

Unclassified

ECO/WKP(2009)10

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

20-Feb-2009

English - Or. English

ECONOMICS DEPARTMENT

OVERCOMING THE FINANCIAL CRISIS IN THE UNITED STATES

ECONOMICS DEPARTMENT WORKING PAPER No. 669

By Andrea De Michelis

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ABSTRACT/RÉSUMÉ

Overcoming the Financial Crisis in the United States

The global financial crisis that emerged in mid-2007 has caused considerable economic disruptions in the United States and elsewhere, and exposed major flaws in the global financial system. After examining the origins of the crisis, this paper recommends specific policy responses to resolve the immediate problems and discusses how to make the US financial system more resilient and stable in the future.

JEL classification: E44; G20; G21; G28; R21.

Keywords: financial crisis; financial supervision; financial regulation; subprime mortgage; securitisation; deleveraging; housing finance; market stability regulator; United States.

Surmonter la crise financière aux États-Unis

La crise financière qui a éclaté à la mi-2007 a provoqué des perturbations économiques considérables aux États-Unis et ailleurs, et révélé des failles majeures dans le système financier mondial. Après une analyse des origines de la crise, ce chapitre préconise des réponses spécifiques pour résoudre les problèmes immédiats et étudie les moyens de rendre le système financier des États-Unis plus résilient et plus stable dans l'avenir.

Classification JEL : E44; G20; G21; G28; R21

Mots clés : crise financière ; supervision prudentielle ; réglementation des marchés financiers ; crédit hypothécaire à risques ; titrisation ; réduction de l'effet de levier ; financement du logement ; autorité de contrôle pour la stabilité des marchés financiers ; États-Unis.

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OVERCOMING THE FINANCIAL CRISIS IN THE UNITED STATES

By Andrea De Michelis¹

1. The crisis that started in mid-2007 is widely seen as the largest disruption of financial markets in decades. Large segments of the US financial system have been in a perilous state for more than a year and, despite actions by the authorities and market participants, there is no clear end in sight. Furthermore, the crisis has had serious repercussions across the global financial markets. The present situation has a number of distinctive features that were never seen before, such as the large amounts of lending to subprime borrowers, the expansion of securitisation, the disconnection between loan originators and final investors, the questionable assessment of credit rating agencies and the unparalleled resort to off-balance sheet vehicles. Yet, these developments unfolded in the context of a traditional credit boom, seen before in different markets, with usual characteristics such as an erosion of lending standards, under-pricing of risk and skyrocketing asset prices.

2. The crisis originated in the US housing sector following the accumulation of substantial mortgage debts by households. Mortgage originators took the risk of extending mortgage loans to borrowers previously not considered creditworthy, leading to an accumulation of low-quality subprime debts. The sudden underperformance of these subprime mortgages was the trigger of the crisis, but the relatively limited amount of subprime mortgages was not enough by itself to create such a large crisis. While the ultimate losses from the mortgage-market meltdown have been estimated to be relatively contained, they have rapidly spread in the highly interconnected global financial system. Various financial institutions have been successively affected, including mortgage lenders, commercial as well as investment banks, and the two major government-sponsored enterprises (Fannie Mae and Freddie Mac).

3. In the United States, the authorities have taken aggressive actions to respond to the crisis. For instance, the Federal Reserve has moved aggressively to cut interest rates, provide liquidity through new windows and assist systemically important financial institutions on the verge of bankruptcy. While these actions have helped to stabilise the situation in the short term, they have taken monetary policy into largely uncharted territories and therefore raise questions about their long-term effects. Meanwhile, the financial crisis has revealed many flaws in US financial regulatory policies, which will take time to repair. In the words of the key policymakers, “[t]he current system of functional regulation has several fundamental

¹ This paper is based on material presented in the OECD Economic Survey of the United States published in December 2008 under the authority of the Economic and Development Review Committee (EDRC). Please note that the paper was written over the summer of 2008 and was later updated for publication in November 2008; therefore, it does not reflect subsequent developments. The author would like to thank Andrew Dean, Robert Ford, Adrian Blundell-Wignall, Patrick Lenain and David Carey for valuable comments. The paper has also benefited from discussions with the EDRC delegates and numerous experts, including from the US government. Special thanks go to Jessica Hoel for outstanding research assistance, to Laure Meuro for technical assistance and to Heloise Wickramanayake for technical preparation.

problems” (Treasury, 2008a). Lessons drawn from the present financial crisis will help to reduce the likelihood of crises recurring in the future.

4. The first section of this paper discusses the origin of the crisis and explains how it has unfolded and become so severe. The US authorities have responded to these events with aggressive and timely policy actions. However, as discussed in the second section, further measures should be quickly implemented to contain the damage, as financial markets remain in a perilous state and the economic outlook is bleak. Further challenges lie ahead since the crisis has revealed major flaws in the financial system. The final section lays out the argument for a comprehensive reform of the regulatory and supervisory framework. (The paper has been drafted so that each section can be read independently from the other two.)

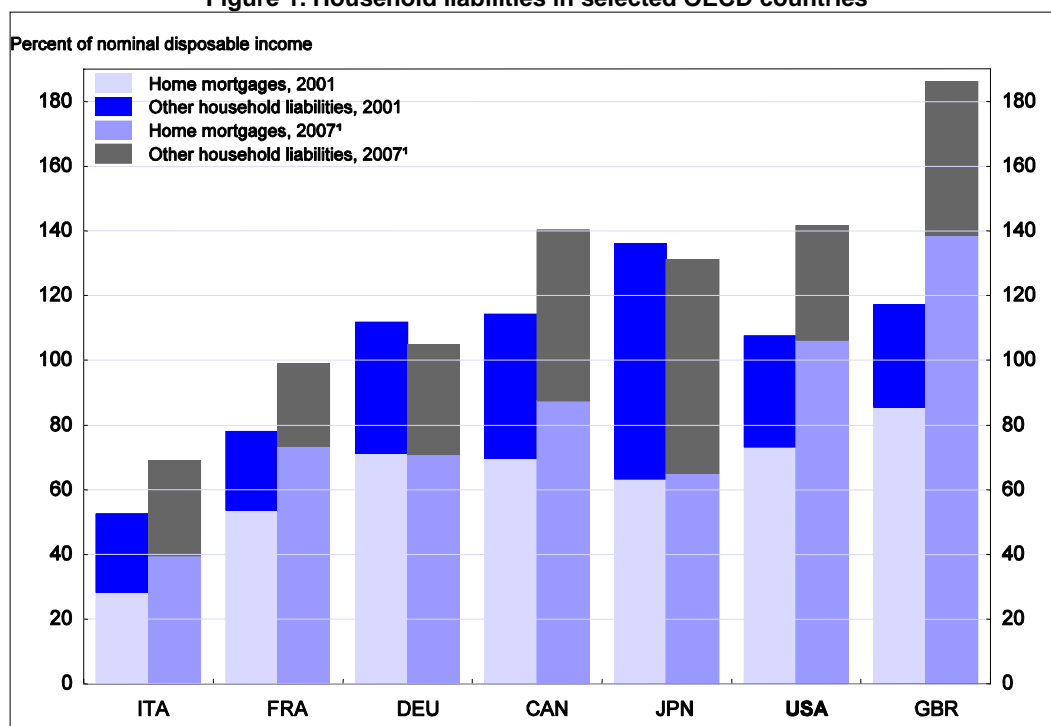
Section 1: The anatomy of the crisis

5. Although the origin of the crisis is not yet fully understood, it is widely agreed that its roots lie in the accumulation of low-quality subprime mortgage loans and their securitisation. While the origination of mortgage loans to less creditworthy borrowers was initially subject to strict underwriting standards, the quality of these loans deteriorated sharply after 2004, as mortgage originators discovered that investors were eager to hold higher yield securities based on subprime loans as credit quality on the earlier vintages of subprime loans was very good and that regulatory or prudential rules did not seem to impede associated lending. Once delinquent subprime mortgage loans started to increase, causing large losses on associated instruments, market sentiment shifted rapidly. Trust among market participants dissipated, leading to a sudden drying-up of liquidity, thereby amplifying the financial crisis and pushing several institutions to the brink of bankruptcy.

Mortgage lending expanded rapidly, and the quality of loans deteriorated

6. Since the start of the decade US households have sharply increased their indebtedness relative to their income, notably their take-up of mortgage loans. US household debt increased more than in most OECD countries for which data are available, except the United Kingdom (Figure 1) and Australia. In 2001, in the midst of the recession, a total of \$2.2 trillion new mortgage loans were originated, 85% of them being safe agency loans (that is, essentially issued by government-sponsored enterprises such as Fannie Mae and Freddie Mac) or prime jumbo loans (Figure 2). (Key features of the major categories of mortgage loans in the United States are described in Annex A1). The low level of interest rates encouraged a continued rapid increase in the total volume of mortgage lending, which surged to nearly \$4 trillion in 2003. An important caveat is that these data refer to gross mortgage originations, and thus they may exaggerate the expansion net mortgage borrowing over this period, since many new originations refinanced existing debt. In any case, while the increase in lending was spread across all mortgage classes, conforming mortgages rose at their fastest pace until 2003, reflecting a refinancing boom. By contrast, after 2003, lending standards and the quality of new mortgage loans began to deteriorate. The share of conforming loans declined, while home equity lending as well as Alt-A and subprime mortgages expanded rapidly. The share of these three lower-quality categories made up nearly 50% of the mortgage originated in 2006, up from only 15% in 2003.

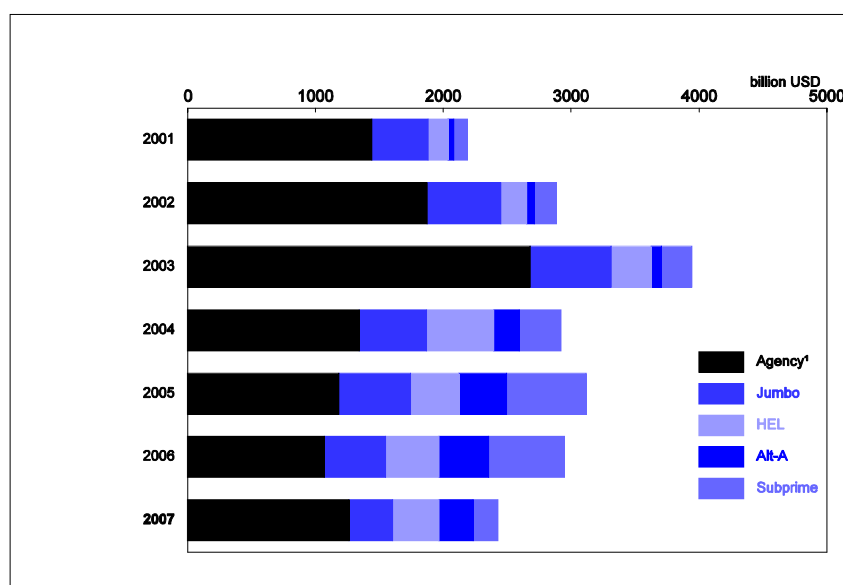
Figure 1. Household liabilities in selected OECD countries



1. 2006 for Italy, Germany and Japan

Source: OECD (2008)

Figure 2. Total mortgage originations by type



1. Agency mortgages include both GSEs and FHA/VA loans. See Annex A1 for details on the various types of mortgages. HEL stands for home equity lines.

Source: Baily *et al.* (2008) using Inside Mortgage Finance data.

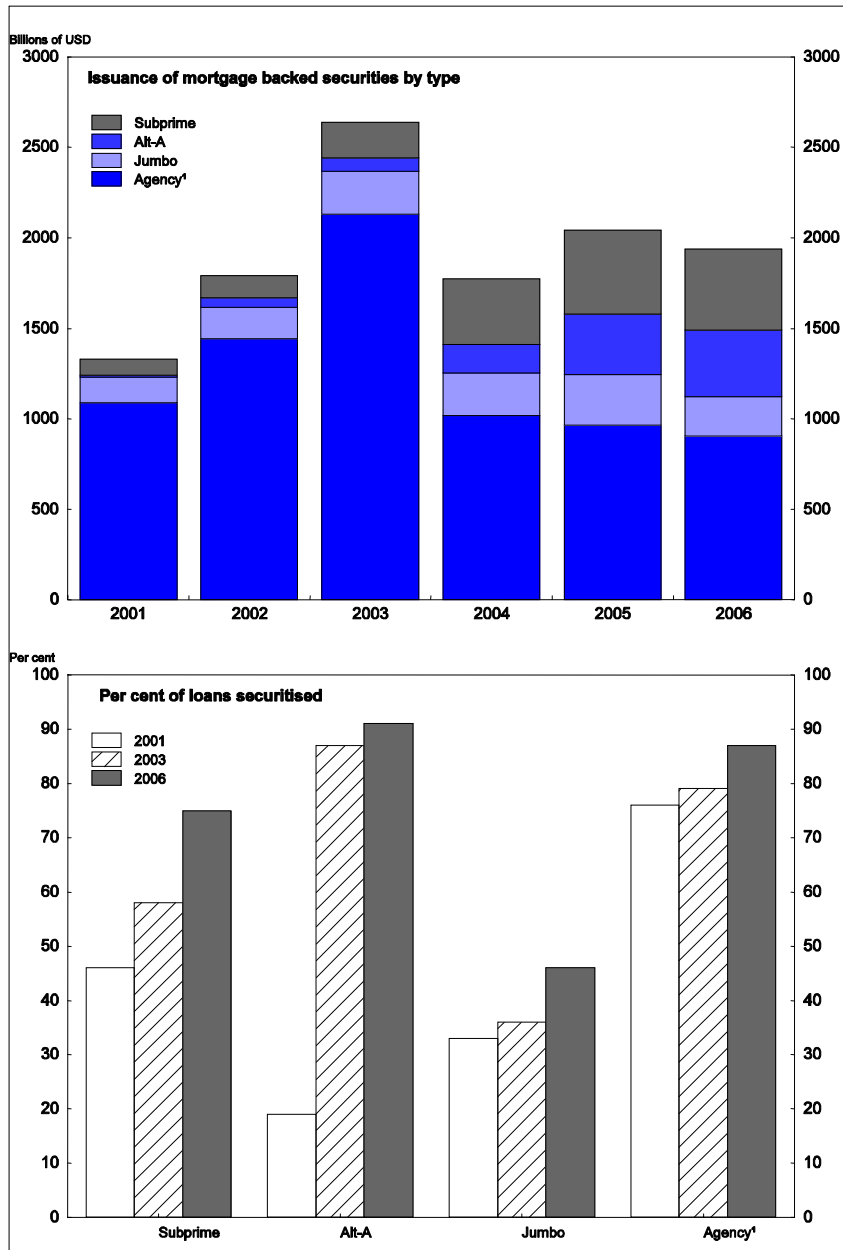
Widespread securitisation, including under private labels

7. The past two decades have witnessed a fundamental transformation in the way that funds have been channelled towards the mortgage market. Mortgage loans were traditionally, and still are in many OECD countries, originated by commercial banks and funded by the deposits of retail customers. The banks themselves evaluated the loans and assumed the risks. In the United States, this system collapsed in the Savings & Loan (S&L) crisis of the mid-1980s, partly because S&Ls failed to tackle the risk inherent in the funding of long-term fixed interest mortgages by means of short-term floating-rate deposits. Securitisation was seen as a part of the solution to this problem because it allowed mortgage lenders to sell their loans and use the receipts to make more loans: the so-called originate-and-distribute model. The development of the market for mortgage-backed securities (MBS) was led by the two major government-sponsored enterprises (GSE), Fannie Mae and Freddie Mac; these institutions were chartered by Congress to promote home ownership, but were owned by private shareholders. The GSEs purchase predominantly fixed-rate mortgages from the lenders after conducting due diligence to ensure that the loans conform to their standards, and then they pool them and sell the resulting MBS. The payments on the underlying mortgage pool are transferred to the MBS holders. Investors who buy the MBS assume the interest rate risk, but the credit risk is usually retained by the GSEs since they guarantee that the investors receive the unpaid principal balance of a mortgage at its maturity or in the event of a refinancing or a default.

8. The development of a deep and liquid market for MBSs means that mortgage originators greatly reduce their exposure to borrowers and to the underlying collateral. In fact, less than one-third of US mortgages are kept on the books of the originating banks, while more than two-thirds are securitised. In contrast, in most other OECD countries, the share of securitised mortgages rarely exceeds 20% of total outstanding mortgage loans. As documented in a recent ECB report (2008), mortgage securitisation in Europe has remained relatively low, though it has picked up significantly from the negligible levels of the 1990s. At the end 2006, total outstanding MBSs were nearly \$6.5 trillion in the United States, but only \$400 billion in the euro area and less than \$750 billion in the European Union. Even in the United Kingdom, which accounted for about half of European MBS issuance in 2006, less than 20% of residential mortgages are securitised. However, banks in Germany, Denmark and other European countries issue covered bonds, essentially senior bank liabilities which are secured by a mortgage portfolio. Like MBSs, these bonds provide substantial funds for mortgage lending, but they differ from MBSs in that the mortgages remain on the bank's balance sheet and the bond holder can turn to the bank should the cover pool not be sufficient. In any case, even including these covered bonds, securitised loans in Europe would be low by US standards. The state of affairs in Australia and Canada was similar to that in Europe (Ahearne *et al.*, 2005). By 2004, the proportion of outstanding mortgages that had been securitised had grown steadily in Australia but still remained only about 20% in Canada, on the basis of data collected only for the four major banks, the share of securitised mortgages was 17.5%.

9. While the originate-and-distribute model was fostered by the GSEs, an increasing share of nonconforming mortgages (*i.e.* those that the GSEs were not allowed to purchase) was financed by so-called private-label MBSs. By the mid of the decade, private-label securitisation had become the main funding source of Alt-A and subprime mortgages. The rise in origination of these lower-rated categories of loans was associated with an even more pronounced shift towards securitisation (Figure 3). Issuance of securities backed by Alt-A and subprime mortgages increased from \$11 billion and \$87 billion, respectively, in 2001 to \$366 billion and \$449 billion in 2006. Over the same period, the share of issuance to origination of these asset classes increased from 40% to 81%. As a result, riskier loans gained important shares in the mortgage market. At the end of 2007, securitised Alt-A and subprime mortgages accounted for 16% of outstanding mortgages (Figure 4) and 25% of outstanding MBS.

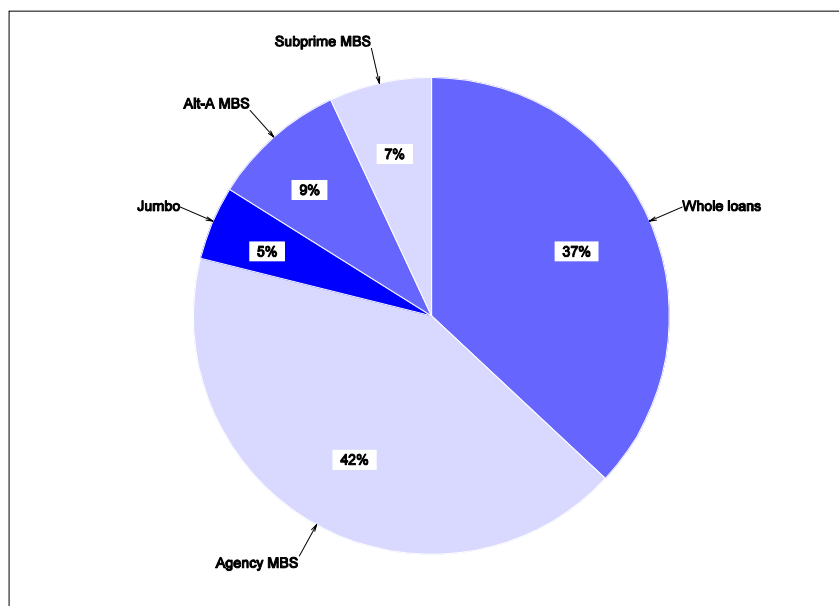
Figure 3. High-risk securitised mortgage lending, 2004-2006



1. Agency mortgages include both GSEs and FHA/VA loans.

Source: Ashcraft and Schuermann (2008) using Inside Mortgage Finance data.

