supervisors need to encourage better risk management practice and the build-up of adequate liquidity buffers. One also needs to worry about whether national supervisors acting unilaterally will have the resolve and incentives to take effective actions. If their incentives were too weak just before this crisis, they will remain weak once this storm is gone.

## **The need for EU supervision**

Worldwide coordination of bank supervision can only be achieved through informal means. But Europe can be much more ambitious. It is time to think about replacing national regulation and supervision of banks with an EU-level agency. Besides the issue of regulatory competition, there are additional and important arguments in favour of an EU-level supervisory authority. It is almost self-evident that cross-border banking requires some form of transnational or supranational supervisory entity. Moreover, while local knowledge may be important, modern financial arrangements have become so complex that there are relevant economies of scale in concentrating the needed expertise inside a single supervisory agency.

One should always be wary of taking rushed decisions during a crisis, because the likelihood of making mistakes is very high. But the case in favour of a EU-wide regulatory and supervisory regime for banks is overwhelming. The crisis and the failure of national supervisory agencies provide a unique opportunity to overcome bureaucratic and political opposition to this institutional innovation.



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# The subprime crisis and credit risk transfer: something amiss

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6 September 2007

*Securitization transferred credit risk from the bank's balance sheets to the market. The subprime problem became a crisis when some of this risk landed back on banks. Regulators need to find a way to deal with the off-balance sheet operations of banks that made this possible and to improve transparency concerning banks' effective exposure to risk.*

By now everyone in Europe knows all about US subprime loans, ranging from 'Alt-A' to the 'ninja' variety (granted with 'no verification of income, job status or assets'). Still, it is not obvious why an even pronounced increase in delinquency rates on such loans, with the attendant losses on mortgage exposures, should have sparked a financial crisis that touched all classes of assets globally, even those relatively immune from credit risk. True, the share of the less safe loans in the issuance of mortgage-backed securities had almost doubled in the past few years. But an estimate of the direct losses of the actual and expected defaults ranges between \$100 billion and \$200 billion, relatively little, considering the valued of aggregate of financial assets (and also in comparison with \$5 trillion lost in the dotcom crisis).

We know how the crisis has unfolded.<sup>1</sup> After a sharp drop in the prices and market liquidity of all mortgage-backed securities, an equally sharp increase in the price of risk and spreads, and a drying-up of the issuance of all asset-backed securities, contagion extended to the short-term end of the financial market, first to a wide class of commercial paper and then to the money and interbank markets. As uncertainty and mutual mistrust spread to counterparties (even banking counterparties), overnight interest rates jumped and, as they say, cash became king. The repeated injections of liquidity on the part of various monetary authorities have so far provided only limited solace to this state of affairs. All this is clear, but the question is why a surge of subprime defaults should affect (though not disruptively for the moment) the banking system and (more worryingly) general credit conditions?

The question arises because the subprime mortgage-backed securities that sparked the crisis represent an extreme version of the credit risk transfer process in which the core banks have been engaged for a long time pursuing the 'originate

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<sup>1</sup> A useful rendition of the events since June and up to August 2007 is in Bank of International Settlements, *BIS Quarterly Review*, September 2007.

and distribute' business model. The banks originate the loans and then distribute the underlying risk to a myriad of outside investors. This made credit 'something that is largely bought and sold on the markets, rather than held ... on the balance sheets of financial intermediaries'.<sup>2</sup> Among the undisputable merits of this model (more complete markets, a wider range of instruments available to investors, enhanced liquidity, improved allocation of resources) is that the transfer of credit risk away from banking intermediaries would make the system more resilient to financial shocks. The fragmentation of risk and its distribution to non-bank players providing liquidity in several markets would alleviate the systemic consequences and allow an easier absorption of such shocks. This, however, is not what has happened. Though the credit underlying all kinds of asset-backed securities and of credit derivatives should no longer be on the balance sheet of the originating banks, the collapse of one segment of those securities has affected and is affecting the banking system. Why is that? The answer is that part of the credit risk flowed back to some banks, though not on to their books.

