Section 2
How is the Crisis Unfolding?

Federal Reserve policy actions in August 2007: frequently asked questions (updated)

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A revised and updated version of the 13 August article on the basic whos and whys of what the Fed has been doing to calm financial markets.

Editors' note: This column updates the 13 August 2007 article on the same topic and includes a slightly revised version of the content of the earlier article.

Let us start with the facts. On Thursday 9 August 2007 the Federal Reserve's Open Market Trading Desk (the 'Desk') injected $24 billion into the US banking system. This was done in two equal-sized operations, one at 8:25am and a second 70 minutes later at 9:35am.[1] On Friday 10 August 2007, the Desk was in the market three times (8:25am, 10:55am and 1:50pm), putting in a total of $38 billion. By early this week, things seemed to have returned to normal with injections of $2 billion on Monday and no action at all on Tuesday.

The Fed's operations came on the heels of two even larger injections by the ECB in Frankfurt. On Thursday morning it put nearly €95 billion ($130 billion) into European financial institutions, followed by a somewhat smaller operation of €61 billion ($83.6 billion) on Friday. Things continued to seem unsettled in Europe after the weekend, as the ECB added €47.7 billion ($65.3 billion) on Monday (13 August), and then in two separate operations put €25 billion ($34.2 billion) into the European banking system on Tuesday.[2]

How is this actually done? What are the mechanics of the transactions?

In all of these cases, the funds were put into the banking system using what are called 'repurchase agreements' or 'repos' for short. A repurchase agreement is a short-term collateralized loan in which a security is exchanged for cash, with the agreement that the parties will reverse the transaction on a specific future date at an agreed price, as soon as the next day. For example, a bank that has a US Treasury bill (T-bill) might

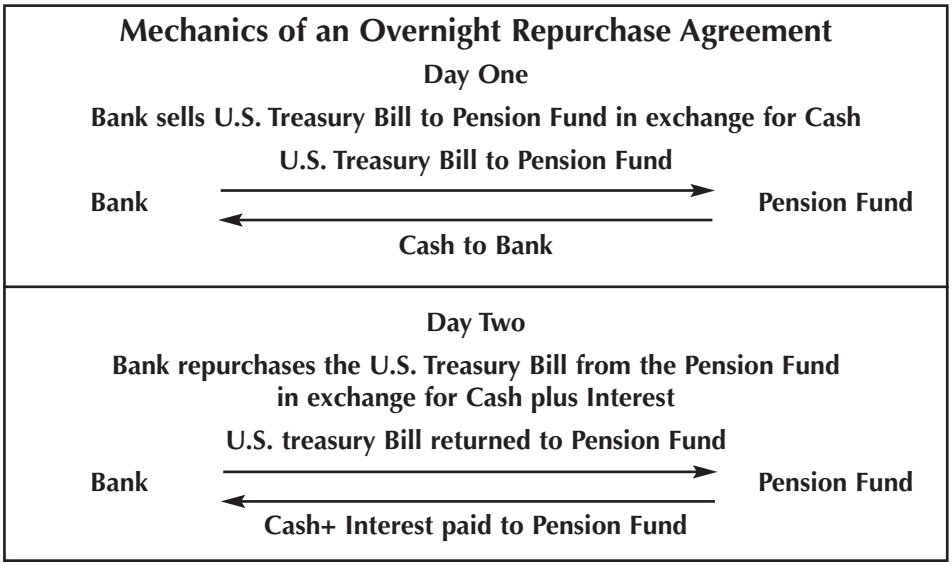
1 You can find all the details by looking at the historical data on the Federal Reserve Bank of New York's website. Every transaction is posted shortly after it is completed.

2 On Tuesday, the ECB provided €17.5 billion through its regular weekly auction plus €7.5 billion through fine-tuning operations.

need cash, while a pension fund might have cash that it does not need overnight. Through a repurchase agreement, the bank would give the T-bill to the pension fund in exchange for cash, agreeing to buy it back at the original price – repurchase it – with interest the next day. In short, the bank gets an overnight loan and the pension fund gets some extra interest. The details are shown in the figure below.

The easiest way to think about a repo is as an overnight mortgage. In the same way that you pledge your house to the bank in exchange for a loan, a financial institution pledges a bond to the Fed in exchange for funds.

Figure 1



The Desk engages in repurchase agreements every morning (the exact time varies). The quantities normally range from $2 billion to $20 billion.[3] Most of them are overnight; but it is standard to engage in repos that are as long as 14 days. The $35 billion on Friday 10 August 2007 was the largest since those in the aftermath of the 9/11 terrorist attacks. The record is $81.25 billion on 14 September 2001.

How does the Fed pay for the repo? Where does it get the money?

There is an important difference between what happens when two private financial institutions engage in a repo with each other and how it works when the Fed is involved. When a pension fund engages in a repo with a bank, the pension fund transfers cash to the bank. Looking at the cash accounts of the two institutions,

3 The Desk puts out a call for bids, usually stating the term of the repo and the type of collateral that it will accept. Banks and securities dealers submit their offers – quantities and prices – and then the manager at the New York Fed decides how much to accept. There are three types of collateral: US Treasury securities, US agency securities (issued by people like Fannie Mae and the Small Business Administration) and mortgage-backed securities. Offers average roughly five times what is accepted for Treasury securities, ten times for agency securities and 15 times for mortgage-backed.

we see the level of one going down (the pension fund) and the other one (the bank) going up, for a total of zero. When the Fed engages in a repo, it simply credits a bank's reserve account, creating money (albeit for a very short time). Put another way, when the Fed wants to engage in a repo, or buy anything else for that matter, it can simply create liabilities to do it. It is a bit like having a credit card with no limit where the bill never comes.

What happens if the bonds used in the repo fall in value overnight?

When the Fed engages in a repo the bank (or securities dealer) on the other side – what is called the counterparty – agrees to repurchase the security at a fixed price regardless of what happens in the markets.[4] It is these banks which reap the gains or suffer the losses from prices moving up or down. The only risk the Fed faces is that the counterparty in a repo goes bankrupt and cannot make good on the promise. Given that these are very large banks, and that the repos are very short-term, this is an incredibly unlikely event.

Does this have any impact on the government's budget deficit?

No. Central banks' operations have nothing to do with fiscal policy – federal government tax, expenditure and debt management policies – they are all about the interest rate and the quantity of reserves in the banking system. The Federal Reserve is the Federal Government's banker, accepting and making payments, issuing debt when it wants, etc., but they are not connected in any material way. (This is a slight simplification, as there is an esoteric connection that creates a quantitatively negligible impact.)

If the Fed has $35 billion to help the financial system, why can't it use some of its money to help the poor?

The Fed is not spending the money on bailing out banks or hedge funds, or helping rich people. It is making fully collateralized loans that will be repaid the next day (or week). So, while it is putting the funds in today, it is taking them out almost immediately. If, instead, the Fed were to take $35 billion in $20-dollar bills and hand them out to the needy, this would be a permanent increase in the quantity of money in circulation. More money in the long run means higher prices – and that is inflation.