Figure 4. Outstanding mortgage loans, end 2007



Source: Deutsche Bank (2008) using Federal Reserve and LoanPerformance data.

10. A key factor in the development of the market for MBSs was financial innovation, which allowed issuers to generate highly rated securities from the underlying mortgage pool (Box 1). As a result of this process, essentially all the risk was supposed to have been concentrated into a relatively small group of low rated securities, which were typically retained by the issuers or sold to investors with a high appetite for risk. The other securities were designed to receive top grades from rating agencies and marketed as safe investments. Freddie Mac and Fannie Mae were among the buyers of the latter. As of March 2007, their portfolios holdings included \$350 billion of private-label MBS, including \$170 billion of subprime MBS. These amounts were significantly above their combined minimum capital requirement at the time of about \$110 billion (according to calculations by the Secretariat).

Box 1. How subprime mortgages were transformed into AAA-rates securities

Mortgage securitisation can be partly thought of as a financial innovation offering sophisticated investors a diversification tool and the ability to better target their risk/return profile. At its essence, the process entails purchasing the underlying loans from various originators and banding them together. Such diversification, since the mortgages come from different areas, was expected to protect the health of the overall pool from any local shocks and ensure that the payment flows remained stable over time.

For the issuers of mortgage-backed securities (MBS), it is very important that their products receive the highest possible mark by a nationally recognised credit rating agency. Their ratings are supposed to represent an unconditional view of the creditworthiness of the debt instrument. Other things being equal, a higher rating thus means a higher price for the MBSs.

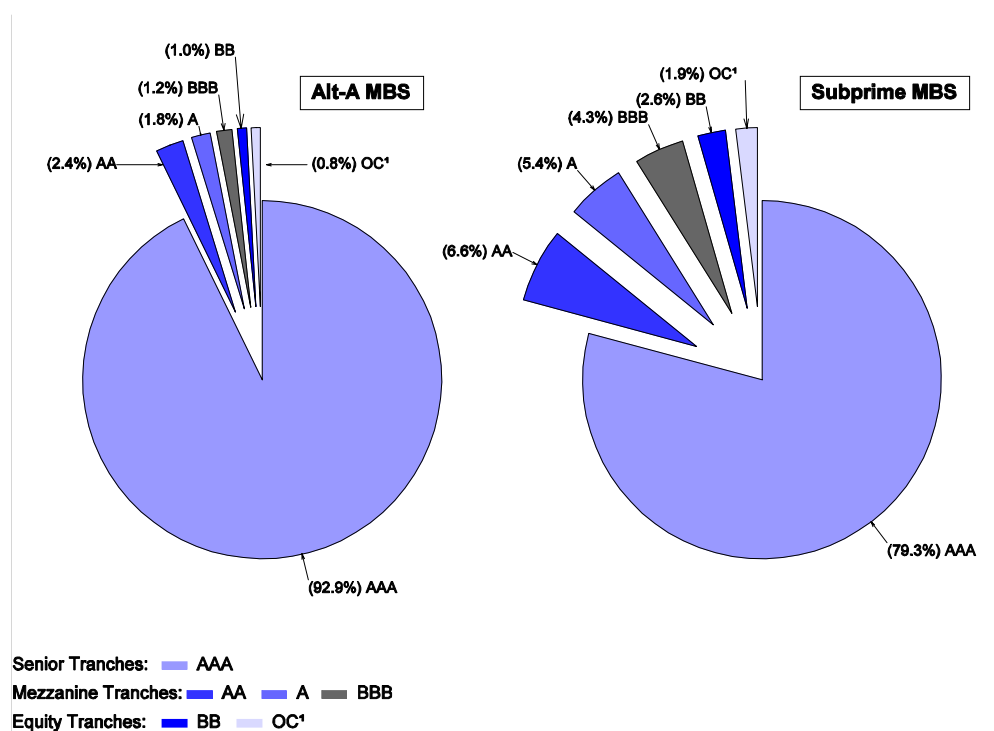
For conforming mortgages, the government-sponsored enterprises (GSEs) and the rating agencies face a relatively easy task. The GSEs only purchase high-quality mortgages and guarantee the timely payment of interest and the eventual payment of principal. Furthermore, the federal government backs all their debt. Thus, not surprisingly, all GSE-issued MBSs carry a credit rating of AAA (the most secure).

For nonconforming mortgages, a substantial share of them is expected to underperform. Furthermore, issuers of private-label MBS are not (implicitly or explicitly) guaranteed by the federal government. Therefore, an asset based on a simple pool of nonconforming mortgages would carry a credit rating below or even well below AAA, since the

purchasers take on not only the interest risk but also some of the credit risk. For this reason, private-label MBSs tend to have a complicated capital structure with varying risk and return across a range of products.

In a typical deal, the issuer transfers the receivables of the mortgage pool to a so-called special purpose vehicle (SPV), an off-balance sheet legal entity, which holds the receivables and issues the securities. These securities are then usually separated into senior, mezzanine (junior) and non-investment grade (equity) tranches. Figure 5 illustrates the typical capital structure for Alt-A and subprime MBSs. It shows that these securities were structured in a way that attributed the majority of funds to AAA tranches, even though the underlying assets were composed of subprime and Alt-A loans.

Figure 5. Typical capital structure of Alt-A and subprime mortgage-backed securities



1. Over Collateralisation.

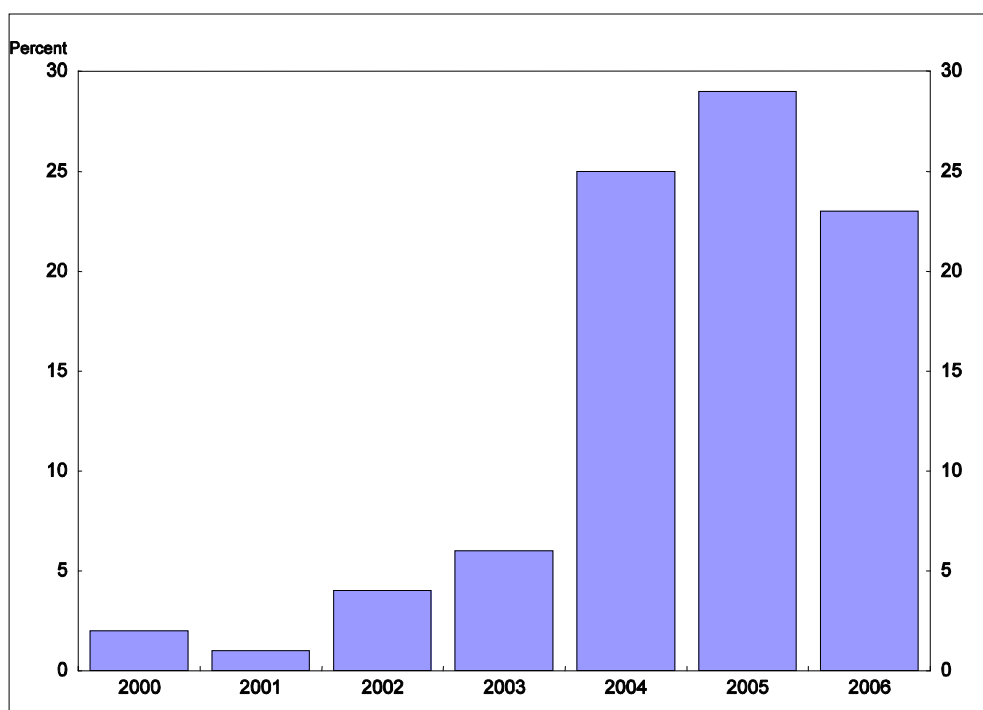
Source: Ashcraft and Schuermann (2008) using data from Bear Stearns.

A senior tranche has preferred claim on the stream of returns generated by the receivables held by the SPV; once all the senior tranches are paid, the mezzanine holders are paid next; the equity tranche receives whatever is left. This subordination structure is designed to ensure that senior tranches of private-label MBSs are deemed to be very safe. Furthermore, as explained in Ashcraft and Schuermann (2008), SPVs often feature other credit enhancements to protect investors from losses on the underlying mortgage pool. In particular, some portion of the mortgages can go into delinquency, but various forms of protection should mean there is still enough income coming into the pool to keep paying the holders of the senior tranches. The holders of the senior tranche have an asset that is less risky than the underlying pool of mortgages; in fact credit rating agencies were willing to give them the same AAA rating that agency MBSs get. For financial institutions that are required to set aside a certain percentage of capital to support assets, AAA and AA private-label MBSs carry the same (20%) "risk weighting" as agency MBSs. Similarly, asset managers are often allowed to treat senior tranches of even subprime MBSs as a substitute for agency MBSs.

Given this complicated structure, the various tranches of MBSs are difficult to price. One complication arises from the fact that even the senior tranches are vulnerable to extremely large losses in those rare events when the performance of a considerable share in the pool of underlying assets deteriorates. In other words, the returns distribution of the various tranches is not smooth and, for this reason, MBS are said to be subjected to *cliff effects*. A further concern is the calculation of the default risk on the non-senior tranches, since these tranches tend to be very small. Even if the distribution of the overall underlying assets can be reasonably assessed, the distribution of small sections of tails is going to be extremely difficult to assess.

11. Over the 2003-2006 period, there was also a noticeable increase in the proportion of mortgages with adjustable interest rates (ARM). ARM origination rose from about 10% of the total in 2001 to over 35% in 2004, and remained near this record level thereafter. Such loans were attractive to some borrowers because initial repayments were lower than for fixed-rate loans, reflecting the steeply upward-sloping yield curve at this time. While a higher proportion of variable rate mortgages suggest increased vulnerability to higher interest rates, one could argue that if such loans were taken by low-risk borrowers as a prudent debt management/cash flow practice, then they would be not only reasonable, but also desirable. However, in the United States, in 2006 nearly half of the outstanding ARMs were not low-risk, but subprime. Moreover, a rapidly increasing share of Alt-A and subprime mortgages had low teaser rates and even negative amortisation to begin with, making initial repayments particularly low but subsequent payments potentially very high (Figure 6). In addition to the prevalence of ARM, the combination of rising loan-to-value ratios and deteriorating underwriting standards left borrowers and lenders very exposed to the risk of lower house prices and weaker economic conditions.

Figure 6. Interest-only and negative amortisation loans: share of total mortgage originations, 2000-2006



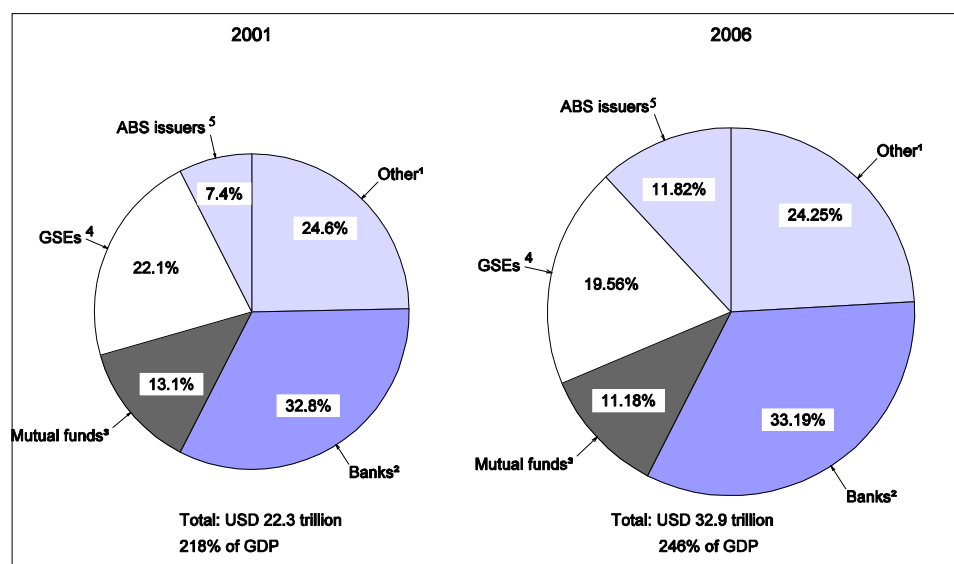
Source: Baily *et al.* (2008) using Credit Suisse and LoanPerformance data.

An expanding non-bank financial system

12. Over time, financial institutions have accumulated an increasing share of riskier assets. In addition, their balance sheets have expanded tremendously, reflecting increasing leverage (Figure 7). As risk premia fell, lenders and investors aggressively sought out new opportunities to increase yield, even at the cost of higher risk. Beyond mortgage financing, aspects of this widespread boom included rapid growth in the volumes of private equity deals and the increased use of structured credit products. It should be emphasised that commercial banks and other regulated depository institutions accounted for only half of the increase in the assets of the financial sector. The structure of the financial system changed fundamentally during the boom, with a sharp increase in the share of assets held outside the traditional banking system and the GSEs. This non-traditional financial system, which includes investment banks,

hedge funds and other less regulated entities, grew to be very large. Assets held by this parallel system in early 2007 exceeded \$10 trillion, more than the total assets held by the traditional banking system (Geithner, 2008).

Figure 7. Credit assets held by the financial sector



1. Insurance companies, pension funds, and other.
2. Commercial banks, savings institutions, credit unions.
3. Money market mutual funds, mutual funds, closed-end funds, exchange-traded funds.
4. Government-sponsored enterprises, agency-backed mortgage pools.
5. Private issuers of asset-backed securities.

Source: Federal Reserve, Flow of Funds Tables (June 2008).

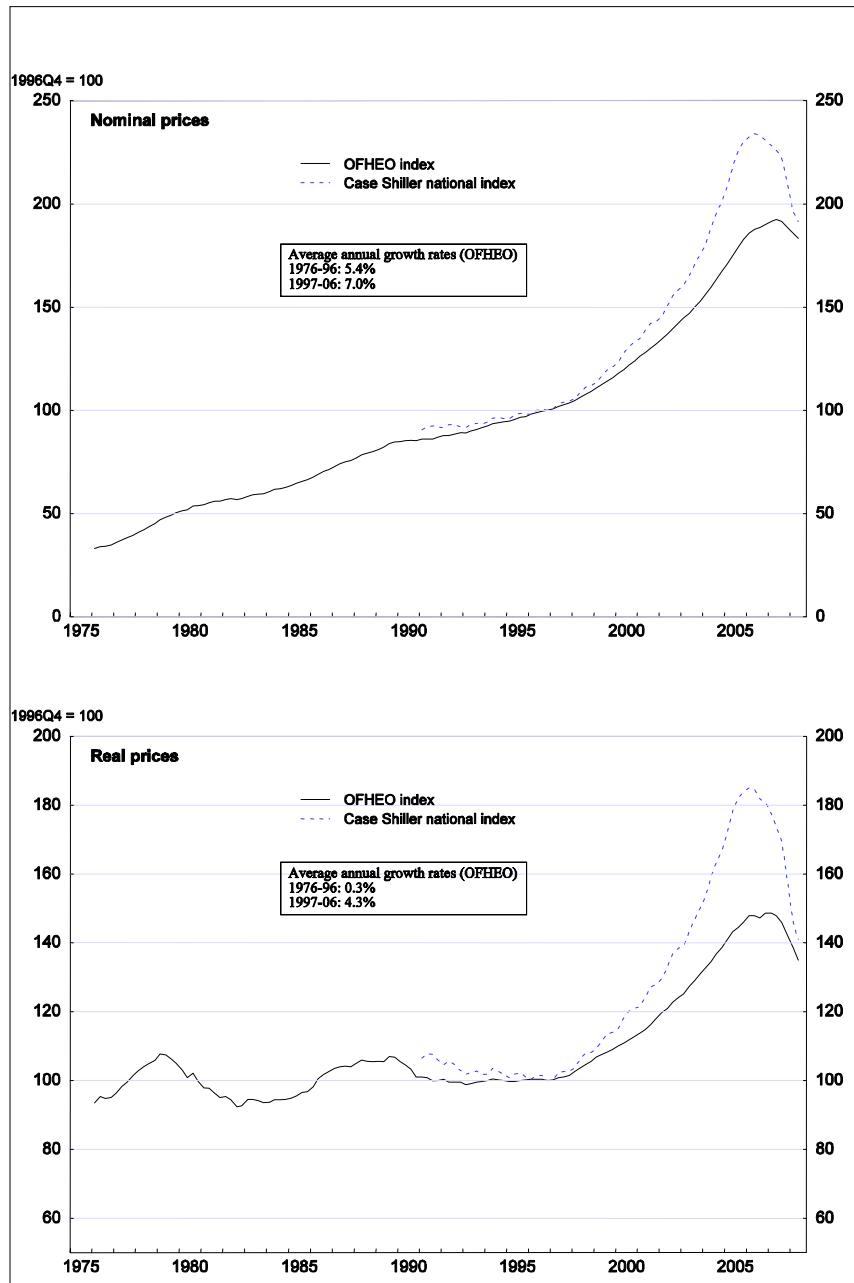
The housing market correction

13. Over time, as housing became less affordable, demand for housing diminished, resulting in an accumulation of unsold homes. In response to the increasing inventory of unsold homes, house prices slowed, starting in mid-2004 in some locations, and then posted outright declines, while residential construction began contracting in early 2006. Available evidence suggests that this adjustment in both prices and quantities was necessary to restore equilibrium in the housing market since prices had almost surely overshot fundamentals, construction activity had absorbed record-high resources from the overall economy and the boom in subprime lending had made possible for too many households to purchase homes beyond their means. As of the third quarter of 2008, real house prices on a nationwide basis (as measured by the OFHEO index) had retreated to their levels at the end of 2005 (Figure 8) and the share of residential construction in GDP has nearly halved from the peaks reached in mid-2005.