This has mostly happened through the growing diffusion of conduits and SIVs.<sup>3</sup> These are entities, off the banks' balance sheets, that invest long-term, largely in high-yield asset-backed securities and raise short-term finance by issuing correspondingly collateralized commercial paper (so-called asset-backed commercial paper). The banks provide such entities with financial guarantees that only appear below-the-line in their balance sheet, playing the role of last-resort liquidity providers if and when difficulties of refinancing arise. The precise extent of such commitments in the aggregate and for individual banks is unknown. According to market estimates reported by the BIS, outstanding asset-backed commercial paper reached a sum of \$1.5 trillion last March, of which some \$300 billion was based on mortgage-backed assets. According to another estimate, European banks have more than \$500 billion invested in asset-backed commercial-paper conduits, with German banks holding a quarter of this sum.

This crisis, however it ends, is likely to prompt ill-conceived regulatory proposals. But, if there is one field where something ought to be done, even before damning the sins of rating agencies, it is to find a way to deal with the off-balance sheet operations of banks and achieve greater transparency of their effective exposure to risk.

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2 Mario Draghi, 'Monetary Policy and New Financial Instruments', Central Bank of Argentina – 2007 Money and Banking Conference. On which see *BIS Quarterly Review*, cit; Stephen Day and Agnes Molnar (2006), 'Investment Vehicles: The Advantages of Flexibility', *International Financial Law Review* (November).

3 Ivar Simensen and Ralph Atkins (2007), "'Not Uncritical': Subprime Exposure Drags down German Banks', *Financial Times* (22 August).

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# The crisis of 2007: some lessons from history

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*17 December 2007*

*There is a strong tendency in the media and policy circles to view each crisis as totally new and unexpected. Financial crises, however, are as old as financial markets. Here are the lessons drawn by one of the world's leading economic historians of financial crises.*

Recent financial instability triggered by the collapse of the US subprime mortgage market has many features with great resonance from financial history.

- The crisis occurred following two years of rising policy interest rates.
- Its causes include lax oversight and a relaxation of normal standards of prudent lending in a period of abnormally low interest rates.
- The default on a significant fraction of subprime mortgages has produced spillover effects round the world via the securitized mortgage derivatives into which these mortgages were bundled, to the balance sheets of hedge funds, investment banks and conduits (which are bank-owned but off their balance sheets) which intermediate between mortgage and other asset-backed commercial paper and long-term securities.
- The uncertainty about the value of the securities collateralized by these mortgages spread uncertainty about the value of commercial paper collateral and the soundness of loans for leveraged buyouts.
- All this has led to the freezing up of the interbank lending market across the world in August 2007 and substantial liquidity injections by the ECB and the Federal Reserve to avert a credit crunch from affecting the real economy.
- The credit crunch has not yet been alleviated and a recession in the United States with consequences for Europe and other countries threatens.

## **A historical perspective**

Many of the financial institutions and instruments caught up in the crisis are part of the centuries-old phenomenon of financial innovation. The new instruments – often devised to avoid regulation – are then proved to be successful or not by the test of financial stress such as we have been recently encountering. The rise and fall of financial institutions and instruments occurs as part of a lending boom-

and-bust cycle financed by bank credit. The credit cycle is connected to the business cycle.

Irving Fisher, the famous macroeconomist, and others have told the story of a business cycle upswing driven by a displacement leading to an investment boom financed by bank credit and new credit instruments. The boom leads to a state of euphoria and possibly an asset bubble. A state of over-indebtedness develops which often ends in a bust.

A key dynamic in the crisis is information asymmetry manifest in the spread between risky and safe securities. The bust would in the past often lead to bank failures and possibly panics. The process could be short-circuited by a lender of last resort providing ample liquidity at a penalty rate.