What is liquidity and why is it so important?

The publicly stated rationale for these large interventions is that liquidity has dried up. Unfortunately, liquidity is one of those terms that means different things

4 The Fed only engages in transactions with 21 primary dealers. Primary dealers agree to make bids or offers when the Fed conducts open-market operations, provide information to the Fed's open-market trading desk and actively participate in US Treasury securities auctions when the bonds, notes and bills are initially sold.

to different people. In the glossary to my money and banking textbook, I define liquidity as 'the ease with which an asset can be turned into a means of payment such as money', that is, when an asset is liquid it is easy to sell large quantities without moving market prices. When something is illiquid, it is hard to sell.

People do not want to buy things that they cannot easily sell. If they are worried that a bond they are considering buying may be difficult or expensive to sell they will lower the price they are willing to pay, assuming anyone is still willing to buy it at all. For financial markets to function well, it must be cheap and easy both to buy and to sell securities. When market liquidity dries up, the financial markets stop functioning.

This form of liquidity might be better labelled market liquidity as distinct from what I would call lending liquidity. Lending liquidity is the term I attach to the concept that was in the news until recently. You may recall reading or hearing about enormous amounts of liquidity sloshing around the system. When people said this what they meant (I think) is that loan supply was plentiful so it was easy to borrow at favourable rates. Put differently (and using some technical jargon), it meant risk spreads were low and insensitive to a borrower's balance sheet position, that is, the risk premium a borrower paid was small and did not increase with additional borrowing, which should be riskier.

The autumn of 1998 was the last time market liquidity dried up to a greater extent than we observe today. Then it was difficult to even trade US Treasury securities, usually the most liquid financial market there is.[5] So far, things are nowhere near that bad. In fact, with few exceptions, markets still seem to be operating normally.

$35 billion seems like quite a bit of money. Is it?

To put the number into perspective, we have to understand what these funds are used for. When the Fed injects 'money' into the financial system what it does is create balances in what are called reserve accounts. That is where the money goes. Commercial banks have deposit accounts at the Fed (you and I cannot have one). Those are the bank's checking accounts, with the exception that they do not pay interest. Because there is no interest paid on reserve balances, banks try to economize on the quantities.

Banks hold reserves at the Fed for three primary reasons. First, they are required to hold them. Second, they need it to do business, so that they can meet customer demands for withdrawals and they can make payments to other banks. Third, it is prudent to do so; reserves act as the bank's emergency fund, they are always ready just in case disaster strikes.

5 We can get some sense of the operation of a market by looking at the behaviour of securities dealers who both buy and sell. When a market operates normally, the difference between the price they bidding to buy and the one they asking to sell – the bid/ask spread – is very small and they are willing to quote a single price for a large quantity. In the fall of 1998 there was a brief period when the bid/ask spread for US Treasury bonds was ten times normal and the quantity for which dealers were willing to hold the price was one-tenth normal.

So, is $35 billion a big number or not?

Here are three numbers we could use to get some sense. First, total reserves in the US banking system for the two weeks ending 1 August 2007 averaged $45 billion, of which roughly $12 billion was held as deposits in reserve accounts at the Federal Reserve. The remainder is held in cash in banks' vaults – that counts, too.

Second, excess reserves, those above what the Fed requires banks to hold, usually total less than $2 billion.

Third, on an average day, the gross quantity of interbank transfers is $4 trillion. This includes $1.6 trillion in funds that are transferred for the purpose of settling purchases and sales of various bonds (primarily US Treasury securities).[6]

Looking at these numbers, first we see that the Fed's action on Friday increased banking system reserves by more than 75%. More importantly, the addition of $35 billion increased the size of reserve accounts by a factor of four. Second, the increase was more than ten times the normal level of excess reserves (although for complex reasons it is hard to know today exactly how much it will add to average excess reserves).

Finally, note the rather amazing fact that during normal times the banking system uses $12 billion to engage in $4 trillion in daily transactions. That is, on average a dollar in a reserve account is used more than 300 times per day. Because reserves do not pay interest, banks have a big incentive to economize on their use – this is pretty efficient. (This is also the reason that excess reserves are so low.) That banks do this every day suggests that they know how to do it; but the fact that they use the funds so many times means that if anyone starts hoarding reserves, there is the potential to disrupt the system.

The conclusion is that $35 billion is a very big number, three times the normal level of reserves that banks hold.

Why did the banks need this money?

It is easy to explain why the Fed used open-market operations to add $81.25 billion on 14 September 2001 in the aftermath of the 9/11 terrorist attacks. People's inability to reach their offices in downtown New York had closed some very large banks. Though those banks could still receive payments from other banks, they could not make any payments to anyone else. Funds were flowing into a few huge reserve accounts, but nothing was coming out. A few large banks were sucking up the lifeblood of the financial system.

Last week the trigger seems to have been the continued fall in the value of certain mortgage-backed securities. Mortgage-backed securities bundle a large number of mortgages together into a pool in which shares are then sold. The owners of these securities receive a share of the payments made by the homeowners who borrowed the funds. The pools create a form of insurance. In the same way that automobile insurance companies know what fraction of the insured will have collisions (but not exactly which individuals), pools of mortgages mean investors can predict the quantity of defaults and the repayment rates.

6 If you want to know more, look at: www.federalreserve.gov/paymentsystems/fedwire/default.htm

There are numerous types of mortgage-backed securities, but the ones that have run into difficulty are in what is called the subprime segment of the market. Subprime borrowers are basically people with poor credit who cannot qualify for a standard mortgage. Making loans to these people is known to be risky. And when things are risky, sometimes they do not work out. That is what happened.

But up to now, the problems in the subprime mortgage market are relatively small. Currently, losses are estimated to be at most $35 billion, equivalent to a stockmarket decline of about 0.2%. (Last week the value of stocks traded in US markets were down a not terribly unusual 1.5%, or seven times the total expected decline in the value of these mortgages.)

What has happened is that problems in this one small part of the financial system have been seeping into the rest of the market. When people see that they have underestimated the risks in one place, they start to question their ability to accurately evaluate risks everywhere else.

Then two things happen. First, the prices of risky financial assets fall. Risk requires compensation, and the more risk there is the more compensation. Second, people flee from risky stuff that they find hard to evaluate and put their money in safe assets. This is what is called a flight to quality and it is reflected in an increase in prices of US Treasury securities and an influx of funds into the banking system.

So, the first reasons the banks need the reserves is to serve the customers that have brought money into their deposit accounts.

But individuals are not the only ones who have reduced their tolerance for risk. Bankers have, too. Bankers' reduced risk tolerance shows up in two important ways, both of which result in higher demand for reserve balances. The first is that they simply want a bigger cushion against the possibility of losses. That is pretty simple.