14. There was a strong relation between house prices and the performance of mortgages. Rising prices allowed borrowers to refinance and avoid any step up in interest rate that had been built into their mortgage contract and also to roll credit card debt into their mortgage with a lower monthly payment. However, delinquencies began to rise towards the end of 2004, well before the crisis hit and immediately after the house prices slowed, (Baily *et al.*, 2008). And not surprisingly, delinquencies were highest in those areas where house appreciation had previously been stronger (Doms *et al.*, 2007). Delinquency rates on subprime adjustable rate mortgages shot up further in early 2007. The performance of other types of mortgages also worsened, perhaps with the sole exception of fixed-rate loans to prime borrowers

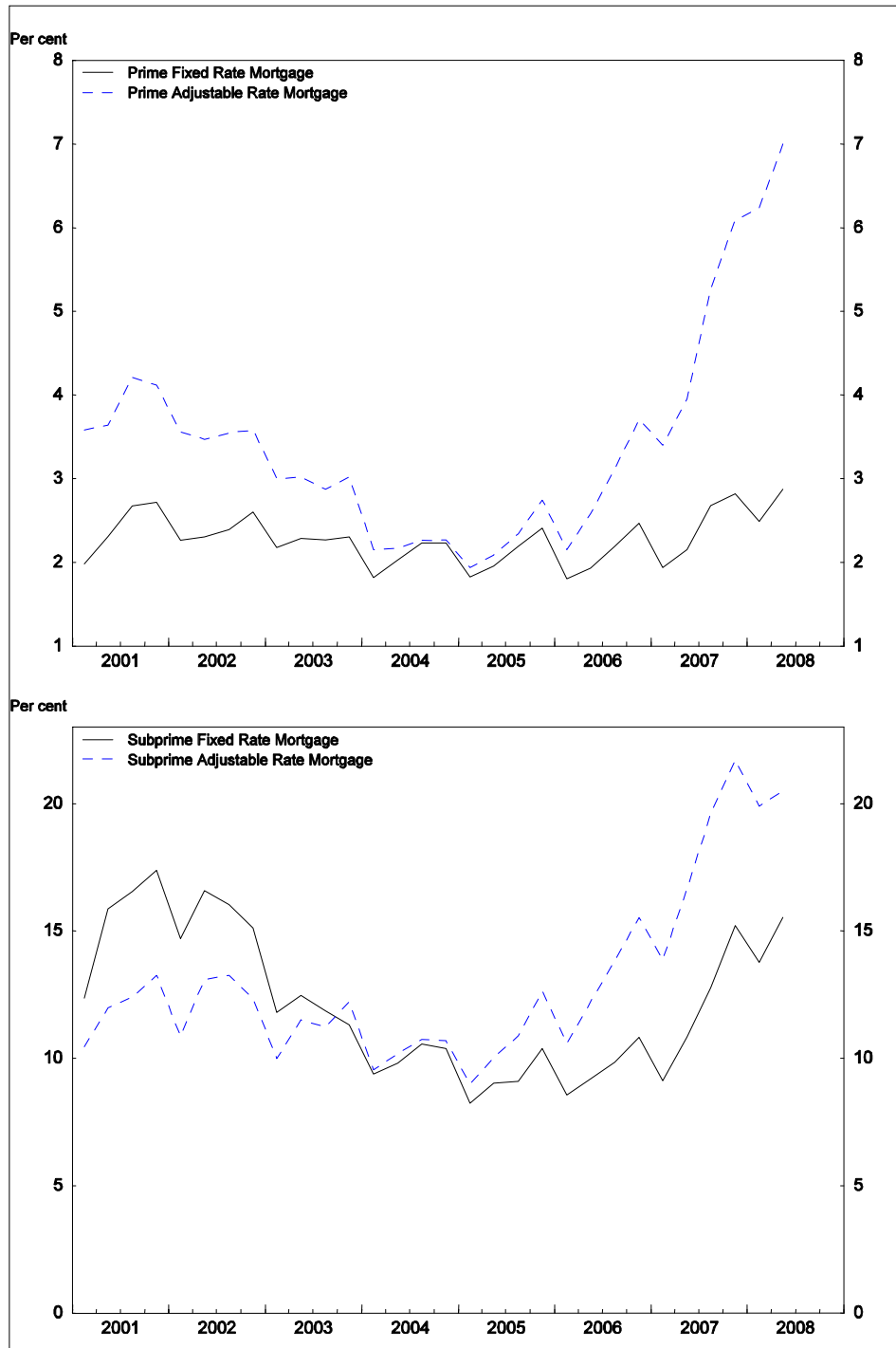
(Figure 9). Higher delinquency rates have led to more foreclosures, which rose from 650 000 in 2005 to 1.3 million in 2007. (Box 2 examines the relation between house prices and the boom in riskier mortgage lending.)

Figure 8. House prices



Source: Office of Federal Housing Enterprise Oversight (OFHEO) and Datastream. OFHEO index is all homes 1976-1990 and purchase-only 1991-2008.

Figure 9. Mortgage delinquency rates



Source: Datastream and the Mortgage Banker Association (MBA) National Delinquency Survey.

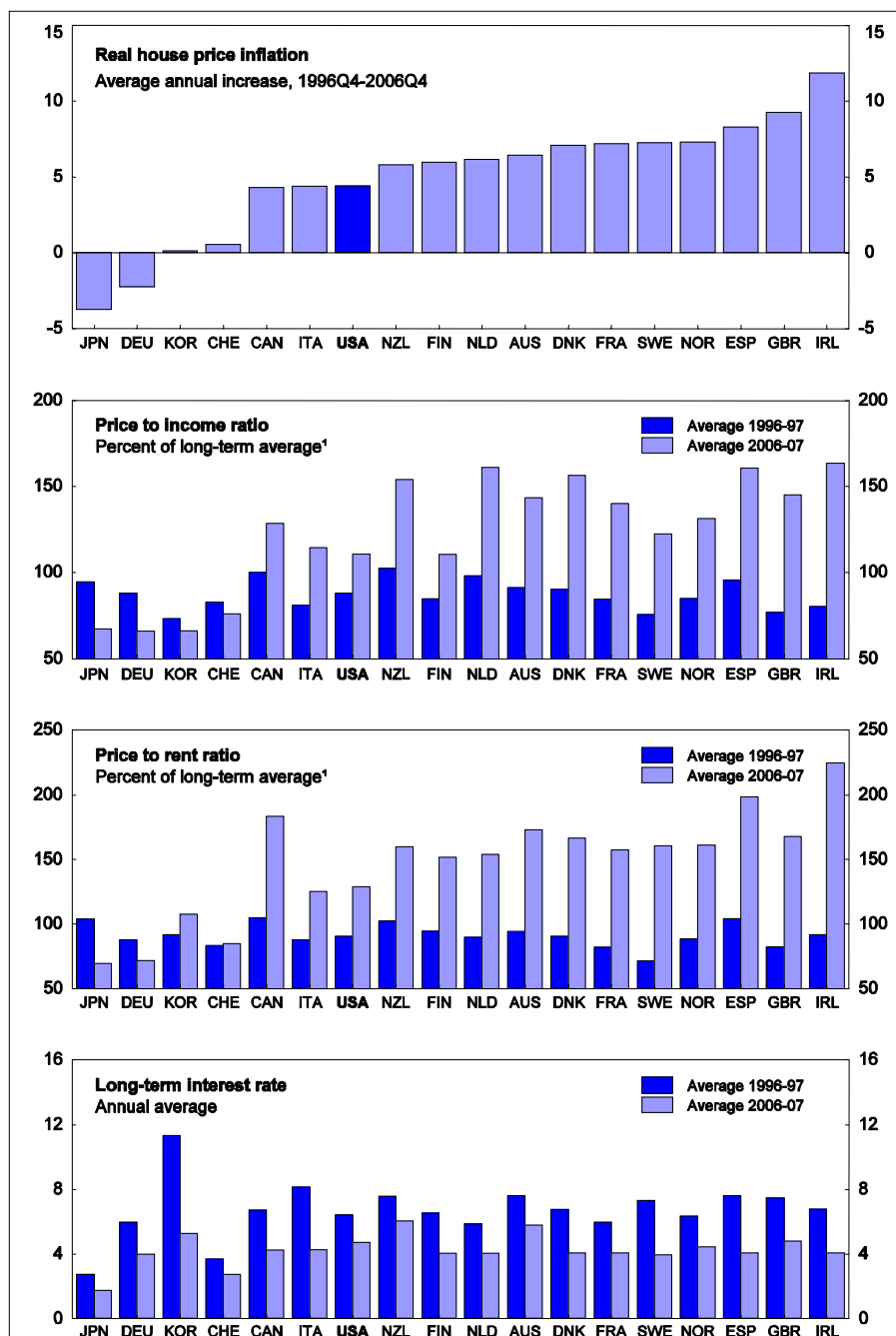
Box 2. Did the boom in subprime lending contribute to the sharp increase in house prices?

The boom in subprime lending over 2003-05 coincided with the period when house prices appear to have risen markedly above fundamentals. It is therefore important to examine the relation between these two developments, and in particular whether the extension of credit to risky borrowers led to undue housing appreciation. However, this question has proved to be difficult to answer. Mian and Sufi (2008) examine it using a very detailed dataset, which allows them to draw inferences across neighbourhoods (ZIP codes) and over time. They find that the largest increases in house prices from 2001 to 2005 and the subsequent sharp rises in defaults from 2005 to 2007 happened in areas that experienced rapid growth in the share of mortgages sold by the lender shortly after origination. These areas were characterised by high "latent demand" in the mid-1990s that is by a high share of borrowers whose mortgage applications had been denied. (Standard explanations for why credit is quantity rationed rather than price rationed beyond a certain point are that further increases in interest rates exacerbate adverse selection (Stiglitz and Weiss, 1981) and moral hazard problems (Diamond, 1991), and therefore would not compensate lenders for the extra risks of such lending). The rapid growth in lending in these areas occurred despite relatively unfavourable income and employment developments. This study concludes that over the period 2001-2007, at least 15% of total home purchase loans and 10% of aggregate house price appreciation in the United States can be attributed to an outward shift in the supply of credit.

Other studies also find evidence but are more guarded about drawing a causal relation from credit expansion to the surge in house prices. Mayer and Sinai (2008) demonstrate that metropolitan areas with higher subprime originations had greater "excess" appreciation in price-to-rent ratios. Mayer and Pence (2008) find that subprime originations appear to have been heavily concentrated in fast-growing parts of the country with considerable new construction, such as Florida and California. These locations saw house prices rise at faster-than-average rates relative to their own history and relative to the rest of the country. However, this link between construction, house prices, and subprime lending is not universal, as other markets with high house price growth, such as the Northeast, did not see especially high rates of subprime mortgage issuance.

Overall, these three studies suggest that house price appreciation was linked to the mortgage credit expansion, and they caution against treating house prices as exogenous to credit conditions. However, the extent to which subprime lending helped to cause this housing boom remains an open question.

In any case, it is important to emphasise that the degree to which house prices rose and probably overshot fundamental values in the United States was not extreme by international comparison (Figure 10). Most countries in the OECD area have also experienced marked house price appreciation since the mid-1990s. This should not be surprising since some of the factors encouraging price appreciation in the United States applied more generally, especially the decline in long-term interest rates. However, the cross-country evidence suggests that the boom in subprime lending, which was a US-specific development (perhaps with a few exceptions such as the United Kingdom), was not the main factor behind the surge in house prices in the United States.

Figure 10. House price developments in selected OECD countries¹

1. The figures here show information through 2007q3.

Source: OECD update of Girouard *et al.* (2006).

Mortgage origination standards deteriorated

15. Delinquency rates on mortgages since mid-2005 rose steeply. Although the weakening of the housing market contributed to this increase, the key factor was increasingly poor underwriting (Bernanke, 2008a). Mortgage lenders layered multiple risk factors – high cumulated loan-to-value ratios, poor credit histories, low documentation of income and assets – in their underwriting practices. More and more, borrowers reputedly provided false information on incomes and assets, with the complicity of mortgage brokers, and those in the MBS issuance chain – mortgage brokers, issuers, credit rating agencies, underwriters and final investors – did not undertake adequate checks. This lack of diligence, together with originate-and-distribute, meant that mortgage brokers were paid for creating mortgages but did not have to bear the costs associated with possible delinquencies. In addition, the share of new mortgages with interest-only or negative amortisation plans rose from about 5% in 2003 to about 25% in the successive three years. Furthermore, over the same period, the share of Alt-A and subprime loans in MBSs with a silent second mortgage – *i.e.*, not disclosed to the first-mortgage lender at the time of origination – increased from less than 10% to over 30%.

Box 3. Are mortgage borrowers walking away from their obligations?

It is often claimed that the link between housing prices and foreclosures is reinforced in the United States since most mortgages are “non-recourse” either by law or in practice. This means that, in case of a default, if the value of the collateral is not high enough to cover the outstanding debt, the borrower is not liable for the difference. In other words, a borrower can choose, perhaps because she holds “negative equity” (*i.e.* the house’s value is less than the amount of mortgage debt), to walk away from her obligations and send the keys back to the lender who would bear the capital losses (so-called “jingle mail”). Therefore, the argument goes, the purchase of a house financed with a high loan-to-value mortgage allowed borrowers to gamble that their properties would appreciate over time without bearing any significant risks. If the argument were correct, this would call for policymakers to allow “deficiency judgements” (*i.e.*, making borrowers personally liable for the unpaid balance of the mortgage when the proceeds of a foreclosure sale are insufficient to satisfy the outstanding debt). However, while this reasoning likely applies to some, this box will argue that the above claim is largely misleading and whether mortgages are non-recourse either by law or in practice will likely have little to do with the rising wave of foreclosure in the United States.

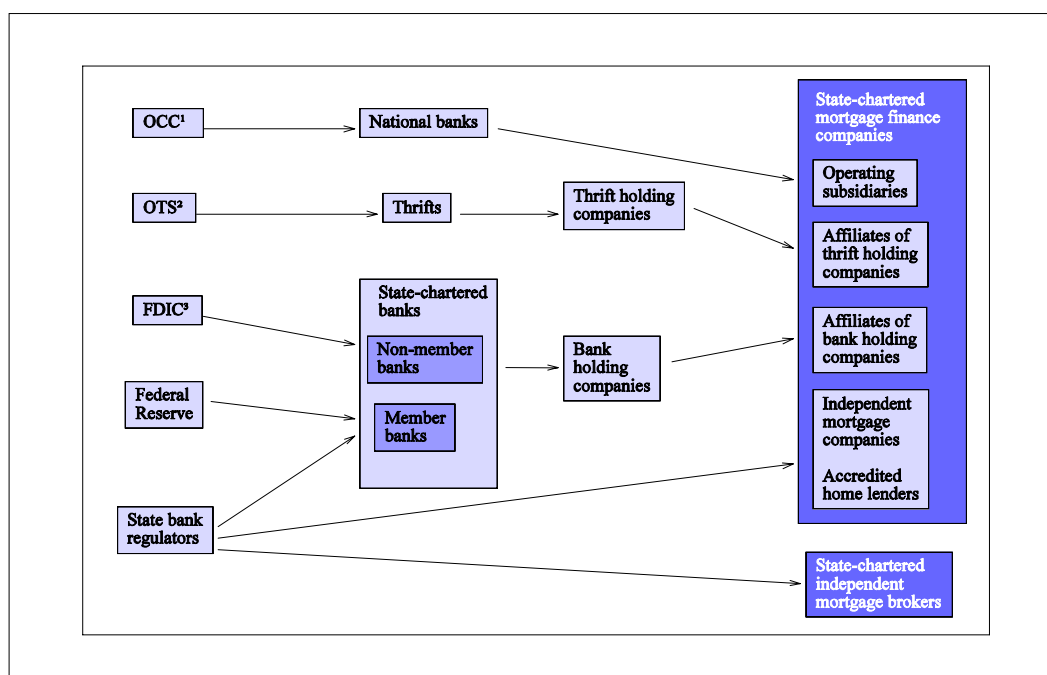
First, it is important to note that almost every state in the United States permits deficiency judgments. Yet, it is true that there are differences across states which can be utilised to attempt identifying the effect of deficiency judgments on mortgage defaults. California, Arizona, Nevada, and Florida provide an insightful case study. California and Arizona forbid deficiency judgments on purchase mortgages – those issued to purchase a property –, but it is possible to get a deficiency judgment on refinancing mortgages – those issued to refinance an existing mortgage – in California and on home equity lines in Arizona. By contrast, all mortgages are recourse-loans in Nevada and Florida. In other words, it is much easier to walk away from a mortgage in the former two states than in the latter two. However, all four states have had the most overheated mortgage markets and reportedly the highest incidence of jingle mail. Given that, there does not appear to be strong support for the claim that states that have had the most problem with mortgage defaults are those that are non-recourse to the borrower.

Second, the claim also fails to recognise that for prime investors the cost of defaulting is not trivial because of the consequences of damage to their credit ratings. Furthermore, it is possible that, even if the borrower is currently under water, the option value of continuing to own the house and pay the mortgage may be positive, since it may be reasonable to believe that the house will appreciate in the future. Indeed, empirical evidence from past episodes suggests that homeowners with negative equities in their houses tend not to walk away, when they can afford the mortgage payments. For example, researchers at the Federal Reserve Bank of Boston have documented that during a specific historical episode involving a downturn in housing prices - Massachusetts during the early 1990s - less than 10% of a group of homeowners likely to have had negative equity eventually defaulted on their mortgages. They therefore conclude that “current fears that a large majority of today’s homeowners in negative equity positions will soon “walk away” from their mortgages are probably exaggerated. [...] This result is also, contrary to popular belief, completely consistent with economic theory, which predicts that from the borrower’s perspective, negative equity is a necessary but not a sufficient condition for foreclosure.” (Foote *et al.*, 2008).

In conclusion, the fact that some borrowers decided “to mail in the keys” does not mean that those who defaulted on their mortgages were trying to game the system. To the contrary, it seems that most of defaulting mortgagors are simply unable to afford the loans and have no other assets. The option of pursuing deficiency judgments probably affects the lenders’ bargaining powers, and thus the amount of concessions (principal and interest rate) that they are willing to grant borrowers, but probably has little effect on the default decision of typical borrowers.

16. This deterioration in credit standards was facilitated by the absence of a coherent regulatory and consumer protection framework. Mortgage origination is regulated and supervised by a complicated array of federal and state authorities (Figure 11). Despite warnings from some sources, none of them was able to stop or mitigate the erosion of lending standards in the mortgage market. The Federal Reserve could have done more to stop the erosion of mortgage lending standards with its admittedly limited powers in this area. In particular, the Home Owner Equity Protection Act (HOEPA) of 1994 gave it the authority to restrict some mortgage offerings. Then Federal Reserve's Governor Edward M. Gramlich warned his colleagues of the decline of lending standards and the dangers that this posed, and proposed changing HOEPA regulation to bring about half of subprime mortgage origination under stricter supervision (Gramlich, 2007a). Furthermore, in 2005, a consumer advisory board, during a regular briefing, brought to the attention of the Federal Reserve's governors concerns about the problems emerging in the mortgage markets (Baily *et al.*, 2008). Stronger action could perhaps have significantly reduced the amount of bad lending. (Box 4 explains why loose monetary policy over 2003-2005 only played role in the formation of the crisis.) State regulators also could have done more, since many of the worst lending practices happened in state regulated institutions.

Figure 11. Existing regulatory and supervisory structure for mortgage origination



1. Office of the Comptroller of the Currency.
2. Office of Thrift Supervision.
3. Federal Deposit Insurance Corporation.

Source: Treasury (2008a).