Countercyclical monetary policy is also an integral part of the boom-bust credit cycle. For example the historical record shows that stockmarket booms occur in environments of low inflation, rising real GDP growth and low policy interest rates. As the boom progresses and inflationary pressure builds up, central banks inevitably tighten policy to trigger the ensuing crash. The story is similar for housing.

Stockmarket crashes have serious real consequences through wealth effects and possible liquidity crises. Housing busts, in addition to directly producing negative effects on the real economy, can also destabilize the banking system. These risks are present in the current housing bust.

Bordo (2007) presents some historical empirical evidence for the United States from 1921 to the present on the relationship between credit crunches, recessions, financial crises and monetary policy. I plot the monthly spreads between the Baa corporate bond rate and the ten-year Treasury constant maturity bond rate, as a measure of the financial market's assessment of credit risk. I also show NBER recession dates and major financial market events, including stockmarket crashes, financial crises and some major political events that affected financial markets. I also show policy interest rates (the federal funds rate and the discount rate).

The patterns revealed by the data show that peaks in the credit cycle proxied by the spreads are often lined up with the upper turning points of the business cycle. Also many of the events like banking crises and stockmarket crashes occur close to the peaks. Furthermore, policy rates peak very close to or before the peaks of the credit cycle.

The historical relationship for the United States between real housing prices (and other measures of the housing market), the business cycle and policy rates reveals a similar pattern. Tightening of monetary policy is associated with reversals of real housing prices and business-cycle downturns.

## **Financial innovation and financial crises**

Historically, financial crises originate on the liability side of banks' balance sheets as depositors rush to convert deposits into currency in the face of a financial shock. In recent decades, since the advent of deposit insurance, pressure has come from the asset side. Examples include the commercial-paper market in the 1970 Penn Central crisis, emerging market debt on money centre banks in 1982 and hedge funds in the LTCM meltdown in 1998. A historical example was the 1763 crisis in the market for bills of exchange.

In many of these cases financial innovation which increased leverage and was often devised to circumvent regulations was an integral part of the story of the boom. Examples include Penn Central in 1970 with innovation in the commercial-paper market; the savings and loan crisis of the 1980s with junk bonds; LTCM with derivatives and hedge funds; and today with the securitization of subprime mortgages. In this episode risk has been shifted from the originating bank into mortgage-backed securities which bundles shaky risk with the creditworthy. Asset-backed securities were absorbed by hedge funds, offshore banks and commercial paper. The shifting of risk from the banks to the financial markets as banks tried to avoid regulated capital requirements did not reduce systemic risk and increased the risk of a more widespread meltdown. Indeed the exposure of the non-bank financial sector has ultimately put pressure on the banking system.

## **International spillovers**

Financial crises have always had an international dimension. Contagion spreads through asset markets, international banking and the exchange-rate standard. The Baring crisis of 1890, when Argentina defaulted on its debt, is a classic historical example of contagion. Tightening by the Bank of England created the backdrop for the crisis. It led to sudden stops in lending from the European core to the periphery. This led to currency crises and debt defaults in a pattern similar to 1997–8.

The current crisis has spread between advanced countries via the holding of opaque subprime mortgage derivatives in diverse banks in Europe and elsewhere. Emerging countries have so far avoided crises because of defensive measures, especially large foreign-exchange reserves, in reaction to the 1990s meltdown. However, if the credit crunch continues and the US economy goes into recession, the emerging countries will also be affected.

## **Policy lessons**

1. Anna Schwartz once made a distinction between real financial crises, defined as a scramble for liquidity requiring lender of last-resort action, and pseudo-crises (asset busts leading to wealth losses) which do not require the lender of last resort. The recent wealth losses by hedge funds and others represent pseudo-crises.