The second reason bankers need more reserves is that they became less willing to lend their reserves to other banks. There is a huge daily interbank market for overnight loans. It is called the federal funds market and the interest rate charged on those overnight loans is the federal funds rate. The federal funds rate is the rate targeted by the Federal Reserve.[7] On a normal day (which Thursday and Friday of last week were not) banks are willing to make loans early in the day even if it means temporarily overdrawing their accounts. (Yes, they are allowed to do that.) Banks that are overdrawn in the morning figure that if they do not receive payments to bring their reserve accounts back into positive territory by the end of the day, they can always go out and borrow it back. Well, it appears that last week banks were not willing to behave in this way and the result was that it was very difficult to borrow late in the day.

The bottom line of this very long-winded explanation is that the banks wanted to hold substantially higher level of reserves. Keeping the federal funds rate at its target level of 5¼% – that is what the desk is supposed to do every day – meant engaging in huge operations.

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7 When the Federal Open Market Committee sets the interest rate they are really instructing the Desk to try to keep the federal funds rate determined by banks in the market for overnight loans near a specific target. The Desk does this by supplying the quantity of reserves it believes the banking system will want at that target rate. For somewhat complex reasons, the Fed does not actually determine the rate. See Chapter 18 of my textbook Money, Banking, and Financial Markets (pp. 462 ff.,1st edn, pp. 430ff., 2nd edn).

Did the Fed's operation have something to do with mortgages?

Yes. On Friday 10 August the Fed accepted mortgage-backed securities as collateral for the entirety of the $35 billion in repos it engaged in that day. Importantly, though, they did not accept just any mortgage-backed securities. They only allowed dealers to pledge mortgage-backed securities issued or fully guaranteed by federal agencies.

Two comments are important here. First, this is not new. The willingness to accept mortgage-backed securities as collateral in repo goes back to changes made in advance of the year 2000 switchover. At the time there were concerns about being able to get funds into the financial system quickly, and this is one of the changes made to ensure the Desk could do that. Since then, the Fed has taken mortgage-backed securities as collateral in repo at nearly the same rate they have taken agency securities.

Nevertheless, the way in which the Fed chose to do this on Friday 10 August is notable. Normally, when the Fed sends out a message it tells dealers exactly what it wants in collateral. Each of the three categories is treated separately. So, it is common for the Desk to send out a message that it is willing to accept only Treasury securities. Alternatively it might send out a message that it will accept all three types – Treasury, agency and mortgage-backed – in three separate operations. What the Desk did on Friday is send out a message that said it would take whatever the dealers wanted to deliver. Since mortgage-backed securities are the cheapest to deliver (they have the lowest price in the market), that is what came in.

My speculation is that the Fed did this to demonstrate to the markets that it believes mortgage-backed securities are good as collateral. It was trying get financial-market participants to value mortgage pools sensibly.

Who decides to do this?

A number of people are involved in deciding the quantity of a daily open-market operation. On a normal day there is not much to decide. The Desk staff makes a recommendation in a conference call and the participants agree. (Having listened in on these calls, I can attest to the fact that they are normally not very interesting.) Last week was obviously not normal. While I doubt that the entire Federal Open Market Committee decided on the action, the committee members may have been consulted through a conference call. My guess is that the chairman, Ben Bernanke, and the New York Fed president, Timothy Geithner, had a say. What I can be sure of is that the decision was made by the Federal Reserve, not by the Secretary of the Treasury or the President of the United States.

Why did this happen when it did?

It is natural to ask whether there is some specific reason for these events to occur when they did. Can we identify a specific trigger? While we can see something has happened, as I suggested earlier, there has been no fundamental deterioration in economic conditions. In fact, in the United States there was no economic data

released on Thursday 9 August 2007. So, people did not suddenly change their view of the future.

Instead, what happened was analogous to a bank run. Bank runs can be the result of either real or imagined problems. How it works is that most people, even fairly sophisticated investors, are not in a position to assess the quality of the assets on a financial institution's balance sheet. In fact, most people do not even know what those assets are. So when we learn that one bank is in trouble, investors begin to worry about all financial institutions and start to flee. The inability to accurately value assets leads to a strong shift toward high-quality securities like Treasury bonds.

Thinking about it this way, there are two events that may have precipitated this. The first was the announcement on 2 August that the German bank, IKB Deutsche Industriebank AG, was in trouble because of investment in US subprime loans. And then, on Wednesday one of Europe's largest banks, BNP Paribas, had three funds with similar problems. Financial-market participants' response was to reduce their exposure to risky investments, on the assumption that they could not properly assess the risks. That is exactly analogous to a bank run. It is impossible to predict the exact timing of something like that.

Does this have anything to do with discount lending?

For those of you who have seen (and heard) Jim Cramer's diatribe on CNBC on Monday 3 August,[8] you may be wondering about discount lending. The Fed has a standing offer to lend to banks (so long as they have collateral to pledge for the loan) at a rate that is 1 percentage point above the federal funds rate target of 5¼%. So, today a bank can borrow from the Fed at 6¼%. Banks, not the Fed, decide when to request a discount loan. The borrowed funds are deposited into the bank's reserve account and can be loaned out to other banks.

While we do not know for sure, it seems unlikely that discount lending increased much last week. The reason is that banks always have the option of borrowing from other banks at the federal funds rate, and the Federal Reserve Bank of New York reports that the highest rate charged for an overnight interbank loan late last week was 6%.[9] I seriously doubt that a bank would borrow from the Fed at 6¼% when it can borrow more cheaply from another bank.

I would guess that Cramer was really arguing for an interest-rate cut. It is hard to see why that is necessary at the moment. If you cannot buy and sell the securities you own, you probably do not care if the cost of funds is 5¼% or 4%, or whatever.

8 You can watch Jim Cramer screaming on UTUBE at: http://www.youtube.com/watch?v=SWksEJQEYVU It is very entertaining and will take you only 3:13 minutes to watch.

9 On the day of Cramer's diatribe, there was a federal funds loan reported at 6½%, above the level at which the Fed was willing to lend. But because both the effective federal funds rate was close to the target and the (weighted) standard deviation was low, my strong suspicion is that the quantity of lending at 6½% was very low.

The ECB's operation was much larger than the Fed's. Is there a reason?

The details of the ECB's operating procedures are very different from those of the Fed, and I will not go into the details here. Nevertheless, I can provide the simplest explanation for the size of the ECB's operation. When the ECB announced its intention to provide funds on Thursday 9 August 2007 (a day it would not normally operate at all), it said that it would accept all bids at or above their 4% target. The result was that banks asked for and received €95 billion ($130 billion) on Thursday, €61 billion ($83.6 billion) on Friday, and €47.7 billion ($65.3 billion) the following Monday.[10]

To explain this, we need to understand two things about how bank reserves work in Europe. As it turns out, 9 August is the first day of a 35 day reserve maintenance period in the eurosystem. As I mentioned earlier, banks hold reserves because they are required. The amount they need to hold depends (in a complicated way) on the size of deposits the bank held in the past. Because there can be day-to-day fluctuations in accounts, the requirement is enforced as an average over a longer period, called the maintenance period. In the United States, the maintenance period is two weeks. In Europe it varies from 28 days to 35 days.