Box 4. The role of monetary policy

Although some observers have noted that the low level of the federal funds rate from 2003 to 2005 contributed to a credit boom, there is reason to believe that the conduct of monetary policy had only a subsidiary role in the formation of the crisis. First, one important reason why interest rates remained low in the United States and around the world was the so called "global savings glut", that is the supply of savings has been large relative to the demand for investment funds. Indeed, long term rates continued to decline even after the Federal Reserve began to tighten policy in June 2004, which then Chairman Alan Greenspan famously regarded as a conundrum (Greenspan, 2005). Second, even with hindsight, it appears that the actual monetary stance was only a bit looser than what would have been optimal. Using the multipliers of the Federal Reserve's large scale econometric model (FRB/US), Elmendorf (2007) calculates that if the federal funds rate had been only 50 basis points higher from the second quarter of 2004 through

the third quarter of 2006, the unemployment rate would have been near 5% (the OECD estimate of the NAIRU) and core inflation close to 2% (a typical target for US inflation). In short, under this alternative scenario, a slightly tighter monetary stance would have produced a nearly optimal economic outcome, both in real and in nominal terms. It is hard to say what the effects of this extra tightening would have been, but it is unlikely that this small adjustment in financial conditions would have any noticeable effect.

By contrast, the failure of regulatory policy to properly take into account the implications of financial innovation and the global savings glut almost surely played a major role in determining the financial situation. Regulators, including the Federal Reserve, do not seem, at least with hindsight, to have fully appreciated the risks involved in the credit boom. In sum, the main policy challenge for the US authorities is to address these regulatory failures rather than re-think the conduct of monetary policy.

The unfolding of the global financial crisis

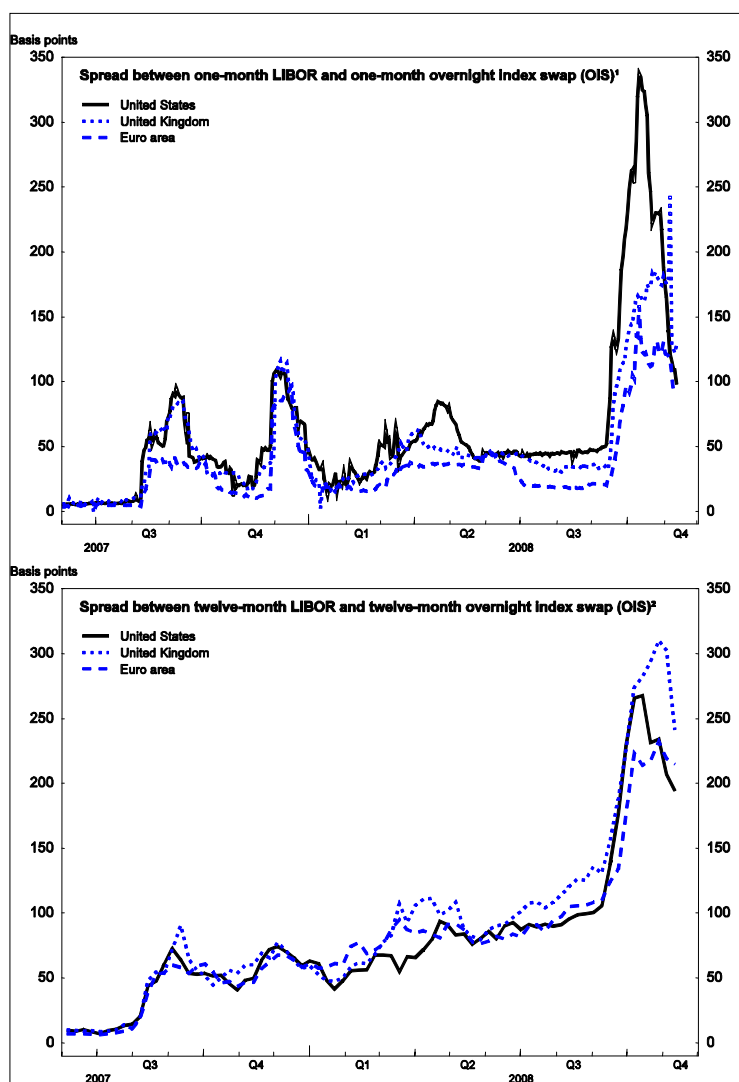
17. The deteriorating performance of subprime mortgages was the main trigger of a global financial crisis, which saw a sudden re-pricing of credit risks, large losses on securitised mortgage loans, a massive drying up of bank liquidity, shortfalls of equity capital in large financial institutions and a series of financial difficulties that are still unfolding. In mid-2007, a handful of hedge funds linked to investment and commercial banks in the United States and in Europe reported that they incurred heavy subprime-related losses. Investors then realised that subprime MBSs were much riskier than supposed, and certainly much riskier than indicated by their credit ratings. Financial firms worldwide were encouraged to question the value of a variety of collateral they had been accepting in their lending operations – and to worry about their own finances. The result was a sudden hoarding of cash and cessation of inter-bank lending, which in turn led to severe liquidity constraints on many financial institutions.

18. Despite the prompt and aggressive response of many OECD central banks, including the Federal Reserve and the European Central Bank, which injected large amount of liquidity in the financial system, conditions did not return to normal. The interbank lending market, in particular, came under considerable stress. US commercial bank borrowing exceeds \$2 trillion and, to retain flexibility, most of this is short term. As a result, if a bank suddenly cannot borrow to roll over its short-term debt, problems arise. Distress in interbank lending market is evident from the behaviour of the London Inter-Bank Offer Rate (LIBOR), which is based on uncollateralised loans between banks, and is a key interest rate used to price various consumer and business loans, including various kinds of mortgages. The tension on the interbank market can be measured by the LIBOR spread, the difference between the three-month fixed-rate LIBOR and the expected interest rate that would accrue from repeatedly rolling over a loan at the overnight federal funds rate for three months, known as an Overnight Indexed Swap or “OIS” (Figure 12). The LIBOR spread is typically less than 10 basis points, but on 9 August 2007 it jumped to 40 basis points. Since then, it has remained unusually high and, at times, has fluctuated widely, surging to over 300 points in September and October 2008. These developments clearly indicated that banks believed that there were significant new risks in lending to other banks. Another sign of stress and a second symptom of the financial crisis comes from looking at the average difference between the yields of securities issued by Fannie Mae and Freddie Mac and US Treasury securities of equivalent maturity. In August 2007 this gap doubled from its typical range of 15 to 25 basis points to more than 40 basis points, and, as the crisis later intensified, it surged to more than 100 basis points. Moreover, as market participants adjusted upwards their assessment of risk, spreads increased in many other markets, such as on the market for investment-grade corporate bonds and high-yield bonds (Figure 13).

19. Hence, after affecting the institutions holding large amounts of subprime MBSs, the financial crisis spread to other segments of the financial system over the next year. In late 2007 some monoline insurers, so called because they specialise in the business of credit default insurance for MBSs, posted large losses in relation to their capital. This led to their credit ratings being downgraded, which also reduced the value of the insurance cover they provided, leading to further losses on MBSs. The problems of monoline insurers also caused difficulties in the municipal bond and student loan markets.

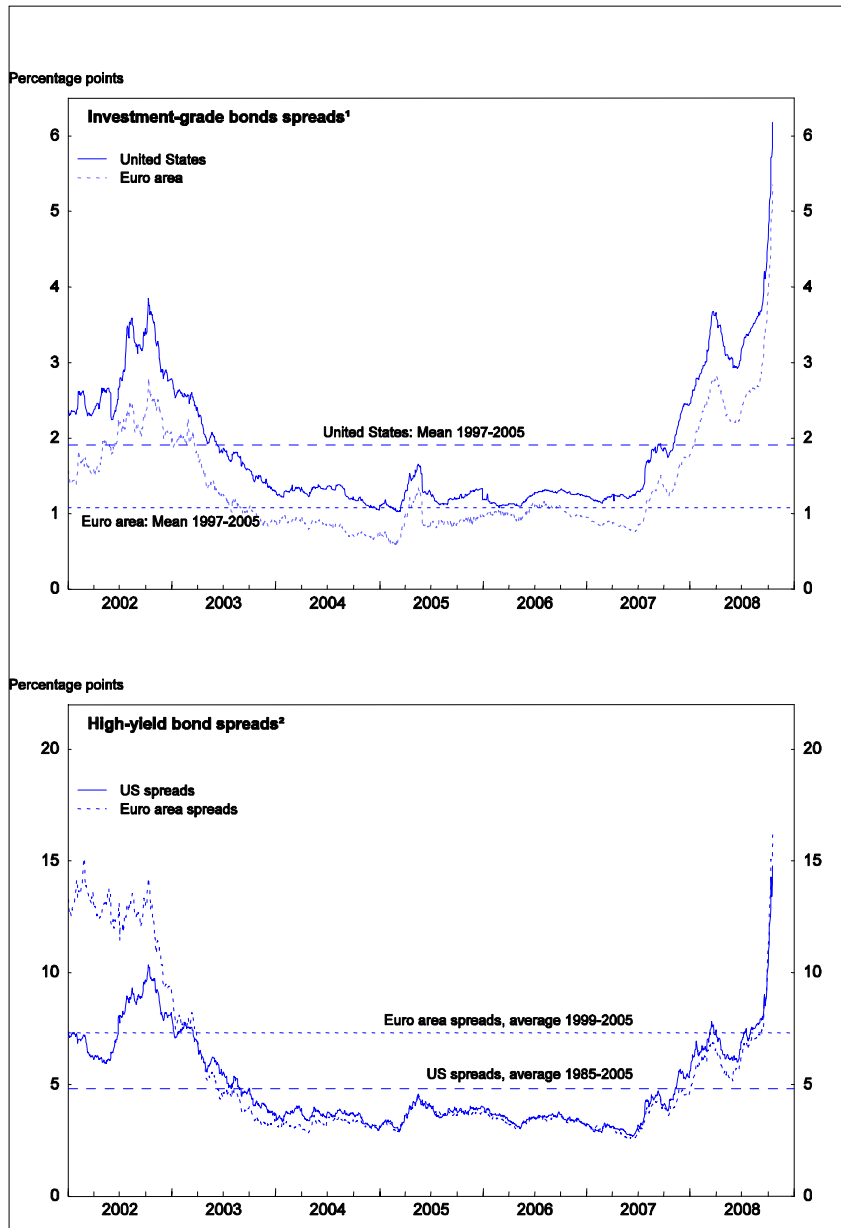
20. In mid-March 2008, a major investment bank, *Bear Stearns*, was pushed to the brink of failure after suddenly losing access to short-term financing markets. A bankruptcy filing would have forced the secured creditors and counterparties of Bear Stearns to liquidate the underlying collateral. Given the illiquidity of markets, those creditors and counterparties might well have sustained substantial losses. The US authorities judged that a disorderly failure of Bear Stearns would have threatened overall financial stability, and the Federal Reserve provided special financing to facilitate the acquisition of Bear Stearns by JPMorgan Chase, a large commercial bank.

Figure 12. Interbank market spreads



1. Daily data.
 2. Weekly data.
- Source: Bloomberg.

Figure 13. The rise in bond spreads



1. Merrill Lynch corporate BBB rated bonds. Spreads based on average yields for 5-7 years and for 7-10 years.
2. Spreads of high-yield bonds (Merrill Lynch indices) over government bond yields (10-year benchmark bonds).

Sources: Datastream, Moody's, OECD calculations

21. In July 2008, the share prices of *Fannie Mae* and *Freddie Mac* dropped sharply as concerns mounted both about their losses and longer-term profitability and about the prospects for earnings dilution given the considerable new capital that they might have to raise. While the two GSEs were not involved directly in the subprime meltdown, their portfolios had substantial holdings of nonconforming and also subprime MBSs, especially relative to the small capital reserves that they were required to hold. In response to these developments, as a supplement to the Treasury's existing limited authority to lend to the GSEs, the Federal Reserve established a temporary arrangement to extend credit to Fannie Mae and Freddie Mac. Furthermore, Congress enacted legislation temporarily giving Treasury unlimited authority to purchase common stock and debt securities issued by the GSEs. However, these actions failed to restore

confidence on the Fannie Mae and Freddie Mac, and, on 7 September 2008, the Federal Housing Finance Agency, their new single supervisor, put them into conservatorship, essentially taking full control of both enterprises. In addition, Treasury, on the authority recently granted by Congress, made financial support available to the two GSEs. In exchange, the federal government was given an 80% stake in the two enterprises and their top management was replaced; in contrast to bond holders, who were bailed out.

22. The Federal Deposit Insurance Corporation (FDIC), a government-owned company that provides insurance on deposits in member banks, had to use its receivership powers in July to take over *IndyMac Bank*, a medium-sized bank headquartered in California, which was on the brink of bankruptcy as credit losses on mortgages has depleted its capital base. In September, the Office of Thrift Supervision seized *Washington Mutual*, the sixth largest commercial bank in the United States (more precisely, Washington Mutual was a savings bank holding company and the former owner of Washington Mutual Bank, which was the US largest savings and loan association), and placed it into the receivership of the FDIC. With \$307 billion in assets, Washington Mutual is the largest commercial bank failure in US history. Furthermore, over the course of 2008, the FDIC had to intervene to rescue several other smaller banks, and it estimated that the combined cost of three operations may put a significant dent into its \$53 billion federal deposit insurance fund. Finally, the FDIC, together with the Federal Reserve, also played a pivotal role in late September and early October to facilitate the merger between two major banks, Wells Fargo and Wachovia, in order to prevent the bankruptcy of the latter, which once was the fourth largest US commercial bank.

23. The month of September witnessed further disruptions. First, *Lehman Brothers*, a major investment bank with more than \$600 billion in debt, filed for bankruptcy, marking the largest corporate failure in US history. In contrast to what happened with Bearn Stearns, it appears that the failure of Lehman Brothers was unavoidable since no private-sector solution was available and no public-sector solution was feasible, since both the Federal Reserve or the US Treasury reportedly lacked the authority for a rescue operation which would likely resulted into “billions of dollars of expected losses” for the taxpayers (Bernanke, 2008b). The day after the collapse of Lehman Brothers, the Federal Reserve extended a \$85 billion loan to *AIG*, the world’s largest insurance company, in order to prevent what was considered a “disorderly failure [that] would have severely threatened global financial stability and the performance of the US economy” (Bernanke, 2008b). The US authorities judged that AIG's assets adequately secured the loan. Furthermore, in order to protect US taxpayers and to mitigate moral hazard risks, the terms of the credit extended to AIG imposed significant costs and constraints on the firm's owners, managers, and creditors. In November, the government support to AIG was raised to about \$150 billion.

How relatively small credit losses triggered a financial crisis

24. The unfolding of the crisis since August 2007 has resulted in considerable losses for the financial system. In large part, the size of the losses can be attributed to the fact that the holdings of MBS were lightly capitalised. As discussed in Box 5, the multiplication of new financial structures permitted an unprecedentedly high degree of leverage to fund MBS holdings. Available estimates suggest that total losses and write-downs may run up to \$3 trillion, about half of which incurred by US financial institutions (among others, see Deutsche Bank, 2008b). While even \$3 trillion may appear relatively small relatively to the size of global or even US financial markets, the key issue is that the incurred losses are not small in comparison to the size of the capital of financial institutions and therefore may significantly impair the availability of credit to households and firms as financial firms attempt to reduce their assets in order to repair their balance sheets. This process of re-calibrating the holding of assets to the reduced capital is known as *deleveraging*. Furthermore, it should be recognised that the subprime meltdown triggered what has been called a “*global margin call on virtually all leveraged positions*” (Warsh, 2008). As the assets held by financial institutions typically have longer maturities than their liabilities, the resulting increase in the discount factor led to a further decrease in the capital base of these firms – the net worth a financial

institution is the present discounted value of the difference between its future revenue and expenditure streams. The liquidity crisis thus suddenly brought an end to the credit boom that preceded it, as a striking loss of confidence in credit ratings and an accompanying revaluation of risks led investors to pull back from a wide range of securities, especially structured credit products. Along the way, the complex and opaque nature of many structured products was revealed and dangerous flaws in the business model of many large financial institutions were exposed.

Box 5. Holdings of mortgage-backed securities were financed with highly complex and leveraged structures

Many mortgage-backed securities were funded by other structures called collateralised debt obligations (CDOs), which held Alt-A and subprime mortgage-backed securities (MBS) as collateral. These CDOs were ultimately held by a wide range of investors and financial institutions. And the more recent CDOs were themselves frequently backed by structured securities, resulting in so-called *two-layer securitisations*, in which structured products were used to fund other structured products. These two-layer securitisations are inherently more complex and opaque, and are more exposed to tail risk than their earlier one-layer counterparts. These tail risks generate a distribution of returns on the more senior tranches of two-layer securitizations that has been referred to as *cliff effect* (Joint Forum, 2008). Simply put, the cliff effect refers to the fact that investors of senior tranches of complex securities can expect to receive a small positive return in most circumstances, but they are vulnerable to extremely large losses in those rare events when the performance of a large share in the pool of underlying assets deteriorates.

An additional factor explaining the spreading of losses was that MBSs and CDOs were often sold to special investment vehicles (SIV). SIVs may be thought of as a virtual bank financing their holdings by issuing short-term securities, often commercial paper backed by those same MBS and CDOs, which need to be rolled over constantly. As the market for short-term liquidity dried up and the value of MBSs and CDOs dropped, investors, especially money-market funds, stopped buying paper issued by SIVs. This obliged SIVs either to default or draw on their credit lines with banks. This development exposed banks to SIV risks. In some cases, banks, which had previously sponsored the creation of these SIVs, also took SIV assets back onto their own balance sheets in order to protect their reputations and perhaps avoid lawsuits. SIVs were initially supposed to be separate from the banks that had sponsored them, constituting a “clean break” from a bank’s balance sheet as defined by the Basel II Accord, hence not adding to the banks’ reserve requirements. Indeed, most SIVs were explicitly created to circumvent capital requirements, which would have lowered their ability to leverage and thus lower profitability. It is now however clear that SIVs were not remote from the risk of bankruptcy and that while they generated large profits in the past they are now responsible for part of the losses that the financial system is incurring.

In conclusion, holdings of MBSs were often supported by complex structures, which were highly exposed to tail risks and funded through extreme maturity transformation. With hindsight at least, it should therefore not be surprising that when, unexpectedly, the performance of the assets backing these MBSs sharply deteriorated, these structures collapsed, resulting in large losses for those financial institutions that had sponsored them.

Investors and credit rating agencies underestimated the risks

25. In response to the greater financial complexity that developed in recent years, it seems that many investors relied heavily on credit rating agencies to properly evaluate the new structured securities, rather than demanding information and transparency. In many cases, it seems that they purchased complex instruments knowing little about the underlying assets. Instead, investors took comfort in the diversification inherent in the underlying mortgage pool and in the various credit enhancement techniques applied by to the higher tranches. The belief that the higher tranches were not particularly risky was supported by the high credit ratings. Moreover, in the significant housing market downturns of the late 1970s and the late 1980s, home prices nationwide had slowed significantly, but had not decreased in nominal terms. With nominal home prices having fallen over the past couple of years in many parts of the United States, the credit risk in the pools of mortgage-backed securities turned out to be much more correlated than previously assumed.

26. In retrospect, however, credit rating agencies (CRA) made major errors of judgement in rating these securities. They did not check the underlying borrower data, assuming that mortgage originators had already done so. The high credit ratings that were awarded on the senior tranches of collateralised debt obligations (CDOs) were overly influenced by the low default rates in the past, when issuance of subprime mortgages occurred less through this securitisation model and there was more restricted access to such mortgages. In other words, the CRAs seem to have overly relied on the fact that housing prices had never fallen nationally and to have ignored the substantial fall in quality of creditors to Alt-A and subprime mortgages. This led the CRAs to underestimate the correlation between defaults in non-prime mortgages (Ashcraft and Schuermann, 2008).