However, the spillover of the subprime crisis into the interbank loan market and the freezing of liquidity to the banking system have posed the threat of a real crisis and have been dealt with properly by the ECB and the Federal Reserve. By contrast, the Bank of England initially followed a strict Bagehot policy of keeping its discount window open at a penalty rate. The run on Northern Rock on 14 September 2007 and the Bank's apparent volteface likely did not reflect the failure of the Bank's lender-of-last-resort policy but perceived inadequacies in the UK's deposit insurance, the lack of coordination between the FSA and the Bank, and political pressure.

2. The Federal Reserve by cutting its Funds rate by 100 basis points between September and December has correctly followed the conventional approach to

monetary policy by temporarily putting its inflation objectives in abeyance to prevent an incipient recession. As long as the Fed's commitment to its goal of a low inflation nominal anchor is perceived to be credible, such easing should not be inflationary. However, once the threat of recession dissipates, it behooves the Fed, if it wishes to maintain its credibility, to take back the money and raise rates. The ECB and the Bank of England as of now have not cut their policy rates, although they have been countering the liquidity crisis by injecting funds into the money markets. Should the risk of recession become as serious as in the United States, they should follow the Fed's example.

3. The Fed has followed the conventional wisdom and acted reactively by dealing with the consequences of an asset boom after it has bust. However, there may be a case for the central bank in some circumstances acting in a preemptive manner to forestall a low probability event such as a national housing bust.

Finally, I speculate on whether the recent financial crisis could have been avoided if the Fed had not provided as much liquidity as it did from 2001 to 2004. The Fed injected liquidity following shocks (the tech bust, 9/11) that might lead to financial crises, but when no financial crises occurred, it permitted the additional funds to remain in the money market. It also overreacted to the threat of deflation in 2003–4, which most likely was of the 'good' (productivity-driven) variety rather than the 'bad' recessionary variety.

If, consequent upon these events, the markets had not been infused with liquidity as much as they were and for so long, then interest rates would not have been as low in recent years as they were and the housing boom which just bust may not have expanded as much as it did.

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Bordo, Michael D. ( 2007), 'The Crisis of 2007: The Same Old Story Only the Players have Changed', <http://michael.bordo.googlepages.com>.

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# Reflections on the international dimensions and policy lessons of the US subprime crisis

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15 March 2008

*We may just have started to feel the pain. Asset price drops, including housing, are common markers in all the big banking crises over the past 30 years. GDP declines after such crises were both large (–2% on average) and protracted (two years to return to trend); in the five biggest crises, the numbers were –5% and three years. This article, based on the author’s testimony to the Congress, picks through the causes and consequences. It argues that when it comes to ‘cures’, it would be far better to get the job done right than get the job done quickly.*

‘There is nothing new except what is forgotten.’ – Mlle Rose Bertin

## Financial crisis: the setting

Across countries and over the centuries, economic crises of all types follow a similar pattern.<sup>1</sup> An innovation emerges. Sometimes it is a new tool of science or industry, such as the diving bell, steam engine or radio. Sometimes it is a tool of financial engineering, such as the joint-stock company, junk bonds or collateralized debt obligations (CDOs). Investors may be wary at first, but then they see that extraordinary returns appear to be available on these new instruments and they rush in. Financial intermediaries – banks and investment companies – stretch their balance sheets so as not to be left out. The upward surge in asset prices continues, and that generation of financial-market participants concludes that rules have been rewritten. Risk has been tamed, and leverage is always rewarded. All too often, policy-makers assert that the asset-price boom is a vote of confidence for their regime, that this time is different. Seldom, to my knowledge, do they protest that perhaps the world has not changed and that the old rules of valuation still apply.