The second point is that in Europe banks receive interest on the reserves that they are holding. The interest rate paid on required reserves is equal to the average of the overnight lending rate over the maintenance period, a rate that is almost always slightly above the ECB's target rate. (This is very different from the United States, where no interest is paid.)

Imagine that you are a bank and you hear the ECB announce that it will lend you as much as you want at the 4% target. Maybe you know something about what is going on, maybe not. In either case, when the ECB says that it is going to give you as much as you want on a day when it normally does nothing, you have to wonder what they know that you don't.

You also know that since the reserve requirement is an average over the next 35 days, if you hold a high level of reserves today, you can always make up for it with a very low level before the end of the maintenance period. And, again unlike in the United States if you are stuck with excess reserves holdings, in you can redeposit it at the ECB at a 3% interest rate. All of this makes it much cheaper for European banks to take the reserves from the ECB and helps explain why they took so much.

10 It is possible that the ECB did this to rescue a single institution that was unable to obtain credit elsewhere. I hope that is not the case.

An extensive but benign crisis?

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The public is overreacting to the current turmoil in financial markets. The turmoil is most likely a situation where very specific problems are spread out extensively across investors and countries and thus the defaults are benign.

The public and (especially) the press seem to have overreacted to the current turmoil in financial markets. It is often claimed that all we are witnessing is global liquidity's revenge on Bernanke. However, if it is a financial turmoil that we are facing, it is most likely to involve an 'extensive/benign' scenario rather than an 'intensive/malign' scenario. An extensive/benign scenario is one in which a specific and quantitatively limited type of risk (i.e. the one related to the subprime borrowers in the United States) is spread out extensively across investors and countries for risk-sharing purposes (the benign phenomenon) via the instruments of financial diversification. An intensive/malign scenario, by contrast, is one associated with a large amount of risk concentrated with some investors (possibly geographically), whose deterioration usually leads to large default losses (the malign phenomenon).

In the last 20 years, financial markets have changed dramatically throughout the world, and in the United States in particular. This has been synonymous with the increased ability of risk diversification. Put differently, the new financial system has become increasingly atomistic. The physical link between the primary borrower (the family seeking a mortgage) and the lender, via a plethora of instruments of financial diversification (and of subsequent borrowers/lenders along this chain), has weakened considerably.[1] At the same time, technological improvements in the risk assessment process have substantially reduced monitoring costs for lenders.

In this context, the fact that lenders (loosely speaking) have been assuming an increasing amount of risk (the subprime loans) is a natural implication of the deepening of financial diversification. In the specifics of mortgage markets, home-ownership projects that were turned down ten years ago have now become eligible for finance. With falling monitoring costs and the increased ability of diversification, financing riskier categories of borrowers can be perfectly consistent with profit maximization by lending institutions. But for previously constrained families,

1 The IMF refers to this as a more arm's-length financial system, with an increased role for price signals and competition among lenders (see IMF WEO, September 2006).

this process of financial diversification has meant a loosening of their borrowing constraints. Overall, and from the viewpoint of economic theory, it is hard to identify this as a malign phenomenon.

It is sometimes argued that, along the financial diversification chain, it may become increasingly difficult to identify where the risk exactly lies. Certainly true, yet isn't this exactly what financial diversification is all about? Making idiosyncratic (family-specific) risk negligible relative to the aggregate pool of financed (home-ownership) projects.

From a different angle, many critics have pointed out the fallacy of this process arguing, somewhat loosely, about excessive lending or excessive amount of risk as necessary drawbacks of increased financial diversification. From the standpoint of economic theory, though, excessive is meaningful only if inefficient. In this case, one can formally identify an inefficiency if either of two phenomena arises: an increased 'adverse selection' and/or an increased moral hazard problem. Possibly only the latter qualifies as concrete in this context.

Adverse selection and moral hazard

Is it not worrying that, simply allured by the rumour that nowadays nobody is denied a mortgage, virtually any family – including the most risky ones – can decide to show up in a bank and ask for a loan? Not really, to the extent that the risk associated with this borrower is priced correctly (with this being more likely as monitoring costs fall) and is diversified through the system. After all, once again, this is what financial risk-sharing is all about.

Is it not true that, tempted by the increased opportunities of insurance, financial institutions have been taking up an increasing amount of risk? Prima facie, this may qualify as a deepening of a moral hazard problem. 'Lending institutions need to take risks by making loans, and usually the most risky loans have the potential for making the most money. A moral hazard arises if lending institutions believe that they can make risky loans that will pay handsomely if the investment turns out well but they will not have to fully pay for losses if the investment turns out badly.'[2]

In the specifics of our example, the insured is financial institution 'n-1' along the chain and the insurer is financial institution 'n' buying a mortgage-backed security. What is crucial about moral hazard, though, is that the insured individual (better informed than the insurer about his/her own intentions) has the ability to affect the return distribution through his/her behaviour, and does that in a distorted way. Does this apply to our case? Possibly yes. Pushed by fierce competition to make it to the 'funds-of-the week' top-ten list of pseudo-specialized financial reviews, with the comfortable belief that one will be handsomely compensated in the case of success and allured by the possibility of diversifying much of the risk away, many funds' managers have probably taken up an increasingly inefficient amount of risk. A correct assessment of risk should instead consist in compensating funds managers just slightly less if the fund is listed at, for example, 11th in the ranking (if only such an ideal ranking existed).[3] To be sure, this poten-

2 Source: Wikipedia.

3 I thank Nicola Pavoni for a lively discussion on this point.

tial source of inefficiency does not lie in the funding of subprime loans per se, but in the excess funding of risky projects due to a perverse or distorted assessment of risk.

A correct quantitative assessment of the proportion of these inefficiently risky loans is extremely hard. However, one should make sure that such an assessment be made relative to the spectacular increase in financial investment experienced in the last ten years in both the US and global markets. In this vein, there is scope for cautious optimism.

House prices and aggregate compared with idiosyncratic risk

In the turmoil of comments witnessed these days, many seem to have forgotten that, in the United States, the initial cause of distress has been a fall in house prices. It is well-known that, via gains in home equity,[4] the house price acceleration has considerably widened the access to borrowing for the average family through a series of instruments: secondary loans, mortgage-equity withdrawal, mortgage refinancing, etc. Here, though, we would like to focus the attention on two partly neglected aspects: the previous increase in house prices may not have necessarily been a bubble; a fall in house prices is the realization of an aggregate risk.