Prudential regulations and investor mandates contributed to the demand for structured products

27. It was attractive for banks and other large investors (such as pension funds) to invest in the investment grade tranches of structured products because yields were slightly higher than on other highly rated securities, whereas for purposes of risk weightings required by capital adequacy rules for banks (and investment mandates for pension funds) they were treated the same. For example, AAA rated assets are risk-weighted at 25% if they are to be held long term, whether or not they are structured products. Moreover, for banks, structured products could reasonably be held in the trading account, with a view to eventually selling them. These allowed banks to maintain relatively little capital against the holdings, since risk weightings for assets held in trading accounts were low, being based on the results of modelling value at risk, which had been very low up until mid-2007. By contrast, traditional loans and other long-term investments could not reasonably be held in the trading account and so attracted higher risk weightings.

Structured finance was highly profitable

28. Creating structured products out of mortgage-backed securities (MBS) was highly profitable. The main source of profit came from the senior tranches of structured products because of the high fees investors were willing to pay. Special investment vehicles (SIV) were also profitable because they could use cheap short funding to some extent to finance the MBS on the asset side of their balance sheets. Such off balance sheet intermediation had the advantage for banks of attracting much lower capital requirements than on-balance-sheet intermediation. Remuneration arrangements in banks (both commercial and investment) also encouraged excessive risk taking because managers and traders shared fully in the profits from high-risk strategies but did not fully share in the losses insofar as they only occurred some years later. The problem is that remuneration arrangements did not claw back past performance-related payouts when they were revealed through subsequent large losses.

Section 2: Short-term crisis resolution

29. The spreading of losses through the system and the associated depletion of capital has put several financial institutions under pressure. Most of the losses divulged by financial institutions are based on mark-to-market valuations, rather than actual defaults, and it is highly uncertain how write-downs in an illiquid market will compare with the ultimate losses. In any case, asset write-downs imply a sharp depletion of regulatory capital. In addition, another important source of funding and balance sheet pressure was that mortgage lenders ended up having to fund a sizeable volume of loans that had been intended for securitisation or off-balance sheet funding. In response, financial institutions have raised fresh capital, but additional losses announced on a recurrent basis have made the process of raising capital increasingly more difficult. In the second half 2008, the crisis spread to regional banks which, in contrast to the larger financial institutions, had remained relatively immune to the stress in financial markets. These banks have relatively high exposures to home equity loans and especially commercial mortgages, both of which have shown some signs of difficulties lately and are to a greater extent held on the originators' books rather than being securitised. Given that raising new capital may be expensive and difficult in current circumstances, a

significant amount of deleveraging, *i.e.*, reduction of debt through the rapid sales of assets, is to be expected. This will weigh on lending growth and could even result in a credit crunch. Thus, authorities are likely to face further tough challenges. In this section, short-term policy responses are discussed to: *i)* facilitate an orderly adjustment of the housing market; *ii)* resolve the drying-up of liquidity in the interbank market; and *iii)* deal with the risk of bankruptcy of financial institutions.

Coping with the wave of house foreclosures

30. The number of house foreclosure started to increase in 2007 and is likely to remain high into 2009, reflecting the decline in house prices, which put a growing number of borrowers “under water”, *i.e.* pushed them into a position of negative equity in their house. (While, as previously discussed in Box 3, it appears unlikely that most borrowers with negative equity will default on their mortgages as long as they can afford it, the lack of refinancing opportunity in combination with rapidly deteriorating labour market conditions is expected to result in many additional foreclosures). The wave of foreclosures adds to the inventory of unsold homes and, in turn, puts house prices under negative pressure, which weakens banks’ asset position still further. The result could be a downward spiral and additional recessionary pressures. Yet, price declines appear to be a necessary part of the market adjustment as the bubble deflates. Thus, measures sufficient to prevent avoidable foreclosures and facilitate orderly loan reductions, but not so large as to prevent needed adjustment, are the focus of the planned actions by the Administration and Congress.

31. The authorities have taken a number of steps to encourage voluntary agreements between lenders and distressed borrowers. Most notably, public funds have been made available to support mortgage counselling, which has been successful in the past (Gramlich, 2007b). The Administration also brokered a voluntary agreement, the “HOPE NOW” alliance, between mortgage servicers and other industry participants to put some adjustable-rate mortgage borrowers on a “fast track” to modifications that would maintain the initial low mortgage interest rate for five more years. Further measures should be considered to encourage orderly loan workouts, notably to facilitate the restructuring of an existing mortgage when a homeowner owns a house that is affordable but has a wrong mortgage.

32. However, significant legal impediments stand in the way of voluntary loan restructuring. In many cases, the ability to help distressed borrowers first requires coordination and agreement between the holders of the first and second mortgages. For instance, to avoid the costly foreclosure process, the first-mortgage holder may have an interest in reducing the payment obligation of the borrower. Since the priority of mortgages generally follows the order in which they were recorded, the second mortgage must be re-subordinated (or repaid in full) to the new first mortgage. The second-mortgage holder, however, may withhold her consent to re-subordination to bargain with both the homeowner and the first-mortgage holder. One contribution that policymakers can make is to help design a standard package for restructuring mortgages that indicates, among other things, how to distribute losses among first- and second-mortgage holders. Such a package, even if it does not involve any federal funding, could be useful by reducing the number of decisions that need to be made in a loan restructuring, speeding up the process, and by helping to gain assent from second-mortgage holders. In any case, policy makers should be careful not to distort incentives excessively and should be aware that undue pressure on second mortgage-holders will ultimately raise interest rates on future credit transactions and thereby harm future borrowers.

33. In the last quarter of 2007, the Administration launched a new programme called “FHASecure” authorising the Federal Housing Administration (FHA) to guarantee refinancing to adjustable-rate borrowers who are delinquent on their payments due to an interest-rate reset and who had been timely on their payments for the six months prior to the reset. This initiative has been generally praised for its cost effectiveness and the US authorities estimate that it has helped nearly 300 000 households to refinance over period up to August 2008. Furthermore, along with the legislation enacted in July 2008 to support Fannie Mae and Freddie Mac, Congress has enacted a new “Hope for Homeowners” initiative which has

expanded the eligibility for FHA-guaranteed loans in order to help more households refinance their mortgages when they have negative equity in their homes. The measure has several merits. First, it provides an effective incentive for lenders to reduce principal amounts 10% below the currently appraised values. Second, it is designed to restrict eligibility to those borrowers who are owner-occupiers and satisfy solid underwriting standards. This should ensure that the new loans can be guaranteed at relatively low cost to taxpayers. Third, it limits the risk to taxpayers and possible budgetary transfers as it requires that borrowers have to pay for the FHA insurance and have to share equally with the FHA the new equity and any future appreciation. Nonetheless, the legislation may involve larger public funds than planned as, for example, plans to impose a fee on the government-sponsored enterprises to cover some of the costs may turn out to be unfeasible. Furthermore, while the legislation is carefully designed, it is also complex and its implementation is likely to be difficult. For instance, it is not clear that mortgage servicers have the financial incentives and are properly staffed to handle the wave of bad loans. Last the legislation is in essence a large-scale scheme to bail out distressed borrowers, and as such it may generate undesirable moral hazard problems.

34. In November 2008, the US authorities announced a new plan allowing qualified mortgage borrowers to get reduced interest rates or longer loan terms to make their payments more affordable. To qualify, borrowers have to be at least three months behind on their mortgages and have to owe ninety per cent or more than the home is worth. Investors who do not occupy their homes are excluded, as well as borrowers who have filed for bankruptcy. The plan establishes a streamlined modification program, which requires less documentation and less processing. More specifically, the streamlined modification seeks to create a monthly mortgage payment that is sustainable for troubled borrowers by targeting a 38 per cent benchmark ratio of housing payment to monthly gross household income. While the plan is clearly a step in the right direction, some observers, including FDIC chair Sheila Blair, are sceptical whether it will deliver a much needed wide-scale modifications of distressed mortgages. Since the plan applies only to loans that Fannie Mae and Freddie Mac own or guarantee, the effected mortgages represent only 20 per cent of outstanding delinquent loans. Hence, for the plan to effectively contain the mounting wave of foreclosures, other industry participants, including portfolio lenders and representatives of private label security investors, ought to readily and rapidly adopt the streamlined modification program as the industry standard.

The Federal Reserve's interventions to support market liquidity and stabilise financial market conditions

35. In addition to aggressive cuts in interest rates, the Federal Reserve took a number of unprecedented steps to provide liquidity. Notably, it has introduced several new liquidity facilities since December 2007 (Box 6). The two auction facilities, the Term Auction Facility (TAF) and the Term Securities Lending Facility (TSLF), were devised to efficiently provide liquidity support to depository institutions and primary dealers, respectively. They provide several advantages relative to the traditional discount window (DW). First, they are dynamic – the results shift from auction to auction – and the information obtained through the auction process facilitates price discovery and helps policymakers assess market conditions and sentiment. Second, the auctions appear to have resolved the “stigma” problem since funds are not available immediately, making these facilities a source of funding for an entity that was in desperate shape. (Stigma is the word used to describe the unwillingness to use a liquidity facility because of fears that such use could send an adverse signal about the health and viability of the borrower.) Another advantage of auctions is that they do not create uncertainty about the amount of liquidity provided making it easier to target the federal funds rate. The Primary Dealer Credit Facility (PDCF), on the other hand, is a standby facility, akin to the DW, designed to provide reassurance to market participants that sound primary dealers have access to backstop sources of liquidity. But the actual amount of funds advanced through these facilities is likely to be limited in most circumstances. In the second half of 2008, as the financial crisis intensified, the Federal Reserve further expanded the set of liquidity facilities. First, it greatly

expanded the currency swap agreements (which were first set up in December 2007) with a number of foreign central banks in order to alleviate the demand for US dollars in the global financial markets. Second, it established a series of new facilities to support the markets for commercial paper and money market mutual funds.

36. A key question is whether the new lending facilities have improved the functioning of the interbank market. The LIBOR spread has remained elevated, although the launch of each facility was associated with a narrowing. A recent study found no evidence that the TAF auctions have had a statistically significant effect on term funding (Taylor and Williams, 2008), but its finding can be reversed with minor specification changes (McAndrews *et al.*, 2008). The TSLF has been less controversial since it clearly provided liquidity to institutions that needed it. Furthermore, a second goal of the TSLF was to reduce the premium paid to hold mortgage-backed securities relative to Treasuries, and, also on this count, it seems to have been effective (Fleming *et al.*, 2008.).

37. Perhaps, scepticism towards the auction facilities arises from the fact that they were initially intended to change the composition of the Federal Reserve's assets while leaving the quantity unaffected. A widespread belief, built on past experiences, has been that changes in the composition of the Fed's assets have little or no real effect. But during fall 2007, Federal Reserve's officials became aware that while well established mechanisms existed for injecting reserves into the financial system, officials had no way to guarantee that the reserves would reach the banks that need them. In the United States, standard open market operations put reserves into the hands of a small number of primary dealers, but this does not mean that the funds will then be distributed across the banking system. The TAF was designed to ease this problem, helping specific institutions having liquidity problems mainly by extending out the maturity spectrum (Cecchetti, 2008).

38. The decision to extend backstop facility to primary dealers through the PDCF has generated greater debate. Following the near bankruptcy of Bear Stearns, which was subject to a sudden "run" from its creditors, it became clear that short-term funding that characterise lender-of-last-resort operations should be extended beyond commercial banks, at least when financial markets are not functioning normally. Furthermore, the PDCF, like the TSLF, helped reducing the interest-rate spreads between the asset-backed securities and Treasury securities, thereby improving the ability of investors to buy and sell asset-backed securities in financial markets.

Box 6. The Federal Reserve's new liquidity operations

For depository institutions (commercial banks), the Term Auction Facility (TAF) was launched in December 2007. This is a complement to the Primary Credit Facility, often referred to as the Discount Window (DW). In the TAF, short-term loans are auctioned by the Federal Reserve currently on a weekly basis in single-price auctions. Any sound depository institution with suitable collateral can participate. In order to protect the taxpayers, only depository institutions that are sound and are expected to remain sound for the term of the loan are allowed to participate. A summary of the terms of the two facilities available to depository institutions—the TAF and the DW—are shown in Table 1. Furthermore, in September 2008, a more limited forward TAF auction program was introduced to assure market participants that term funding will be available over year-end. At the time of writing, two auctions were scheduled to take place in November for a total of \$150 billion.

Table 1. Forms of Federal Reserve Lending to Financial Institutions

	Regular Open Market Operations (OMOs)	Single-Tranche OMO Program	Discount Window ¹ (DW)	Term Discount Window Program	Term Auction Facility (TAF)	Primary Dealer Credit Facility (PDCF)	Transitional Credit Extensions	Reciprocal Currency Arrangements
When was measured announced?		March 7, 2008		August 17, 2007	December 12, 2007	March 16, 2008 ²	September 21, 2008	December 12, 2007 ³
Who can participate?	Primary dealers	Primary dealers	Depository institutions	Primary credit-eligible depository institutions	Primary credit-eligible depository institutions	Primary dealers	US and London broker-dealer subsidiaries of Goldman Sachs, Morgan Stanley, Merrill Lynch	Select central banks to lend on to bank in their jurisdiction ³
What are they borrowing?	Funds	Funds	Funds	Funds	Funds	Funds	Funds	US Dollars
What collateral can be pledged?	US Treasuries, agencies, agency MBS ⁴	US Treasuries, agencies, agency MBS, but typically agency MBS	Full range of Discount Window collateral	Full range of Discount Window collateral	Full range of Discount Window collateral	Full range of collateral from tri-party repo system ^{5,6}	Full range of Discount Window collateral and tri party repo system collateral ⁶	Central banks pledge foreign currency and lend against eligible collateral in their jurisdiction
Is there a reserve impact?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
What is the term of loan?	Typically, term is overnight – 14 days. ⁷	28 days ⁸	Typically overnight, but up to several weeks ¹⁴	Up to 90 days ⁹	28 days or 84 days ^{8,10}	Overnight	Overnight	Overnight to 3 months
Is prepayment allowed if term is greater than overnight?	No	No	Yes	Yes	No	N/A	N/A	No
Which Reserve Banks conduct operations?	FRBNY	FRBNY	All	All	All	FRBNY	FRBNY	FRBNY
How frequently is the program accessed?	Typically once or more daily	Typically weekly	As requested (standing facility)	As requested (standing facility)	Every other week, or as necessary ¹¹	As requested (standing facility)	As requested (standing facility)	Typically on schedule with FRBNY TAF auctions or as requested by central banks
Where are statistics reported publicly?	Temporary OMO activity ¹²	Temporary OMO activity ¹²	Factors Affecting Reserve Balances ¹³	Factors Affecting Reserve Balances ¹³	TAF Activity ⁹	Factors Affecting Reserve Balances ¹³	Factors Affecting Reserve Balances ¹³	Factors Affecting Reserve Balances ¹³

1. Discount Window includes primary, secondary and seasonal credit programs.

2. The PDCF will remain in operation through October 30, 2009 as announced on February 3, 2009.

3. ECB and SNB created December 12 2007, BOC BOE and BOJ created September 18 2006, RBA Sveriges Riksbank, DB and Norges Bank created September 24 2008, Reserve Bank of New Zealand created October 28 2008, Banco Central do Brazil, Banco de Mexico, Bank of Korea and Monetary Authority of Singapore created October 29 2008.

4. Reverse repos are collateralized with US Treasuries.
 5. PDCF and TSLF collateral expanded on September 14, 2008.
 6. Includes non-US dollar denominated securities.
 7. Open market operations are authorized for terms of up to 65 business days.
 8. 28-day and 84-day terms may vary slightly to account for maturity dates that fall on Bank holidays.
 9. Maximum maturity of term increased from overnight to 30 days on August 17, 2007, and to 90 days on March 16, 2008.
 10. TOP auctions may be conducted on multiple dates for a single loan and may be conducted well in advance of a loan period.
 11. Forward selling TAF auctions announced on September 29, 2008 were conducted in November with terms targeted to provide funding over year end.
 12. Data available on days when operations are conducted.
 13. Data reported on Federal Reserve Table H.4.1, published weekly on Thursday.
- Source: Federal Reserve, Deutsche Bank (2009).

For primary dealers, two new facilities were introduced — the Term Securities Lending Facility (TSLF) and the Primary Dealer Credit Facility (PDCF). The terms for these two facilities are shown in Table 2. These can be thought of as analogues to the TAF and the PCF for depository institutions. The TSLF auctions the right for primary dealers to exchange agency securities, AAA-rated mortgage-backed securities (MBS), or AAA-asset-backed securities (ABS) collateral in exchange for Treasury securities. The dealers take the Treasury securities obtained in the auction and use them as collateral to obtain cash in the Treasury repo market. The bid price is in basis points. The spread between the one-month Treasury repo rate and the one-month term repo rate on the AAA-rated collateral is the metric that drives the price dealers are willing to bid to swap AAA-rated collateral for Treasuries. In July 2008, the TSLF was expanded to offer primary dealers options which, if exercised, would allow primary dealers to borrow additional Treasury securities for two weeks or less surrounding key financing dates. At the time of writing, \$50 billion are offered every month in the so-called Term Securities Lending Facility Option Program (TOP). The PDCF is a standby borrowing facility for primary dealers, akin to the DW. But there are a number of important differences. First, the PDCF, like the TSLF, is built to utilise the infrastructure of the tri-party repo system managed by two major clearing banks—Bank of New York Mellon and JP Morgan Chase. In contrast, the DW is administered by the twelve Federal Reserve Banks through the discount window function. Second, the scope of eligible collateral is a bit narrower—confined to most major types of investment grade securities. In contrast, the discount window accepts a broader set of collateral, including certain types of whole loans. Third, the PDCF is a temporary facility that must, by law, disappear once market conditions normalise.

In addition to the TAF, TSLF, TOP and PDCF, the Federal Reserve has undertaken other initiatives to support liquidity and the flow of credit. First, the Federal Reserve has entered into temporary foreign exchange swaps with the European Central Bank, the Swiss National Bank, the Bank of Japan, the Bank of England and several other central banks of OECD and non-OECD economies. These central banks disseminate the US dollars obtained through these swaps, contributing to improve liquidity conditions in global financial markets. Second, the Federal Reserve has conducted a series of 28-day term single-tranche open market repo operations. Theoretically, these term repos can provide funding against any open market operation eligible collateral—that is, Treasuries, Agencies, or Agency mortgage-backed securities. In practice, the single tranche operations are used predominately to finance Agency MBS debt because it is typically more expensive to finance than Treasury or Agency debt in the marketplace. Third, two additional facilities were created to support the market for commercial paper which came under considerable stress in September 2008. The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) was established to finance the purchases of high-quality asset-backed commercial paper (ABCP) by US financial institutions from money market mutual funds. The AMLF is intended to assist money funds that hold such paper in meeting demands for redemptions by investors and to foster liquidity in the ABCP market and money markets more generally. The Commercial Paper Funding Facility (CPFF) was set up to provide a liquidity backstop to US issuers of commercial paper. The CPFF is intended to improve liquidity in short-term funding markets and thereby contribute to greater availability of credit for firms. More specifically, the CPFF provides funds for the purchase of highly-rated unsecured and asset-backed three-month commercial paper from eligible issuers via eligible primary dealers. At the time of writing, the Federal Reserve has committed over \$300 billion to finance the commercial paper market through the AMLF and the CPFF. Fourth, the Money Market Investor Funding Facility (MMIFF) was established to support a private-sector initiative designed to provide liquidity to US money market investors. The goal of this initiative is to support the market for short-term liquidity since, late in 2008, money market mutual funds and other investors had been increasing their liquidity positions by investing in shorter-term (frequently overnight) assets. The MMIFF provides senior secured funding to a series of special purpose vehicles to facilitate an industry-supported private-sector initiative to finance the purchase of eligible assets from eligible investors.