But the old rules do apply. The asset price rise peters out, sometimes from exhaustion on its own or sometimes because of a real shock to the economy. This exposes the weaknesses of the balance sheets of those who justified high leverage by the expectation of outsized capital gains. Many financial firms admit losses, and some ultimately fail. All those financial firms hunker down, constricting cred-

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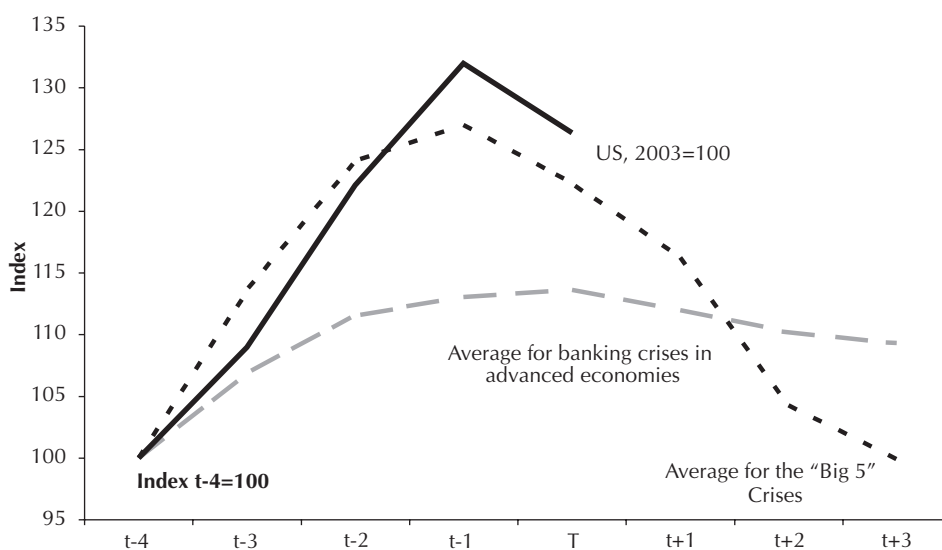
<sup>1</sup> Michael D. Bordo (2007), ‘The Crisis of 2007: The Same Old Story Only the Players have Changed’, at <http://michael.bordo.googlepages.com>.

it availability in an effort to slim their balance sheets. With wealth lower and credit harder to get, economic activity typically contracts. Only after the losses are flushed out of the financial system and often with the encouragement of lagging monetary and fiscal ease does the economy recover.

## The role of the real-estate market

This sorry spectacle repeats itself in the various types of crises, but the most relevant to the present situation is the aftermath of banking crises. In recent work with Kenneth Rogoff, I documented 18 such episodes in industrial economies over the past 30 years.<sup>2,3</sup> Declines in assets, including those of both houses and equities that the United States has experienced over the past year, are common markers of the onset of banking crises. In the worst five banking crises (the Big Five) in industrial countries over the past 30 years, the value of houses fell about 25% on average from their peak (Figure 1).

**Figure 1** Real housing prices and banking crises



Sources: Reinhart and Rogoff (2008) and sources cited therein.

2 Carmen M. Reinhart and Kenneth S. Rogoff (2008), 'Is the 2007 U.S. Subprime Crisis So Different? An International Historical Comparison', forthcoming in *American Economic Review* (May).

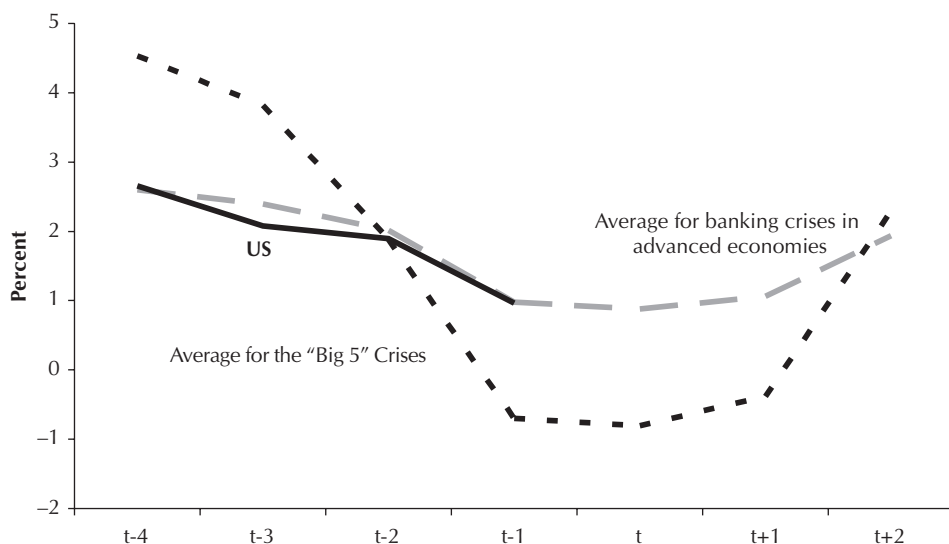
3 The five Big Five crises: Spain (1977), Norway (1987), Finland (1991), Sweden (1991) and Japan (1992) (starting year in parenthesis).