Are we really confident that the recent fall in house prices qualifies (as many have repeatedly suggested) as the pricking of a bubble? This is important; for it implies that the previous price inflation was somehow inefficient.[5] However, serious models exist (the elaboration of which Bernanke has eminently contributed to[6]) that can rationalize an acceleration in asset prices as the result of a so-called credit cycle: an initial increase in house prices (perfectly consistent with fundamentals) strengthens the demand for borrowing (via an equity valuation effect), which in turn validates and reinforces the initial increase in prices. Of course, one cannot rule out that part of the observed run-up in house prices may have been unjustified on the basis of fundamentals. Yet, once again, such an assessment should be made relative to the acceleration that can be rationalized on the basis of a coherent model of the type described above. Furthermore, the parallel strong acceleration in housing investment experienced in the United States may have gradually led to a re-balancing of supply with demand in the housing market, finally leading to the recent fall in prices.

A possible source of concern behind the fall in house prices is that it constitutes the realization of an aggregate shock. As it hits all families simultaneously, this shock is by definition not diversifiable. Hence, there is nothing to blame the modern financial architecture here. This is definitely material for monetary policy. Fortunately nobody knows better than Bernanke about the connections between the financial and the real side of the economy. Despite the allegations of 'rooky mistake' for defining the subprime problem as contained, Bernanke is the one that

4 Technically, the difference between the existing value of the mortgage and the market value of the house.

5 Some economists would, for good reasons, also qualify bubbles as efficient outcomes, but we prefer to abstract from this point here.

6 Bernanke and Gertler (1989); Kiyotaki and Moore (1997). These papers differ in many details but both contain a financial acceleration mechanism.

has spoken recently about a possibly forthcoming negative financial acceleration problem for US families: falling house prices leading to a worsening of balance sheets, to a rise in families' finance premia and tightened borrowing conditions, with possible final effects on consumption.[7]

However, this concern may once again be worth a word of caution. In today's increasingly integrated financial markets, national (usually the prototype of aggregate) shocks assume increasingly the form of idiosyncratic shocks: country risk can in fact be shared away internationally. This entails that both the United States and Europe may end up experiencing a dampening in their growth rates of consumption/output in the near future, but of possibly contained magnitude exactly because of the benefits of international risk-sharing.

The stockmarket and Bernanke's two sides

What to make, then, of the recent turmoil in financial markets? Here we obviously enter more risky territory. One interpretation is that the usual irrational exuberance of the market may have focused excessively on the extensive rather than the benign part of the story. A spark originating from a somewhat limited niche of the US mortgage markets was after all spreading geographically with surprising pervasiveness. In this vein, the phenomenon was taking the form of a new crisis.

But could it not be that we are just facing a relative benign risk being spread out extensively (and therefore not likely to generate major losses and defaults), as opposed to a malign intensive risk concentrated geographically (as the bank crises of the past, see for instance the Massachusetts credit crunch of the 1980s)?

Is the Fed hesitating too long in cutting interest rates? The malevolent interpretation is that Bernanke is hostage to his (alleged) schizophrenic identity, with the champion of inflation targeting on the one hand, and the scholar of the Great Depression on the other. More than a weakness we may see this as a strength. The Fed may well have embraced the extensive-benign interpretation. If this was the case, it is sensible to wait that the portion of "inefficient risk" (see our point above) be naturally re-absorbed by the market, thereby avoiding an ex-post validation of any moral hazard behaviour (however relevant it might have been). Different, and more important, is the issue that pertains to spillovers that may affect the real side of the economy. The Fed is definitely anticipating a cut in the funds rate if any signals of such spillover materialise. In the meantime, the international risk-sharing scenario cited above may continue to offer a comfortable buffer of inertia, both for the Fed and the ECB.

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Not (yet) a 'Minsky moment'

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23 November 2007

The subprime troubles caused a liquidity shock, but there is little reason to believe that a substantial decline in credit supply under the current circumstances will magnify the shocks and turn them into a recession. We have not (yet) arrived at a Minsky moment.

The late Hyman Minsky developed theories of financial crises as macroeconomic events. The economic logic he focused on starts with unrealistically high asset prices and buildups of leverage based on momentum effects, myopic expectations and widespread overleveraging of consumers and firms. When asset prices collapse, the negative wealth effect on aggregate demand is amplified by a "financial accelerator"; that is, collapsing credit magnifies falling aggregate demand. A severe economic decline is the outcome. Many bloggers refer to this as a "Minsky moment" (see Minsky 1975 for the real thing.)

I am sympathetic to the view that "Minsky moments" can happen (indeed, I have written numerous studies that give some support to that claim). But in my view, the correct application of the Minsky model to the current data indicates that we are not facing a Minsky moment – at least not yet. This column, which draws on a much longer analysis I have posted at the AEI, summarises my reasoning.

At the moment, it is not obvious that housing or other asset prices are collapsing, or that leverage is unsustainably large for most firms or consumers. That is not to say that the economy will avoid a slowdown, or possibly even a recession. My main focus is not on forecasting changes in housing prices or consumption, per se, which are very hard to predict. I am interested in assessing the likelihood that financial weakness will substantially magnify aggregate demand shocks through a

The current liquidity shock

We are currently experiencing a liquidity shock to the financial system, initiated by problems in the subprime mortgage market, which spread to securitisation products more generally - that is, mortgage-backed securities, asset-backed securities, and asset-backed commercial paper. Banks are being asked to increase the amount of risk that they absorb (by moving off-balance sheet assets onto the balance sheet), but the related losses that the banks have suffered are limiting somewhat the capacity of banks to absorb those risky assets. The result is a reduction in

aggregate risk capacity in the financial system as losses force those who are used to absorbing risk to sell off or close out their positions.

The financing of many risky activities unrelated to the core mortgage market shock has been reduced relative to their pre-shock levels. There are, at least temporarily, lots of "innocent bystanders" that are affected due to the aggregate scarcity of equity capital in financial intermediaries relative to the risk that needs reallocating.

The housing finance sector shock that started the current problems was small relative to the economy and financial system (estimated losses on subprime mortgages range from $200 billion to $400 billion). It was magnified because of the increased and imprudent use that has been made of subprime mortgage-backed securities in the creation of other securitisation conduits, and because of the connection of the instruments issued by those conduits to short-term asset-backed commercial paper.

From 2000 to 2005, the percentage of non-conforming mortgages that became securitized increased from 35% to 60%, and the volume of non-conforming origination also rose dramatically. Subprime mortgage originations rose from $160 billion in 2001 to $600 billion in 2006. And many of these securitized mortgages became re-securitized as backing for CDOs. As of October 2006, 39.5% of existing CDO pools covered by Moody's consisted of MBS, of which 70% were subprime or second-lien mortgages. Why did subprime issuance boom from 2002 to 2006? Foreclosure rates for subprime mortgages actually peaked in 2002, but remarkably, that experience led to a sharp acceleration in the volume of subprime originations because the 2002–3 foreclosures did not produce large losses. Losses from foreclosure were low in the liquid and appreciating housing market, and ratings agencies wrongly concluded that the forward-looking risks associated with subprime foreclosure were low. Instead, ratings should have recognized that this was an unusual environment, and that there was substantial risk implied by high foreclosure rates.