Table 2. Forms of Federal Reserve Lending to Financial Institutions

	ABCP Money Market Fund Liquidity Facility (AMLF)	Commercial Paper Funding Facility (CPFF)	Securities Lending	Money Market Investing Funding Facility (MMIFF)	Term Securities Lending Facility (TSLF)	Term Securities Lending Facility Options Program (TOP)	Term Asset-Backed Securities Loan Facility (TALF)
When was measured announced?	September 19, 2008 ¹	October 7, 2008 ¹		October 21, 2008 ¹	March 11, 2008 ¹	July 30, 2008 ^{1,2}	November 25, 2008 ³
Who can participate?	Depository institutions, bank holding companies, US branches and agencies of foreign banks	Eligible CP Issuers ⁴	Primary dealers	Eligible Money Market Mutual Funds ⁵	Primary dealers	Primary dealers	All US persons that own eligible collateral
What are they borrowing?	Funds	Funds	US Treasuries	Funds and subordinated note	US Treasuries	US Treasuries	Funds
What collateral can be pledged?	First-tier ABCP	Newly issued 3 month unsecured and asset backed CP from eligible US issuers	US Treasuries	US dollar denominated certificates of deposits, bank notes and commercial paper issued by highly rated financial institutions	Schedule 1: US Treasuries, agencies, agency MBS Schedule 2: Schedule 1 plus all investment grade debt securities ⁶	Schedule 2 TSLF collateral	Recently originated US dollar denominated AAA ABS ⁷
Is there a reserve impact?	Yes	Yes	No (loans are bond-for-bond)	Yes	No (loans are bond-for-bond)	No (loans are bond-for-bond)	Yes
What is the term of loan?	ABCP maturity date (270 day maximum)	3 months	Overnight	N/A	28 days ⁸	Typically 2 weeks or Less ⁹	At least one year
Is repayment allowed if term is greater than overnight?	No	N/A	N/A	N/A	No	No	Yes
Which reserve banks conduct operations?	FRB Boston	FRBNY	FRBNY	FRBNY	FRBNY	FRBNY	FRBNY
How frequently is the program accessed?	As requested (standing facility)	As requested (standing facility)	Daily	As requested (standing facility)	Schedule 1: Every other week Schedule 2: weekly	As necessary ¹⁰	Monthly
Where are statistics reported publicly?	Factors Affecting Reserve Balances ¹¹	Factors Affecting Reserve Balances ¹¹	Securities lending activity	Factors Affecting Reserve Balances ¹¹	Terms securities lending facility activity ¹²	Terms securities lending facility activity ¹²	TALF Activity ¹²

1. The AMLF, CPFF, MMIFF and TSLF will remain in operation through October 30, 2009 as announced on February 3, 2009.

2. TOP auctions are sales of options granting the right to enter into TSLF borrowing.

3. The TALF is expected to go live around February 2009. The Federal Reserve reserves the right to review and make adjustments to these terms and conditions – including the size of program, pricing, loan maturity, and asset and borrower eligibility requirements – consistent with the policy

objectives of the TALF. The TALF will remain in operation through December 31, 2009 as announced on February 6, 2009.

4. Through the CPFF the FRBNY provides financing to an SPV that purchases eligible three-month unsecured and asset-backed commercial paper from eligible issuers.
5. Through the MMIFF the FRBNY will provide senior secured funding to a series of private sector SPVs to finance the purchase of certain money market instruments from eligible investors.
6. PDCF and TSLF collateral expanded on September 14, 2008.
7. Includes auto loans, student loans, credit card loans and small business loans guaranteed by the US Small Business Administration.
8. 28-day and 84-day terms may vary slightly to account for maturity dates that fall on Bank holidays.
9. Loans are targeted to span potentially stressed financing dates, such as quarter-ends.
10. TOP auctions may be conducted on multiple dates for a single loan and may be conducted well in advance of a loan period.
11. Data reported on Federal Reserve Table H.4.1, published weekly on Thursday.
12. Data available on days when operations are conducted.

Source: Federal Reserve, Deutsche Bank (2009).

39. In the second half of 2008, the Federal Reserve more than doubled its balance sheet in an effort to support the flow of credit to households and firms after financial market came to a near halt during the month of September (Figure 14). At the time of writing, it remains unclear whether these actions will successfully avert a crunch on credit and a severe recession of the US economy. In particular, the use of new and unorthodox tools may have unintended consequences as every time the Federal Reserve elevates one class of debt it risks displacing another. Furthermore, according to some critics, the Federal Reserve is taking collateral at a price which is too low and thereby is exposing US taxpayers to substantial risks. While such claims seem to be well founded only for the loans to Bear Stearns and AIG, the Federal Reserve could be more transparent and thus re-assure observers that it is not providing a hidden subsidy to the financial system.

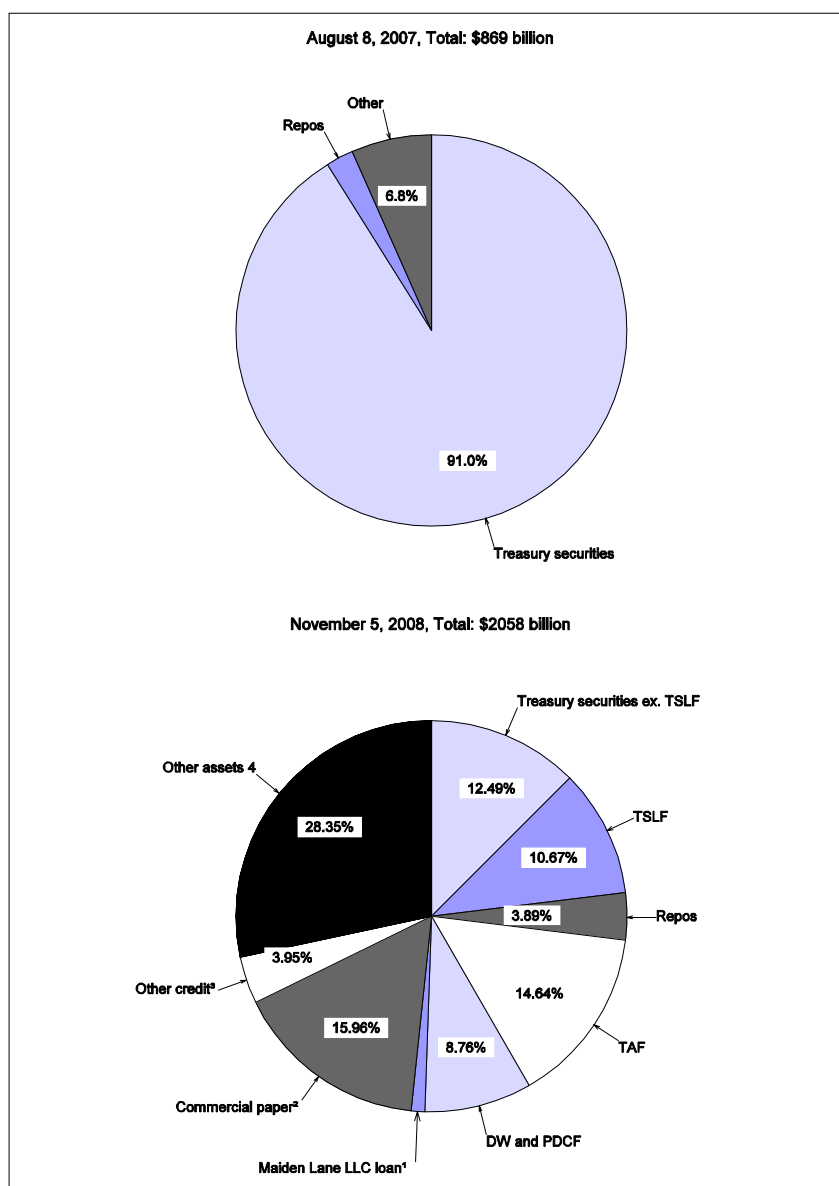
40. The full ramifications of these Fed actions are still unknown, although they appear to have staved off further instability in the financial system and provided additional liquidity. However, the extension of the public safety net to primary dealers, which now seems necessary to reduce the risk of runs by creditors and will be difficult to withdraw, has rendered market discipline less effective. As a result, actions should be taken immediately, even within the current legal framework, to curb the increase in moral hazard. The Federal Reserve should push primary dealers, in return for access to its lending facilities, to strengthen their balance sheets, their liquidity and their risk-management practices. In the longer term, as discussed in the next section, a more durable solution should be implemented.

Recapitalising the banking sector

41. Deleveraging in the banking sector poses the greatest risk to the growth prospects of the US economy, because it could trigger a credit crunch as banks reduce assets to bring them back into line with capital targets. An alternative, of course, is more capital. A first approach to recapitalisation was to allow banks to earn back their losses. The low federal funds rate improves bank margins and thus boosts their profit. But even rates at the current 1% are not low enough, given the losses that banks are likely to incur (Blundell-Wignall, 2008). Furthermore, banks should cut their dividends and raise new capital from the private sector in order to more swiftly repair their balance sheets. However, as the economic situation deteriorated severely during the second half of 2008, more drastic action was required. The US authorities responded quickly to the turn of events. As discussed above, the Federal Reserve set up new liquidity facilities for banks, money funds and commercial paper issuers. Furthermore, the Federal Deposit Insurance Corporation (FDIC) expanded deposit insurance and guarantees new senior unsecured debt of debt of depository institutions and certain financial holding companies. The FDIC should be quickly recapitalised if necessary. Finally, Congress enacted the Emergency Economic Stabilization Act of 2008 providing much needed resources for dealing with the financial crisis and for supporting the US economy. Above all, the Troubled Assets Relief Program (TARP) authorizes the Department of Treasury to draw up to \$700 billion, of which \$250 billion have been already directed towards the critical task of recapitalising banks. At the time of writing, it is still unclear how Treasury will make use of the rest of the TARP funds.

Plans to purchase illiquid assets from financial institutions have been, at least for moment, put to the side. The new strategy is focused on injecting further capital in financial institutions as well as supporting consumer financing (Paulson, 2008). It is essential that the financial rescue package is rapidly and effectively implemented.

Figure 14. Federal Reserve assets



1. Loan extended to acquire certain assets from Bear Stearns.
2. Asset-backed commercial paper money market mutual fund liquidity facility and net portfolio holding of Commercial Paper Funding Facility LLC.
3. Other credit includes loan to AIG.
4. Other asset includes currency swaps with foreign central banks.

Source: Board of Governors of the Federal Reserve.

Section 3: Longer-term crisis prevention

42. The previous two sections of the paper examined the origins and the unfolding of the crisis, and presented immediate policy measures needed to deal with the short-term challenges. This final section addresses the structural flaws in the financial system the crisis has revealed. As events unfolded, systemically important financial institutions took on much greater risks than they could bear. The failures of regulatory oversight and market discipline underscore the need to find ways to make the financial system more resilient and stable.

There are fundamental problems with the current “functional” approach to financial regulation

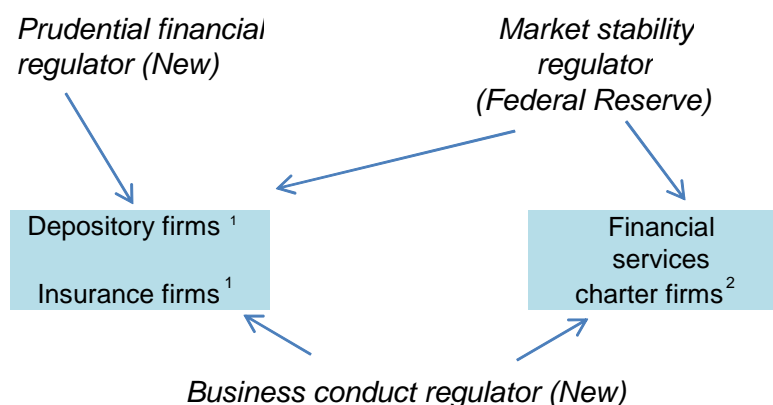
43. The current regulatory structure of US financial markets is based on the principle of “functional” regulation, which maintains separate regulatory agencies across segregated functional lines of financial services, such as banking, insurance, securities, and futures. This combination of “expert” regulators, each responsible for overseeing a specific function, was supposed to promote the resilience and the stability of the system. In practice, however, as documented in Annex A2, the system is highly fragmented, with a complicated web of multiple federal and states statutes and agencies. While the functional system might have served the United States well in the past, this fragmented system with a plethora of specialised agencies is not longer well suited to supervise financial institutions that often and increasingly operate across the traditional sectoral boundaries. No single regulator has all of the information to monitor systemic risk or the authority to take coordinated action throughout the financial system. Furthermore, competition across regulators has increasingly become a costly model in terms of efficiency and effectiveness, resulting instead in duplication and inter-agency disputes, lowering accountability and allowing regulatory arbitrage.

44. There is therefore a strong case for abandoning the current fragmented functional system and adopting a “unified” cross-sectoral framework. Going cross-sector would help to avoid gaps (stability of independent investment banks falling between the cracks) as well as uneven treatment (deficient consumer protection in sectors with weaker regulatory standards). It can make regulation more effective and more efficient. The proposals advanced by the Treasury blueprint – discussed in Box 7 – provide a sensible basis for overhauling the current system (Treasury, 2008a).

Box 7. Models of financial regulation based on a “unified” cross-sectoral approach

Australia and the Netherlands have adopted a cross-sector regulatory approach, which emphasises regulation by “objectives”. In the light of their experiences, the US Treasury has put forward a blueprint to overhaul US financial regulation. It proposes three regulators: a market stability regulator, a prudential financial regulator and a business conduct regulator (Figure 15). The market stability regulator is to be responsible for overall conditions of financial market stability that could impact the real economy. Market stability regulation in this context should be focused on the overall financial system, and it should come with broad authority to collect information and to impose necessary corrective actions. The prudential financial regulator is to focus on financial institutions with some type of explicit government guarantee associated with their business operations. Prudential regulation in this context should be applied to individual firms, and it should operate much like the current regulation of depository institutions. (Note that in the Netherlands, the market stability and prudential functions are combined in a single supervisor, the central bank. For this reason, the Dutch system is often referred to as the “Twin Peak” model). The business conduct regulator is to be responsible for business conduct across all types of financial firms. Business conduct regulation in this context includes consumer protection, such as disclosures, business practices, and licensing.

Figure 15. The regulatory framework proposed in the Treasury blueprint



1. Include depository firms with access to federal deposit insurance and insurance firms with access to an insurance guaranty fund.
2. Include security firms, futures firms, exchanges, investment advisors, private pools of capital, and surplus lines insurers.

Source: Treasury (2008a).

The United Kingdom has also moved away from the traditional functional system and adopted a unified framework, by establishing a single regulator for all financial services, the Financial Services Authority (FSA). The single regulator model offers several advantages stemming from the enhanced efficiency from combining common functions undertaken by individual regulators into one entity. This should lower staff costs and lead to a more consistent approach to overall regulation across different types of financial products and institutions. Perhaps more importantly, a single regulator approach allows for a clearer view of overall risks to the financial system as one entity would regulate all financial institutions. Finally, it also avoids issues associated with overlapping jurisdictions of individual regulators.

However, the current crisis suggests that the objectives-based framework of Australia and the Netherlands also has some merits. Above all, a single regulator in boom-times tends to focus on high-profile business conduct, while in fact market stability and prudential supervision have to be fostered precisely when markets are in bullish mood and the seeds for later busts are being sowed. Lack of priority given to prudential supervision of Northern Rock has been a key finding of the FSA's internal audit review. Separating prudential and conduct-of-business supervision into distinct regulators, as in the Treasury blueprint, may help avoid this by anchoring priority for prudential supervision within an earmarked regulator. Overall, while a unified cross-sectoral approach to financial regulations offers clear advantages over the current fragmented system of functional regulation, the choice between the objectives-based system and the single regulator is more difficult.

Focusing regulation on financial market stability

45. The creation of a market stability regulator is perhaps the most interesting and challenging feature of the Treasury blueprint. The Treasury argues that the Federal Reserve should assume this role given its traditional central bank role of promoting overall macroeconomic stability. In this respect, it will be key to disseminate information about financial market developments and their interactions with the macro economy. For this reason, the Federal Reserve should regularly publish a financial stability report, as it happens already in many other OECD countries. In the blueprint, the stability regulator would have

clear legal authority to impose corrective actions on individual institutions as it deems necessary to foster financial market stability.

46. One issue that the Treasury blueprint leaves ambiguous is whether the market stability regulator, besides being given access to the information gathered by the prudential regulator, will have the power to conduct regular on-site inspections. The Federal Reserve has argued for such authority, which will be critical to ensuring that it has the information to impose appropriate corrective action (Bernanke, 2008c). One possible solution to avoid this problem is to merge the market stability regulator and the prudential regulator into a single regulator, as in the “Twin Peaks” Dutch model (Kremers and Schoenmaker).

47. Another aspect that the Treasury blueprint does not resolve is whether hedge funds and private-equity firms fall under the umbrella and the responsibilities of the market stability regulator. The market stability regulator cannot be indifferent to the scale of leverage and risk in these unregulated institutions, but it does not appear feasible to extend capital and other requirements to hedge funds and private-equity firms. The only realistic approach seems to be to influence these institutions through the intermediary of regulated institutions, notably through the large banks that regularly deal with hedge funds and private-equity firms (Geithner, 2008). In particular, the market stability regulator should foster counterparty-risk management that discourages regulated institutions from becoming excessively exposed to highly-levered institutions outside of the regulatory framework. By encouraging appropriate margining and collateralisation requirements, the regulator can hope to generate market incentives that will work to reduce the scale of leverage and risk in the unregulated sector that could threaten the stability of the overall financial system.