Other banking and financial crises: Australia (1989), Canada (1983), Denmark (1987), France (1994), Germany (1977), Greece (1991), Iceland (1985), Italy (1990), New Zealand (1987), United Kingdom (1974, 1991, 1995) and United States (1984).

## The fallout of banking crises

The cautionary lesson for today's situation in the United States is that the decline in output after a banking crisis is both large and protracted (Figure 2). The average drop in (real per head) output growth is over 2%, and it typically takes two years to return to trend. For the five most catastrophic cases, the drop in annual output growth from peak to trough is over 5%, and growth remained well below pre-crisis trend even after three years.

**Figure 2** Real GDP growth per capita and banking crises (PPP basis)



Sources: Reinhart and Rogoff (2008) and sources cited therein.

## The international repercussions of the US crisis: contagion or confusion?

Swift international spillovers are not a new phenomenon. In this regard, the panic of 1907, which began in the United States and quickly spread to other advanced economies (particularly, Denmark, France, Italy, Japan and Sweden), serves as an illustrative historical benchmark for modern-day financial contagion.<sup>4</sup> Like in the present episode, emerging markets were mostly spared in 1907; the only casualty in that episode was Mexico.

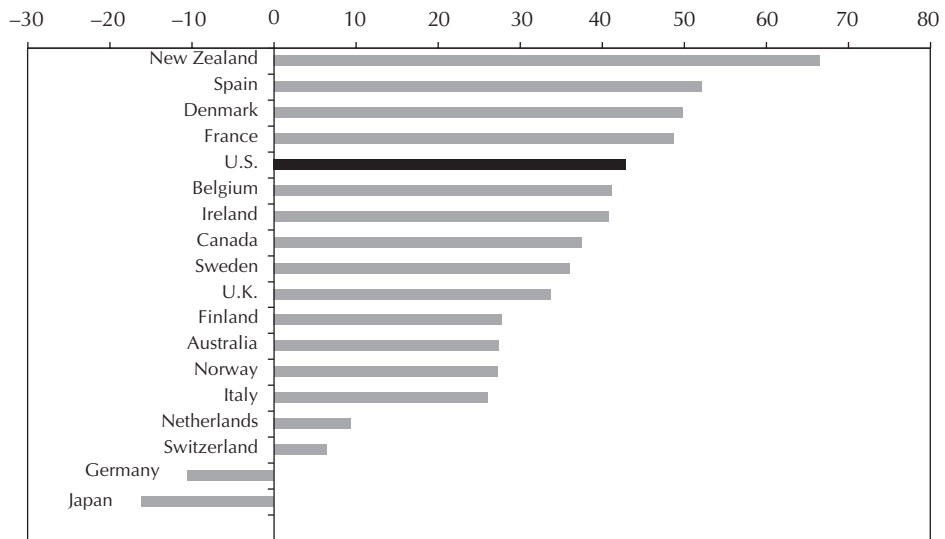
There is little doubt that the US crisis has spilled over into other markets. Two major advanced economies, Japan and Germany, have been singled out by the financial press as being particularly hard hit. There is no denying that German and Japanese financial institutions sought more attractive returns in the US subprime market, perhaps owing to the fact that profit opportunities in domestic real estate