Despite CDOs' increasing reliance on subprime mortgage-backed securities and the observably low quality of these assets (i.e. high subprime foreclosure rates), CDO pools issued large amounts of highly rated debts backed by these assets. The CDO problem became magnified by the creation of additional layers of securitization involving the leveraging of the super-senior tranches of CDOs (the AAA-rated tranches issued by CDO conduits). These so-called leveraged super-senior conduits, or LSS trades, were financed in the asset-backed commercial paper (ABCP) market. Some banks structured securitizations that levered up their holdings of these super-senior tranches of CDOs by more than ten times, so that the ABCP issued by the LSS conduits was based on underlying organizer equity of only one-tenth the amount of the ABCP borrowings, with additional credit and liquidity enhancements offered to assure ABCP holders and ratings agencies. When CDO super-senior tranches turned out not to be of AAA quality, the leveraging of the CDOs multiplied the consequences of the ratings error, which was a major concern to ABCP holders of LSS conduits.

We have learned from the recent turmoil that mistakes in the pricing of fundamental risks in one market can have large consequences for the global financial system. In some ways, the global dimension of the shock is a sign of progress. Over the last two decades, securitization produced great progress in the sharing of risk

and the reduction of the amount of financial system equity capital needed to absorb risk, by establishing mechanisms for transferring risk from banks' and finance companies' balance sheets to the market, and by establishing those mechanisms in creative ways that reduced adverse selection and moral hazard costs associated with more traditional securities markets.

That progress was real and these technological innovations will persist. Mistakes were made as part of what could be called a process of learning by losing (the history of the last two decades has seen many temporary disruptions to the process of financial innovation in securitization, as discussed in Calomiris and Mason (2004), of which the current liquidity shock is clearly the most severe). Securitizations have had a bumpy ride for two decades, which is inherent in innovation, but overall the gains from reshaping risk, sharing risk and creating mechanisms that reduce the amount of equity needed per unit of risk (through improved risk measurement and management) have been large and will remain large, even if there is a substantial permanent shrinkage in securitized assets.

Risk reallocation has already produced a decline in the supply of available credit for some purposes, and this will not be fixed overnight. The financial system was devoting too little equity to intermediating risk in the mortgage securitization market. There is likely to be a long-term reduction in the amount of credit that can be supplied per unit of equity capital in the financial system.

Furthermore, the shock occurred at a time when credit spreads seemed unreasonably low to many of us, reflecting the unusually high level of liquidity in the marketplace and the willingness of investors consequently not to charge sufficiently for bearing risk. In this sense, it is quite possible that credit spreads, once disturbed from those unrealistically low levels, will remain somewhat elevated after the shock dissipates.

But these adjustments, at least for now, do not a financial crisis make. It is possible that the financial system and economy could follow the patterns of 1970, 1987 and 1998 and recover from financial disturbances quickly without experiencing a recession, even without any further monetary policy stimulus by the Fed.[1]

Reasons to be cheerful

My view of the limited fallout rests on eight empirical observations.

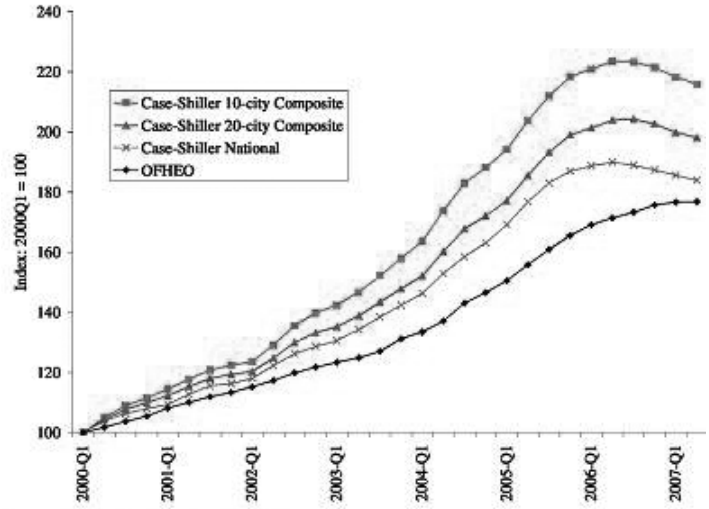
1. Housing prices may not be falling by as much as some economists say they are.

   Too much weight is being attached to the Case-Shiller index as a measure of the value of the US housing stock. Stanley Longhofer and I, along with many others, have noted (Calomiris and Longhofer, 2007) that the Case-Shiller index has important flaws. Most obviously, it does not cover the entire US market, and

1 Recent Fed actions through the discount window and the fed funds rate (discussed below) are comparable with the Fed actions in 1970, 1987 and 1998, episodes during which Fed loosening was confined to fed funds rate declines that averaged 1.1% over the three episodes. To be specific, in 1970 the fed funds rate fell from 7.80% on 17 June to 6.34% on 26 August; in 1987 it fell from 7.59% on 14 October to 6.43% on 4 November; in 1998 it fell from 5.50% on 29 September to 4.75% on 17 November.

the omitted parts of the US market seem to be doing better than the included parts. A comparison between the Case-Shiller and OFHEO (Office of Federal Housing Enterprise Oversight) housing price indexes shows that the Case-Shiller index provides a strikingly different, and less representative, picture of the US housing stock from OFHEO's index. According to the OFHEO index, as shown in Figure 1, housing prices continued to rise on average through June 2007.

Figure 1 U.S. home price appreciation

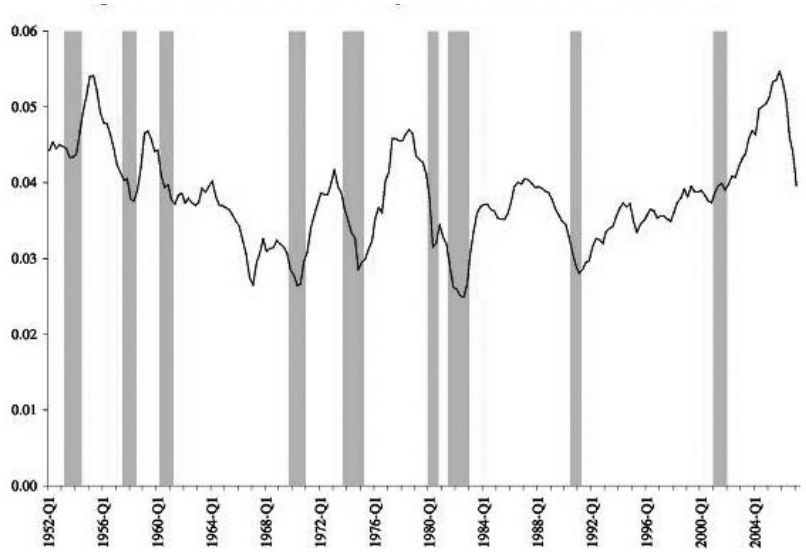


Sources: Calomiris & Longhofer (2007).