48. The Federal Reserve, especially in the context of its enhanced mission of market stability regulator, should re-examine its policy regarding developments in asset prices. There is still no solid case for deviating from the standard prescription that monetary policy should not respond to asset prices *per se* and should instead focus on changes in the outlook for inflation and aggregate demand due to asset price movements. Reasons for this position include the difficulty of measuring asset price misalignment, the difficulty of anticipating future asset price booms and busts or the future effects of preventive policy actions, the difficulty in discriminating among different asset prices (such as housing prices and equity prices), and the possible dilution of the inflation objective (Mishkin and Schmidt-Hebbel, 2006). Yet, the unfolding of events since August 2007 suggests that a rapid rise in asset prices accompanied by a credit boom may reflect wide-reaching market failures. Indeed, regular on-site inspections could give the market stability regulator an informational advantage over market participants to determine if market failures may be driving episodes of booming credit growth and asset prices. It is not that on-site inspection would provide the market stability regulator direct evidence to discriminate between asset bubble and asset price movements supported by fundamentals, but they may help to spot malfunctions in the financial market that are likely to unduly boost some asset prices. For instance, on-site inspections of mortgage brokers, mortgage lenders, issuers of mortgage-backed securities, etc. over the 2004-2006 period may have revealed that underwriting standards for subprime mortgages had become inadequate and other problems along the securitisation chain. By contrast, it appears unlikely that on-site inspections will help to prevent bubbles in the stock market. In conclusion, the market stability regulator, by implementing measures to address imperfections in the financial system, may help reduce the incidence and severity of future bubbles. Monetary policy, instead, appears to be too blunt a tool to address failures in financial markets, since the impact on the overall economy would need to be very large to ensure that the asset price bubble was actually deflated. Nonetheless, it is possible that future research will make a compelling case for adjusting the monetary policy stance in response to asset price movements, since future bubbles will likely create unanticipated difficulties and thus it may be difficult to timely implement regulatory response.

49. In any case, the market stability regulator should promote policies to address the risks to financial stability from asset price bubbles and such policies should be operational at all times – whether a bubble is

in progress or not. For instance, capital requirements should be raised during periods of economic buoyancy, when low default rates and strong profit growth would otherwise encourage banks to expand their risks even more vigorously, and lower them during periods of economic weakness. Such regulation would tend to limit the build up of leverage during the good times and reduce the amount of deleveraging required in bad times, contributing to greater overall economic stability. One approach to counter-cyclical capital requirements is to implement the “dynamic provisioning” already used in Spain. The fundamental principle underpinning dynamic provisioning is that capital requirements are set against outstanding loans in line with an estimate of long-run, expected loss. Generally, the level of provisioning under this formula should be less subject to sharp swings associated to cyclical fluctuations in economic activity than under the current approach. One proposal along these lines, made by Goodhart and Persaud (2008), is to link an individual institution’s (Basel II) capital requirements to a geometric average of asset growth above some threshold in recent years. It should nonetheless be recognised that counter-cyclical is not a fool-proof solution. First, the regulator may not be able to recognise in real time what the state of affairs is. Second, the implementation of dynamic provisioning would imply that in bad times financial institutions will be moving up the estimate of long-run expected loss.

Countering regulatory arbitrage

50. Regulatory arbitrage means both taking advantage of regulatory loopholes and choosing a place of business where regulation is lighter. The first job of a new prudential regulator (or a combination of the relevant various regulators in the current system) should be to reduce regulatory incentives for financial institutions to move intermediation to off-balance sheet structures to which the institutions have a risk exposure, as occurred on a large scale in recent years. Doing so is relatively straightforward when financial institutions guarantee liabilities of the off-balance entities or have a legal obligation to extend credit to them. Indeed, Basel II rules should reduce regulatory incentives to develop intermediation off-balance sheet. However, there are also cases, which proved to be important during the crisis, where financial institutions may choose to bail out associated entities even in the absence of a legal obligation to do so in order to protect their reputation. More reflection will be required on how to handle off balance sheet exposures that arise from reputational concerns rather than from legal obligations. Unless the prudential regulator identifies some proven mechanism by which financial institutions could credibly commit to not rescuing associated structures for reputational reasons, capital charges would need to reflect a continuum of off-balance sheet exposure, ranging from a legal obligation to a reputational obligation to no obligation at all. It would also be helpful if accounting and auditing rules could foster more transparency.

51. As discussed in the previous section of this paper, capital adequacy regulations provided financial institutions with an incentive to hold securities in their trading accounts (for eventual sale) rather than in their long-term assets portfolio, as capital charges are lower on the former. This loophole increased the attractiveness of securitised debt relative to loans with similar credit ratings, which, in contrast, could have not been held in trading accounts for a long time. As a result, the sizeable assets held in the trading account were not properly covered by capital, increasing risks to the system. Regulators are working on amending Basel II regulations to exclude from transaction accounts assets that are not being held to be traded in the short term.

Factoring remuneration structures into regulation

52. Remuneration arrangements in the financial sector are considered to encourage excessive risk taking because senior managers are rewarded for generating high profits in high-risk strategies but often are not held accountable for subsequent losses, and market changes that have resulted from the development and growth of structured products have amplified these incentives problems (Rajan, 2005). Shareholders of public companies have had little power under the current corporate governance framework to insist on remuneration arrangements that better align managers’ incentives with shareholder interests. To

counter this problem, the United Kingdom and the Netherlands have recently implemented measures giving shareholders the right to a vote (nonbinding in the United Kingdom) against remuneration arrangements for top company officers. If these arrangements do promote better incentives, they could be worth imitating in the United States. For their part, regulators should take into account remuneration structures when considering the overall risk posed by a financial institution, as the UK financial regulator and supervisor, the Financial Services Authority, plans to do.

53. One should expect the private sector to react to these problems. The International Institute of Finance (IIF) Committee issued recommendations on best practices on remuneration arrangements to its members, which include all major players in global finance. The IIF acknowledged that the growth of structured products and the “originate-to-distribute” business model have created incentives [...] that have, in some cases, conflicted with sound underwriting practices, realization of risk management goals, or the long-term interests of the firm and shareholders” (IIF, 2008). The IIF considers, quite reasonably, that externally mandated compensation policies would not be efficient. Rather, it encourages its members to relate compensation policies more closely to shareholders’ interests and long-term firm-wide profitability by deferrals. For instance, the IIF suggests that severance pay for top executives should reflect realised performance for shareholders over time. Furthermore, since financial sector returns often accrue over multi-year periods and are uncertain, firms should consider linking compensation to the risk time horizon, possibly through “clawback” provisions and deferred bonuses. The IIF also advises its members to take the risk-adjusted cost of capital into account when determining performance-related compensation. Finally, the IIF calls for more transparency and disclosure to shareholders of compensation policies and criteria, focussing on principles and process, including showing how such policies are aligned with the firm’s business strategy.

Regulating investment banking activities

54. One of the lessons of the ongoing financial crisis is that the business model of the large investment banks may no longer be viable. Lehman Brothers has filed for bankruptcy while Bear Stearns and Merrill Lynch have been acquired by large commercial banks. The two surviving large independent investment banks, Goldman Sachs and Morgan Stanley, have become bank holding companies, and thereby are now fall under the regulatory umbrella of the Federal Reserve. These developments have helped moving on the previous arrangements – the SEC's oversight of the holding companies of the large investment banks was based on a voluntary agreement between the SEC and those firms – but further action is required to effectively and efficiently regulate investment banking activities within a large financial institutions. First of all, the Federal Reserve should indicate whether and how the new credit facilities available to the primary dealers, the Term Securities Lending Facility and the Primary Dealer Credit Facility, will operate after the financial crisis has passed. In doing so, the central bank should strive to achieve a balance between regulation and economic efficiency.

55. In the longer term, legislation is needed to provide a more robust framework require consolidated and uniform supervision of those firms with investment bank units, providing the regulator with the authority to set standards for capital and liquidity holdings as well for risk management. Some observers have questioned whether commercial banks should be allowed to own an investment banks (Blundell-Wignall and Atkinson, 2008). While there seems no clear-cut answer on how to more efficiently regulate investment banking activities, we should also remember that poorly designed regulation has the potential to make things worse. Policymakers should importantly recognise that imposing costly requirements on regulated financial institutions may push activities, and the associated risks, to the unregulated financial sector (*i.e.* hedge funds). And this is unlikely to improve overall financial stability, it only puts risk outside the regulatory reach. In any case, the financial infrastructure should be strengthened so that the consequences of financial institutions becoming illiquid, at least in normal times, would have

limited systemic consequences. To this end, steps taken by the US authorities to establish clearing and settling facilities for credit default swaps and other over-the-counter derivatives are welcome.

56. Overall, the severity and the complexity of the crisis make a compelling case for reviewing the regulatory framework for regulating investment banking activities. It should be recognised that poorly designed regulation has the potential to make things worse. Above all, regulators should be aware that too much regulation may push some business, and associated risk, to the unregulated sector.

Regulating mortgage lenders

57. The collapse of the market for nonconforming mortgage securitisation and the government take-over of Fannie Mae and Freddie Mac have exposed fundamental flaws in the system of housing finance. The process of recovery and repair of the mortgage market will be gradual, entailing both renewed market discipline and aggressive regulatory actions.

58. A first set of problems requires regulators to strengthen the supervision of mortgage origination and to remove impediments to voluntary loan restructuring. As documented in the first section of this paper, the increasingly poor performance of recent vintages of Alt-A and subprime mortgages partly reflects a decline in lending standards since the mid-2000s. Furthermore, public enforcement agencies, at both the Federal and state levels, have mounted investigations to understand the source of this problem, revealing that mortgage brokers were often involved in deceptive practices. Actions taken by the authorities to regulate the origination of high-cost mortgages and to develop strong licensing requirements for mortgage brokers are therefore welcome. New rules regarding high-cost mortgages – which should include most Alt-A and subprime loans – issued by the Federal Reserve in July 2008 require that lenders verify borrowers' income and assets, assess borrowers' ability to afford the full cost of the loans (not simply low initial rates), limit prepayment penalties, and ensure that local taxes and other costs are placed into escrow accounts. If these rules are strictly implemented, the underwriting standards of Alt-A and subprime loans in securitisation pools should improve. Furthermore, the new licensing standards for mortgage brokers require that they are qualified and properly screened and that prospective borrowers can easily look up a broker's employment history, violations, complaints and other information. State authorities are in the process of setting up such licensing databases, and in some states they are already available to the public. The newly approved legislation also calls for uniform minimum licensing qualification standards for state mortgage market participants. It is important that these include personal conduct and disciplinary history, minimum educational requirements, testing criteria and procedures and appropriate license revocation standards.

59. As noted above, the deteriorating standards can also be ascribed to agency problems, since mortgage brokers were often paid on the basis of the volume of mortgages arranged without regard to their quality. It is essential therefore that the private sector take the lead and develop compensation schemes that better align the incentives of mortgage brokers with those of lenders and other upstream investors along the securitisation chain. In any case, the new rules regarding high-cost mortgages should reduce incentives for mortgage brokers to steer borrowers toward loans that they cannot afford and do not fully understand. Furthermore, the new rules promote some standardisation for this class of risky mortgages, and thus facilitate the due-diligence efforts of credit rating agencies and upstream investors.

60. The mounting wave of foreclosures has also revealed legal impediments to mortgage restructuring that are also likely to create further problems in the future, if left unchecked. One of such impediments, as discussed in the previous section of this paper, is that second-mortgage holders have often stood in the way of voluntary work-outs between first-mortgage holders and distressed borrowers. To this end, bankruptcy laws should be reformed to allow judges to reduce the mortgage principal on owner-occupied residences. Although this may lead to higher interest rate in the future, it provides clear

incentives for second-mortgage holders to participate in restructuring agreements. Furthermore, federal authorities should also encourage US states to alter property laws so that second mortgages will remain subordinated to modified first mortgages, as long as the new loans do not alter the obligations of the borrowers in a way that is materially prejudicial to the holders of the junior mortgages. Such amendments would not only help the resolution of future crises but would also discourage borrowers to take on multiple mortgages.

Regulating GSEs

61. Events since the beginning of June 2008 have exposed fundamental weaknesses in the government-sponsored enterprises (GSE). After a sharp drop in the share prices of Fannie Mae and Freddie Mac reflecting concerns that the two companies may have become insolvent, the federal government first tried to re-assure investors that the two GSEs would not be allowed to fail but, in September, it was forced to put them into conservatorship and provide financial support. The government's actions seem to have stabilised the two companies, even though they are still facing difficulties as virtually all other firms. In addition, mortgage interest rates have declined somewhat. As a background for these aggressive policy responses, it should be emphasised that Fannie Mae and Freddie Mac had clearly become too big to fail. To put their size in perspective, as of March 2008, the combination of the MBS that they guarantee (\$3.0 trillion) and their debt outstanding (\$1.5 trillion) totalled \$4.5 trillion, slightly smaller than the publicly held debt of the federal government (\$5.1 trillion) and nearly half of the value of all residential mortgages outstanding (\$10 trillion). Furthermore, both GSEs are highly leveraged institutions since they are subject to very low capital requirements: they need to maintain equity capital of 2.5% of assets (plus 0.45% of balance sheet obligations) while commercial banks are required to hold 4% for tier 1 capital and 8% for tier 2 capital. The justification for the low capital holdings of the GSEs relative to commercial banks is unclear. The largest banks are more diversified than the GSEs, and although banks likely assume greater credit risks, they likely are less subject to interest rate risk than are the GSEs.

62. Following the crisis of confidence in GSE solvency, policymakers had little choice in order to avoid major disruptions in the global financial markets and ensure the flow of capital for mortgage lending. Issuance of private-label MBSs has come to a halt, and it will take time and aggressive actions to ensure that the private sector will be able to ensure an adequate flow of funds towards mortgage lending. In this context, actions taken by the US authorities have been generally appropriate. It is also important that newly established authority, the Federal Housing Finance Agency, in charge of the supervision the GSEs, exercises stronger oversight than its predecessors. The longer term advantages of these GSEs are, however, doubtful. They had been created to help develop the US mortgage market, and this market is now the deepest and most developed in the world. Since they can borrow at low rates, owing to their ties with the federal government, they provide a small subsidy to home ownership, but this subsidy is badly targeted and, as is now clear, it implies huge financial risks for the taxpayers. In a longer term perspective, the securitisation of mortgages, including (or even especially) prime mortgages, should be left to the private sector, as in most other countries in order to foster competition and reduce moral hazard risks. After the financial crisis has passed, this process should begin with the federal government selling its stocks in Fannie Mae and Freddie Mac and credibly removing access to preferential lending facilities with Treasury or the Federal Reserve. Furthermore, the two GSEs should be subject to same regulation and supervision (including capital adequacy requirements) as other issuers of mortgage-backed securities, and be divided into smaller companies to reduce the risk that they remain too big to fail.

Strengthening private-sector securitisation

63. A key priority is to repair the mortgage securitisation market, since the recent experience has revealed deep problems at all levels. Credit agencies will continue to have an important role, notwithstanding the flaws revealed during the crisis. The authorities can strengthen the rating process by

implementing the reforms first suggested by the Financial Stability Forum and then codified in the proposals by the Securities and Exchange Commission issued in March 2008. Above all, to reduce conflict of interest, credit rating agencies should be prohibited from structuring the same products that they rate. To enhance transparency and foster competition, credit rating agencies should make all of their ratings publicly available, and disclose the information used to determine a rating on a structured product, including information on the underlying assets.

64. The incentives of investors and investment managers need to be aligned. The remuneration arrangements of investment managers should be evaluated relative to an index of structured products in order to give managers appropriate incentives to conduct their own due diligence. The issuer needs to retain un-hedged equity tranche exposure to every securitisation deal. And finally, originators should have adequate capital so that warranties and representations can be taken seriously. The US authorities have recently taken actions to promote a market for residential covered bonds in the United States (Treasury, 2008b). As discussed in the first section of this paper, covered bonds are less susceptible to incentives problems than MBSs since the credit risk of the underlying mortgage pool remains with the issuer. It is not, however, clear how far the authorities will have to go to foster these developments, since the market has already begun taking remedial steps in the right direction.

Section 4: Concluding remarks on the lessons from the crisis

65. There is now a rare political opportunity to overhaul the regulatory and the supervisory system for financial markets, and introduce a better system, one that is more suited to the modern financial landscape. At a minimum, such reform should address the problems exposed by the financial crisis in order to prevent or mitigate future crises. It is vital that the authorities seize this opportunity to implement the necessary reforms in a timely manner and that it does not to dissipate the political capital required to implement such a comprehensive reform. Box 8 provides a long list of areas where to start.

Box 8. Policy recommendations to improve the resiliency of the financial system

The financial crisis has revealed the need for a major overhaul of financial regulation. The regulatory framework should be adapted to the changes that have occurred in the structure of the financial system, including the enormous growth of nonbank financial institutions and the development of securitisation and new financial products.

For the broader financial system:

- Move away from the existing fragmented regulatory structure. The new unified approach advanced in the Treasury blueprint provides a sensible basis but many important details need to be resolved. Notably, if the Federal Reserve is to take on new responsibilities, by explicitly taking on the role of market-stability regulator, it should be granted broad powers. Its authority should include the ability to directly examine banks and other financial institutions, including those that are subject to prudential regulation, and to collect information on the structure and the workings of financial markets.
- Banks and other financial institutions should be more tightly regulated and supervised. They should hold capital against off-balance sheet risks, so as to counter regulatory arbitrage.
- Counter-cyclical capital requirements should be introduced and greater emphasis put on the leverage ratio to improve the stability of the system over the cycle.
- Consider changes in laws/regulations concerning corporate governance to give shareholders more influence over management – such as giving shareholders the right to vote against remuneration packages, as is now possible in the UK and the Netherlands, for example – in order to facilitate the negotiation of remuneration arrangements that align management incentives better with shareholder interests. Regulators should consider remuneration structures when assessing the risks posed by any given financial institution.

For financial institutions with large investment bank units:

- These institutions should be brought under the umbrella of a single regulator, having the authority to set standards for capital, leverage, liquidity holdings, and risk management. However, these should not be the

same as those applied to commercial banks.

For mortgage lenders and the GSEs:

- Carefully implement the new Federal Reserve guidelines for high-cost mortgages to ensure the underwriting standards for non-prime mortgages are upgraded.
- Reduce legal impediments to voluntary mortgage restructuring. Reform the bankruptcy laws to allow judges to reduce the mortgage principal on owner-occupied residences to provide greater incentives for lenders to participate in restructuring agreements. Amend property laws so that second-mortgage holders cannot unduly hold back restructuring agreements between first-mortgage holders and borrowers.
- The securitisation of mortgages should be left entirely to the private sector, like in other countries. In order to foster competition and reduce moral hazard, this requires that the GSEs are privatised, no longer have access to preferential lending facilities with the federal government; are subject to same regulation and supervision (including capital adequacy requirements) as other issuers of mortgage-backed securities; and are divided into smaller companies that are not too big to fail.
- Help the private sector solve the agency problems that have afflicted the securitisation of mortgages. Put in place the SEC proposed reforms to improve the credit rating process, including by prohibiting firms to structure the same products that they rate and by disclosing the information used to determine a rating.

ANNEX A1

Box A1. Key features of the main categories of mortgage loans

A *mortgage loan* is a loan secured by real property through the use of a mortgage (a legal instrument). However, the word mortgage alone, in everyday usage and often in this paper, is most often used to mean mortgage loan.

The two basic types of amortised loans are the fixed rate mortgage (FRM) and adjustable rate mortgage (ARM). Other types tend to be combinations of these two. Fixed-rate mortgages are by far the most common, accounting for about 70% of the value of outstanding mortgages.

There is a wide range of mortgages available to homeowner in the United States for either purchasing of new residences or refinancing of previous loans. Mortgage characteristics, including the principal and the credit worthiness of borrowers, vary across originators. The main types are reported below.