<sup>4</sup> See Reinhart and Rogoff (2008).

were limited at best and dismal at worst (Figure 3). Indeed, after the fact, it has become evident that financial institutions in these countries had non-trivial exposure to the US subprime market.<sup>5</sup> This is a classic channel of transmission or contagion, through which a crisis in one country spreads across international borders. In the present context, however, contagion or spillovers are only a part of the story

If other countries are experiencing economic difficulties at the same time as the United States, it is due to the fact that many of the features that characterized the run-up to the subprime crisis in the United States were also present in many other advanced economies. Specifically, many countries in Europe and elsewhere (New Zealand, for example) were having their own home-grown real-estate bubbles (Figure 3). This, in and of itself, makes these countries vulnerable to the usual nasty consequences of asset-market crashes, irrespective of what may be happening in the United States. This cannot be pinned on the US subprime fiasco or on contagion. The odds of a correction were already present.

**Figure 3** Percentage change in real housing prices 2002–2006



Sources: Shiller; BIS.

<sup>5</sup> Owing to the opaqueness of balance sheets in many of these financial institutions in these countries, the full extent of exposure is still unknown.

## **Policy lessons: the banana republic approach to banking supervision**

As Venezuela's worst banking crisis unfolded in 1994–5 (conservative estimates of the bailout costs of that crisis are at around 18% of GDP), no one in that country seemed to know whose responsibility it was to supervise the financial institutions. As is usual in most banking crises, lending standards had become lax, there was interconnected lending and there was plenty of plain old-fashioned graft. The central bank blamed the main regulatory agency (SUDEBAN), the regulatory agency blamed the deposit insurance agency (FOGADE) and everyone else blamed the central bank.<sup>6</sup>

At the time of that crisis, the received wisdom was that such supervisory disarray could only happen in an emerging market; advanced economies had outgrown such chaos. We now know better.

For starters, part of the supervisory responsibilities in the United States is delegated to the states, which is to say that 50 emerging-markets agencies were partially responsible for the oversight of real-estate lending. Supervisors failed to caution depositories as they offered potential borrowers unsuitable mortgages. They also acquiesced as complicated structures were booked off the balance sheet, even though, in the event, they were not treated as such by corporate headquarters at the first sign of stress. And after the fact, they have pointed to the other guy as responsible for the problem.

No doubt, change is needed in both the private and public sectors. My immediate fear is that, as in most prior episodes, the initial reaction will be overdone and inefficient. Financial institutions are already tightening the terms and standards for new lending at a ferocious clip. Rating agencies, following their pro-cyclical tendencies, will overreact as well in the effort to distract the investing public from their laxness of the past few years by strict standards going forward.<sup>7</sup> Similarly, bank examiners will interpret the regulations narrowly, reinforcing the natural tendencies of depositories to tighten credit availability.

And last but not least, politicians have already turned their focus toward the financial industry. If the regulation of financial institutions needs to be revisited, there are compelling arguments to pare the multitude of regulators of depository institutions and insurance companies and to restructure the supervision of rating agencies.<sup>8</sup> But the outcome of hurried debate in the heat of the moment is more likely to be legislative overreach than informed policy-making. It would be far better to get the job done right than get the job done quickly.

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6 Superintendencia de Bancos y Otras Instituciones Financieras (SUDEBAN); Fondo de Garantías de Depósitos y Protección Bancaria (FOGADE) .

7 See Carmen M. Reinhart (2002), 'Sovereign Credit Ratings Before and After Financial Crises', and other chapters in R. Levich, G. Majnoni and C. M. Reinhart, eds, *Ratings, Rating Agencies and the Global Financial System*, New York: Kluwer Academic Press.

8 See Richard Portes (2008) 'Rating Agencies Reform', VoxEu.org, for an insightful discussion.