2. Although the inventory of homes for sale has risen, housing construction activity has fallen substantially.

   The reduced supply of new housing should be a positive influence on housing prices going forward. Single-family housing starts dropped 7.1% in August relative to July and are down 27.1% on a year-to-year basis. Building permits for single-family homes slumped 8.1% in August (the largest decline since March of 2002) and were down 27.9% on the year. This decline in residential investment responded to an apparent excess supply problem; homeowner vacancy rates, which had averaged 1.7% from 1985 to 2005, jumped to 2.8% in 2006. The decline thus far in residential investment by the household sector as a share of GDP has been comparable by historical standards with the declines in the 1950s, 1960s, 1970s and 1980s (most, but not all, of which preceded recessions), as shown in Figure 2.

Figure 2 Residential investment by household sector relative to GDP

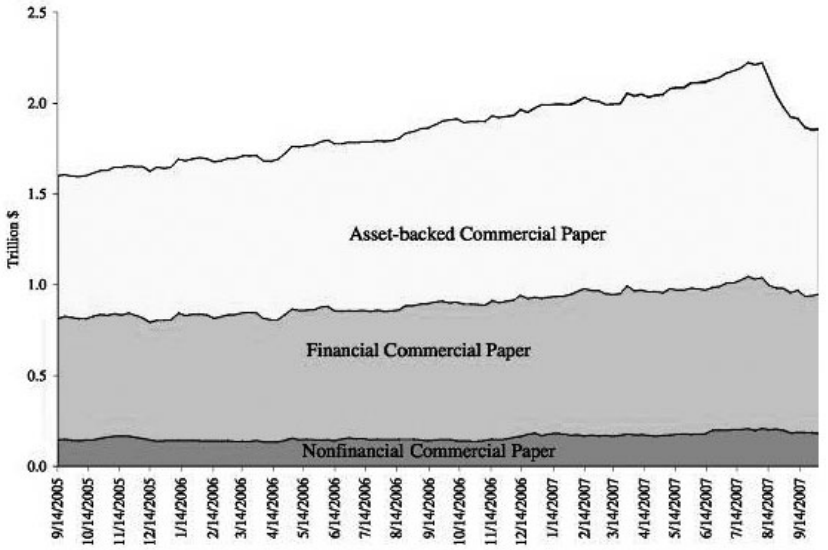


Note: Recessions are shaded.

Source: Federal Reserve Statistical Release Z.1, Table F.6.; National Bureau of Economic Research, Business Cycle Expansions and Contractions.

As Figure 3 shows, almost the entire decline in commercial paper in recent months has come from a contraction of asset-backed commercial paper, while financial commercial paper has contributed somewhat to the decline, and non-financial commercial paper has remained virtually unchanged.

Figure 3 Commercial paper outstanding (weekly, seasonally adjusted)



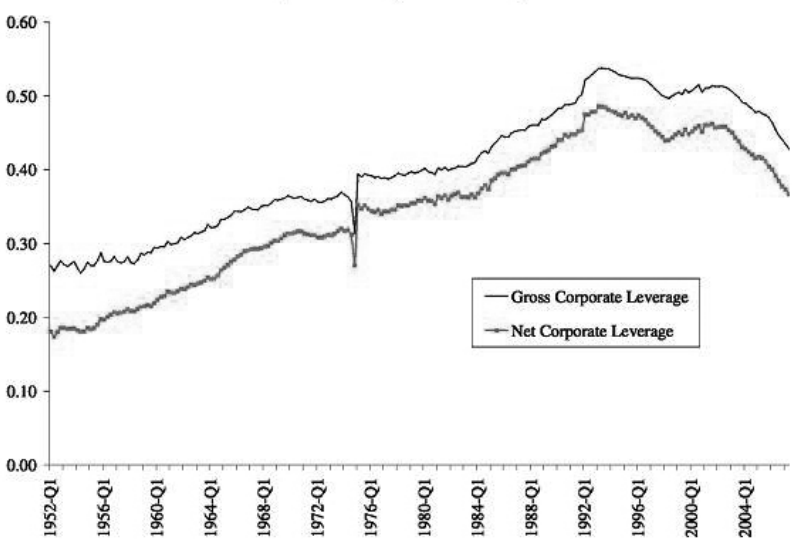
Source: Federal Reserve (http//www.federalreserve.gov/DataDownload/Choose.aspx?rel=CP)

This shows that the fallout from the shock has mainly to do with the loss in confidence in the architecture of securitization per se, and secondarily with rising adverse-selection costs for financial institutions, but has not produced a decline in credit availability generally.

4. Aggregate financial market indicators improved substantially in September and subsequently. Stock prices have recovered, Treasury yields rose in September as the flight to quality subsided, and bond credit spreads have fallen relative to their levels during the flight to quality (although T-bill yields remain low relative to other money market instruments).

5. As Figure 4 shows, non-financial firms are highly liquid and not overleveraged. Thus, many firms have the capacity to invest using their own resources, even if bank credit supply were to contract.

Figure 4 Corporate leverage



Note: Gross corporate leverage is defined as liabilities divided by assets. Net corporate leverage is defined as liabilities, less cash, divided by assets. Cash is defined as total financial assets, less trade receivables, consumer credit, and miscellaneous assets.

Source: Federal Reserve Statistical Release Z.1, Table B.102.

6. As Malpass (2007) has emphasized, households' wealth is at an all-time high and continues to grow. So long as employment remains strong, consumption may continue to grow despite housing-sector problems.

7. Of central importance is the healthy condition of banks. As the Fed chairman, Ben Bernanke, noted from the outset of the recent difficulties, financial institutions' balance sheets remain strong, for the most part, even under reasonable worst-case scenarios about financial-sector losses associated with the subprime fallout. Bank lending has been growing rapidly, which is accommodating the

transfer of securitized assets back on to bank balance sheets. The high capital ratios of banks at the onset of the turmoil is allowing substantial reintermediation to take place without posing a threat to the maintenance of sufficient minimum capital-to-asset ratios.

8. Banks hold much more diversified portfolios today than they used to. They are less exposed to real-estate risk than in the 1980s, and much less exposed to local real-estate risk, although US banks' exposure to residential real estate has been rising since 2000 (Wheelock, 2006).

I conclude from this evidence that the consequences of the recent shocks for the supply of bank credit may turn out to be modest.