- *FHA/VA mortgages* refer to loans issued by federally qualified lenders and insured by the Federal Housing Administration (FHA) and Veteran Administration (VA), respectively. FHA loans have historically being targeted to lower income borrowers while VA loans are only made available to current and previous members of the US armed forces. Both agencies allow high loan-to-value (LTV) ratios, up to 97% for VA and 100% VA, but these mortgages are considered the safest since they carry the explicit backing of the federal government. FHA/VA mortgages are typically purchased and securitised by the Government National Mortgage Association (Ginnie Mae), a government-owned company. Ginnie Mae securities are the only mortgage-backed securities (MBS) that are explicitly guaranteed by the US government
- *Conforming mortgages* are loans to prime borrowers that conform to the established rules and procedures set by the two major Government Sponsored Agencies (GSEs), the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac). The original principal of conforming mortgages must be equal to or less than the applicable conforming loan limit, which is established each year by Office of Federal Housing Enterprise Oversight (OFHEO). The current conforming loan limit for a one-family residence in most geographic areas is \$417 000. The 2008 economic stimulus package temporarily increased the limit for high-cost areas to \$729 750 from \$625 500. Furthermore, most conforming mortgages are loans with a LTV ratio below 80% and with full income documentation. But there are exceptions: for example, Fannie Mae used to purchase a NINA (no-income, no-asset) loan. Conforming mortgages are generally considered very safe since they respect strict underwriting standards and the securities issued by the GSEs benefit from the implicit backing of the federal government. Together, FHA/VA and conforming mortgages are often referred, also in this paper, as *agency mortgages*.
- *Jumbo mortgages* include loans to prime borrowers with an original principal balance larger than the conforming limits imposed on the GSEs by the US Congress. (Often data on jumbo mortgages also include non-agency prime mortgages with limit below the GSEs threshold). Jumbo borrowers are typically more sophisticated than agency borrowers and because of their creditworthiness, have more refinancing and loan options available to them. They also tend to have lower LTV ratios and higher credit scores. As a result, jumbo loans are often prepaid at faster rates than agency loans.
- *Home equity lines* (HEL) are types of loan secured by the equity in a home, which is the difference between the market value of the home and the remaining balance on all of its mortgages. They typically require good credit history and reasonable LTV ratios. Most HEL are most commonly second position mortgages and are often referred to as second mortgages, because they are secured against the value of the property, just like a traditional mortgage loans. They can be structured as a revolving credit loan, also referred to as a *home equity line of credit* (HELOC), where the borrower can choose when and how often to borrow against the equity in the property, with the lender setting an initial limit to the credit line.
- *Alt-A mortgages* refer to a class of loans to borrowers with a good credit score but originated on the basis more aggressive underwriting than for conforming or jumbo loans. Often, the LTV ratio exceeds the maximum level permitted in conforming mortgages or the loan is secured by non-owner occupied property. In addition, the loan documentation may not be complete or the borrower's income/assets have not have

been verified. Many loans with non-traditional amortization schedules such as interest only or option adjustable rate mortgages are sold into securities marked as alt-A. As a result, Alt-A mortgages generally have a higher risk of default than prime ("A") mortgages.

- *Subprime mortgages* are loans to borrowers with blemished credit history and/or who provide only limited documentation of their income or assets. These "B" and "C" loans typically have lower credit scores and high LTV ratios. Subprime mortgage loans are often originated by lenders specialising in this type of business, using processes unique to subprime loans. They are considered the riskiest loans.

Table A1.1 shows the average borrower characteristics of Alt-A and subprime loans in MBS pools, broken out by year of origination. The most dramatic difference between the two panels is the FICO credit score, as the average Alt-A borrower has a FICO score that is substantially higher than the average subprime borrower in 2006. Subprime borrowers typically have a higher CLTV (combined LTV, that is including both first and junior mortgages), but are more likely to document income and are less likely to purchase a principal residence. Alt-A borrowers are more likely to be investors and are more likely to have silent second mortgages on the property. (A silent second is a second mortgage that was not disclosed to the first mortgage lender at the time of origination.) The data also reveal how subprime borrowers have changed. Note that the CLTV of a subprime loan has been increasing since 1999, as has the fraction of loans with silent second mortgages. Moreover, the table illustrates that borrowers have become less likely to document their income over time, and that the fraction of borrowers using the loan to purchase a property has increased significantly since the start of the decade. Together, these data suggest that the average subprime borrower has become significantly more risky, especially since 2004.

It is important to emphasise that there are alternative sources for non-conforming mortgage data and that there is no consensus among either lenders or researchers about what types of mortgages should be considered subprime, so the mortgage data reported below, and also elsewhere in the paper, should be regarded with some scepticism and not be taken at face value. Mayer and Spence (2008) discuss the major sources for subprime mortgage data and show that estimates of the number of subprime originations are sensitive to which types of mortgages are categorised as subprime.

Table A1.1. Underwriting characteristics of loans in MBS pools.

	CLTV ¹	Full doc	Purchase	Investor	No prepayment penalty	FICO score ²	Silent 2 nd mortgage
A. Alt-A Loans							
1999	77.5	38.4	51.8	18.6	79.4	696	0.1
2000	80.2	35.4	68.0	13.8	79.0	697	0.2
2001	77.7	34.8	50.4	8.2	78.8	703	1.4
2002	76.5	36.0	47.4	12.5	70.1	708	2.4
2003	74.9	33.0	39.4	18.5	71.2	711	12.4
2004	79.5	32.4	53.9	17.0	64.8	708	28.6
2005	79.0	27.4	49.4	14.8	56.9	713	32.4
2006	80.6	16.4	45.7	12.9	47.9	708	38.9
B. Subprime Loans							
1999	78.8	68.7	30.1	5.3	28.7	605	0.5
2000	79.5	73.4	36.2	5.5	25.4	596	1.3
2001	80.3	71.5	31.3	5.3	21.0	605	2.8
2002	80.7	65.9	29.9	5.4	20.3	614	2.9
2003	82.4	63.9	30.2	5.6	23.2	624	7.3
2004	83.9	62.2	35.7	5.6	24.6	624	15.8
2005	85.3	58.3	40.5	5.5	26.8	627	24.6
2006	85.5	57.7	42.1	5.6	28.9	623	27.5

Note: All entries are in percentage points except the FICO score.

1. Cumulated loan-to-value ratio (CLTV) includes both first and second mortgages.

2. Credit rating by major credit bureau (FICO).

Source: Ashcraft and Schuermann (2008) using LoanPerformance data.

ANNEX A2

Box A2. The current regulatory structure of US financial markets

Overview -- The regulatory framework of US financial markets is based on a structure that has been knit together over a long time. It has evolved through subsequent steps in response to specific problems without any real focus on overall mission: Congress established the national bank charter in 1863 during the Civil War, the Federal Reserve System in 1913 in response to various episodes of financial instability, and the federal deposit insurance system during the Great Depression. Changes were made to the regulatory structure in the intervening years in response to other financial crises, but for the most part the underlying structure still resembles what existed in the 1930s. In the recent past, the legislation, such as the Financial Modernization Act of 1999 (also known as the Gramm-Leach-Bliley Act), have begun streamlining the framework by setting out the principles of “functional regulation”, that is by establishing that “expert” regulators ought to supervise the relevant function. However, developments in capital markets and in the financial services industry over that past decade have repeatedly put the existing structure under pressure, exposing its deficiencies and its redundancies.

The system, in particular, remains highly fragmented, with a complicated web of multiple federal and state statutes and a myriad of agencies. There are several federal regulators for the banking sectors and for the securities and futures markets. The current number of agencies seems excessive especially for depository institutions, with jurisdictional boundaries often blurring and responsibilities significantly overlapping. For the insurance sector, the regulatory framework is even more segmented since there is no federal insurance regulator while there are more than fifty separate regulators at the state and local level.

The remainder of the box briefly lays out the main regulators and their functions.

Depository institutions; these include all commercial and savings banks. All depository institutions need a basic license to operate, the so-called “charter”, and the type of charter largely determines the primary regulator and the regulatory regime governing its operations. A noteworthy feature of the US system is that charters can be obtained at either the federal or state level.

- *Federal Reserve System (FRS)* – oversees state-chartered banks and trust companies that belong to the Federal Reserve System, bank holding companies (including financial holding companies), and US branches and agencies of foreign banks. In addition, the Federal Reserve possesses general consumer protection authority over all depository institutions at the federal level. To protect consumers, Congress over the years has enacted several important statutes applicable to all lenders, including: the Truth in Lending Act (TILA), which requires that credit terms for both credit card and mortgage transactions be clearly disclosed so consumers can compare credit terms more readily and knowledgeably; and the Home Ownership and Equity Protection Act (HOEPA), which amended TILA to prohibit unfair or deceptive acts for mortgage lending. The Federal Reserve has sole authority to write regulations implementing TILA and HOEPA. These rules issued by the Federal Reserve apply to all mortgage lenders but are enforced by the various bank regulators depending on the type of depository institution.
- *Federal Deposit Insurance Corporation (FDIC)* – regulates state-chartered banks that do not belong to the Federal Reserve System. The FDIC also administers the federal deposit insurance system insures and thus has backup regulatory and examination authority over all depository institutions that it insures. In addition, the FDIC plays a key role in administering the process of resolution of failed institutions.
- *Office of the Comptroller of the Currency (OCC)* – regulates all federally chartered “national” (“N.A.”) banks, and also supervises the federal branches and agencies of foreign banks.
- *National Credit Union Administration (NCUA)* – regulates federally chartered credit unions.
- *Office of Thrift Supervision (OTS)* – oversees federal savings and loans and federal savings banks.
- *State Banking Departments* (50 states and the District of Columbia) – regulate state chartered banks.

Securities and futures markets; the principal category of intermediaries in the securities markets are the brokers and the dealers. Essentially, a broker is a firm or individual who acts as an intermediary between buyers and sellers of securities, usually charging a commission for these services. A dealer is a firm or person who is in the business of buying and selling securities for her own account, either directly or through a broker. Many firms operate

as both brokers and dealers.

- *Securities and Exchange Commission (SEC)* -- regulates the purchase and sale of "securities" at the national/federal level. In addition, in 2004, the SEC implemented a voluntary program to regulate certain major US securities firms on a consolidated or group-wide basis. The SEC generally therefore examines all registered broker-dealers associated with Consolidated Supervised Entities (CSEs), material affiliates of a CSE, as well as the ultimate holding company. Under the program, the CSEs are required to maintain a system of internal controls, adequate capital, and sufficient liquidity to ensure that they can meet any obligatory cash commitments, even in a stressed environment. However, the SEC does not examine a CSE ultimate holding company or material affiliate if it already has a "principal regulator" in order to reduce duplicative/inconsistent regulation and the associated burden to firms. Last, since the Credit Rating Agency Reform Act of 2006, the SEC has the authority to register and oversee rating agencies. Registered nationally recognized statistical rating organisations (NRSROs) are subject to, among other duties and authorities, ongoing disclosure and recordkeeping requirements and SEC examination.
- *State securities regulators* (50 states and the District of Columbia) – administer and enforce the state statutes regulating securities transactions. These so-called "blue sky" laws typically include two basic requirements: the registration of securities and the registration and supervision of securities firms and professionals. In addition, state securities statutes commonly include provisions that prohibit securities fraud and that give state authorities the power to enforce those provisions.
- *The Commodity Futures Trading Commission (CFTC)* – regulates the purchase and sale of commodity and financial futures and options at the federal level. It does not have the authority to regulate transactions of over-the-counter derivatives. There is some overlap across the SEC and the CFTC. For instance, futures contracts on single securities and on narrow-based security indices are jointly regulated by the CFTC and SEC.

Insurance companies; these are primarily regulated by states. State statutes mainly deal with solvency regulation and consumer protection or market regulation. One of the rare instances in which Congress involved itself in insurance regulation was in 1974 with the enactment of the Employee Retirement Income Security Act (ERISA) that established regulatory requirements for employer-sponsored retirement plans, as well as other benefits such as medical, life, and disability insurance. The Department of Labour administers and enforces ERISA.

- There are 51 separate regulators in the continental United States and Hawaii (50 states and the District of Columbia) and additional regulators in U.S. Territories (Puerto Rico and the US Virgin Islands) The *National Association of Insurance Commissioners (NAIC)* was created in 1871 to address the need to coordinate regulation among the states by providing a forum for the development of uniform policy. Its mandate is to protect the public interest; promote competitive markets and the reliability, solvency and financial solidity of insurance institutions; facilitate the fair and equitable treatment of insurance consumers; and support and improve state regulation of insurance.

Bibliography

- Ahearne A., J. Ammer, B. Doyle, L. Kole and R. Martin (2005), “House Prices and Monetary Policy: A Cross-Country Study”, *International Finance Discussion Papers*, No. 841, Washington: Board of Governors of the Federal Reserve System.
- Ashcraft, A. and T. Schuermann (2008), “Understanding the Securitization of Subprime Mortgage Credit”, *Federal Reserve Bank of New York Staff Reports*, No. 318, March.
- Baily, M., D. Elmendorf and R. Litan (2008), “The Great Credit Squeeze: How It Happened, How to Prevent Another”, Discussion Paper, Brookings Institution: Washington, D.C., May.
- Bernanke, B. (2008a), *Fostering Sustainable Homeownership*, speech delivered at the National Community Reinvestment Coalition Annual Meeting, Washington, D.C., March.
- Bernanke, B. (2008b), *Stabilizing the Financial Markets and the Economy*, speech delivered at the Economic Club of New York, New York, NY, October.
- Bernanke, B. (2008c), *Fostering Sustainable Homeownership*, speech delivered at the Federal Deposit Insurance Corporation's Forum on Mortgage Lending for Low and Moderate Income Households, Arlington, VA, July.
- Blundell-Wignall, A. (2008), “The Subprime Crisis: Size, Deleveraging and Some Policy Options”, *Financial Market Trends*, Vol. 2008/1, No. 94.
- Blundell-Wignall, A. and P. Atkinson (2008), “The Sub-prime Crisis: Causal Distortions and Regulatory Reform”, *Lessons from the Financial Turmoil of 2007 and 2008*, Reserve Bank of Australia 2008 Conference, Sidney, October.
- Cecchetti, S. (2008), “Crisis and Responses: the Federal Reserve and the Financial Crisis of 2007-2008”, *NBER Working Paper*, No. 14134, June.
- Congressional Budget Office (2008), *Policy Options for the Housing and Financial Markets*, Washington, D.C., April.
- Curry T. and L. Shibut (2000), “Cost of the Savings and Loan Crisis: truth and Consequences”, *FDIC Banking Review*, Vol. 13, No. 2, pp. 26-35, December.
- Deutsche Bank (2008a), *Mortgage-backed securities special report*, 5 May.
- Deutsche Bank (2008b), “Unwinding leverage”, *Global Economic Perspectives*, July 28.
- Deutsche Bank (2009), “Overview of Global Policy Initiatives”, *Fixed Income Special Report*, January 29.
- Diamond, D. (1991), “Monitoring and reputation: The choice between bank loans and privately placed debt”, *Journal of Political Economy*, Vol. 99, pp. 689-721.

- Doms, M, F. Furlong and J. Krainer (2007), “Subprime Mortgage Delinquency Rates”, Working Paper, No. 2007-33, Federal Reserve Bank of San Francisco, November.
- Dudley, W. (2008), *May You Live in Interesting Times: The Sequel*, remarks delivered at the Federal Reserve Bank of Chicago's 44th Annual Conference on Bank Structure and Competition, Chicago, May.
- Elmendorf, D. (2007), “Was the Fed Too Easy for Too Long?”, unpublished manuscript, The Brookings Institution, November.
- European Central Bank (2008), *Financial Integration in Europe*, Frankfurt, April.
- Fleming, M., W. Hrungrung and J. McAndrews, (2008), “The Market Impact of the Term Securities Lending Facility”, unpublished manuscript.
- Geithner, T. (2008), *Reducing systemic risk in a dynamic financial system*, remarks delivered at The Economic Club of New York, New York, June.
- Girouard, N., M. Kennedy, P. van den Noord, C. André (2006), “Recent House Price Developments: The Role of Fundamentals”, *OECD Economics Department Working Paper*, No. 475, OECD Publishing.
- Goodhart, C. and A. Persaud (2008), “How to avoid the next crash”, *Financial Times*, January 30.
- Gramlich, E. (2007a), *Booms and Busts: The Case of Subprime Mortgages*, paper presented at the Federal Reserve Bank of Kansas City Symposium: Jackson Hole, WY, August 31-September 1.
- Gramlich, E. (2007b), *Subprime Mortgages: America's Latest Boom and Bust*, The Urban Institute: Washington, D.C.
- Greenspan, A. (2005), Testimony of Chairman Alan Greenspan, Monetary Policy Report to Congress, Board of Governors of the Federal Reserve System, February.
- Institute of International Finance (2008), *Final Report of the IIF Committee on Market Best Practices: Principles of Conduct and Best Practice Recommendations, Financial Services Industry Response to the Market Turmoil of 2007-2008*, Washington, D.C., July.
- Joint Forum (2008), *Credit Risk Transfer – Developments from 2005 to 2007*, Bank for International Settlements: Basel, Switzerland.
- Lockhart, J. (2007), *Housing, Subprime and GSE Reform: Where we are Headed*, Speech delivered at the exchange club of Washington, D.C., July.
- McAndrews, J., A. Sarkar and Z. Wang (2008), “The Effect of the Term Auction Facility on the London Inter-bank Offered Rate,” *Current Issues in Economics and Finance*, Federal Reserve Bank of New York.
- Mayer, C. and K. Pence, “Subprime Mortgages: What, Where, and to Whom?”, NBER Working Paper, No. 14083, June.
- Mian, A. and A. Sufi (2008), “The Consequences of Mortgage Credit Expansion: Evidence from the 2007 Mortgage Default Crisis”, *NBER Working Paper*, No. 13936, April.

- Mishkin, F. and K. Schmidt-Hebbel (2006), “Monetary Policy under Inflation Targeting: An Introduction”, Working Paper, No. 396, December; reprinted in *Monetary Policy under Inflation Targeting*, edited by F. Mishkin and K. Schmidt-Hebbel, Santiago, Chile, 2007.
- OECD (2008), *Economic Outlook*, No. 84, OECD Publishing, December .
- Paulson, H. (2008), *Remarks on Financial Rescue Package and Economic Update*, Department of the Treasury, November.
- Rajan, R. (2005), *Has Financial Development Made the World Riskier?*, Speech delivered at the Jackson Hole Conference.
- Stiglitz, J. and A. Weiss (1981), “Credit Rationing in Markets with Imperfect Information”, *American Economic Review*, Vol. 71, pp. 393-410.
- Taylor, J. and J. Williams (2008), “A Black Swan in the Money Market,” *Working Paper Series*, No. 2008-04, Federal Reserve Bank of San Francisco, April.
- Treasury (2008a), *The Department of the Treasury Blueprint for a Modernized Financial Regulatory System*, The Department of the Treasury, Washington, D.C., March.
- Treasury (2008b), *Best Practices for Residential Covered Bonds*, The Department of the Treasury, Washington, D.C., July.
- Warsh, K. (2008), *Financial Market Turmoil and the Federal Reserve: The Plot Thickens*, speech delivered at the New York University School of Law Global Economic Policy Forum, New York, April.

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