Conclusion

The current financial market turmoil resulted from a moderate shock to the housing and mortgage markets, which was magnified by the uses of subprime mortgages in a variety of securitization vehicles, which produced a collapse of confidence in the architecture of securitization and led to a sudden need to reallocate and reduce risk in the financial system. The liquidity risks inherent in maturity-mismatched asset-backed commercial paper conduits substantially aggravated the short-term problem. Despite these disruptions, the fallout thus far in the financial system has been limited and appears to have been contained by a combination of market discipline and short-term central bank intervention. It is hard to know whether new financial shocks will occur (e.g. large housing price declines, or substantial increases in defaults on other consumer loans), or whether consumption demand will decline independent of financial system problems, but there is little reason to believe that a substantial decline in credit supply under the current circumstances will magnify the shocks and turn them into a recession. We have not (yet) arrived at a Minsky moment.

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A B and B future for subprime borrowers?

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A rate cut is unnecessary. Congress will swiftly augment the Bush bailout, adding a fiscal stimulus worth, say, 0.5% of GDP. The anticipation of relief on both the fiscal and monetary side is likely to be enough to normalize credit conditions.

Both addressed the crisis in the US subprime mortgage market, falling US house prices, the wider turmoil in credit markets and the liquidity problems encountered by a growing number of diverse financial institutions. Bernanke listed the weapons in the Fed's armoury and tried to outline the Fed's contingent reaction function to new developments. Bush outlined a small bailout for financially distressed low- and middle-income homeowners.

Bernanke's 'wait and you shall see'

Bernanke succeeded completely in what he set out to do: he said nothing at all new, but said it very well indeed. Ignoring the scholarly and historical bits, what is relevant to future Fed policy can be captured by the following quotes and their translations.

> '… if current conditions persist in mortgage markets, the demand for homes could weaken further, with possible implications for the broader economy. We are following these developments closely.'

Translation: Even though the Fed is in Washington, DC, we are not asleep at the wheel.

> 'The Federal Reserve stands ready to take additional actions as needed to provide liquidity and promote the orderly functioning of markets.'

Translation: We can inject additional liquidity through open-market purchases or at the discount window; we can cut the discount rate or the federal funds target rate, and we can widen the range of eligible assets we will accept as collateral in repos or at the discount window.

> '… the further tightening of credit conditions, if sustained, would increase the risk that the current weakness in housing could be deeper or more prolonged than previously expected, with possible adverse effects on consumer spending and the economy more generally.'

Translation: An increase in credit risk spreads represents a tightening of monetary conditions, even if the federal funds target is unchanged. The Fed is aware of this.

> '… in light of recent financial developments, economic data bearing on past months or quarters may be less useful than usual for our forecasts of economic activity and inflation. Consequently, we will pay particularly close attention to the timeliest indicators, as well as information gleaned from our business and banking contacts around the country. Inevitably, the uncertainty surrounding the outlook will be greater than normal, presenting a challenge to policymakers to manage the risks to their growth and price stability objectives. The Committee continues to monitor the situation and will act as needed to limit the adverse effects on the broader economy that may arise from the disruptions in financial markets.'

Translation: Never mind what we said following the August 7 FOMC meeting. That was then. This is now. However, financial kerfuffles influence the setting of the federal funds target if and only if (and to the extent that) they have a material impact on our fundamental objectives, employment and price stability, going forward.

What does this mean for the future path of the federal funds rate?

Most of the recent real economy data are robust, including the Q2 GDP growth rate of 4.0% (annualized) and robust personal income and personal spending growth in July. However, they extend no later than July 2007, and therefore do not capture any negative effect on consumer and investment demand of the August financial turmoil.

Core PCE (Personal Consumption Expenditure) rose 0.1% in July 2007, keeping the 12-month rate of core PCE inflation at 1.9% for a second month. Headline CPI also rose by 0.1% in July, and fell to 2.1% over a 12-month period, down from 2.3% in June. While both are north of the centre of the Fed's assumed comfort zone (which ranges from 1.0% to 2.0%), they are low enough not to be a cause for embarrassment were the Fed to decide to cut the federal funds target on 6 September.

Although if I were a voting member of the FOMC, I would vote to keep the federal funds rate constant, barring exceptional developments between now and 6 September, I believe that the most likely outcome is a 25 basis points insurance cut in the federal funds rate. We shall see.

Bush's small bailout

By revealed preference, poverty in the United States is something this Republican Administration and Democratic Congress (like past Republican and Democratic Administrations and Congresses) can live with. The prospect of a couple of million homeowners being foreclosed upon during the year before a presidential election is, however, more than the body politic can stand – these people might well be voters. President Bush gave us the homeowners bailout 'lite' in his speech. The Congress will no doubt up the ante and turn this into a homeowners bailout 'premium'.

Bush first gave a concise statement of the case against bailing out mortgage lenders, speculative investors in real estate and those who unwisely took on excessive mortgages, and then outlined a plan for bailing out the last-mentioned category.

> 'A federal bailout of lenders would only encourage a recurrence of the problem. It's not the government's job to bail out speculators, or those who made the decision to buy a home they knew they could never afford. Yet there are many American homeowners who could get through this difficult time with a little flexibility from their lenders, or a little help from their government. So I strongly urge lenders to work with homeowners to adjust their mortgages. I believe lenders have a responsibility to help these good people to renegotiate so they can stay in their home. And today I'm going to outline a variety of steps at the federal level to help American families keep their homes.'

There are a number of aspects of these proposals that are interesting from an economic point of view.

1. It represents a cyclically appropriate, albeit small (especially in the President's version, the only one formally on the table) fiscal stimulus. That is what is meant by 'a little help from their government'.

2. The fiscal stimulus proposed by the President will be implemented mainly through quasi-fiscal means. That means that they will not come in the form of on-budget tax cuts or increases in subsidies or other public spending. Instead they will be hidden in below-market mortgage interest rates, supported by federal guarantees, through subsidized mortgage insurance and other off-budget measures that are functionally equivalent to tax cuts or subsidies. The full budgetary impacts will be obscured and delayed.

That is clear from the central role assigned to the Federal Housing Association (FHA), the cornerstone of socialized housing finance in the United States. The FHA is a government agency that started operations in 1934 and provides mortgage insurance to borrowers through a network of private-sector lenders. Bush proposes to expand a proposal he sent to the Congress 16 months ago that enables more homeowners to qualify for this insurance by lowering down-payment requirements, increasing loan limits and providing more flexibility in pricing. There are obvious elements of subsidy in this proposal.

Already about to come online is a new FHA program ('FHA-Secure') that aims to allow American homeowners who have a good credit history but cannot afford their current mortgage payments to refinance into FHA-insured mortgages. Again, the unaffordable can only be made affordable through a federal subsidy.

The President also proposes to change a feature of the US federal income system that can hit homeowners who no longer can service their mortgages hard. Debt forgiveness counts as taxable income. Assume you have $100,000 worth of mortgage debt you cannot afford to service. Your house is worth $100,000 to the bank. If the bank were to forgive you your mortgage debt and take your house in exchange, you would still be left with income-tax liability on the $100,000 of forgiven debt. That seems a bit rough. Of course, you could instead sell the house to the bank for $100,000 and use the proceeds of the sale to pay off the loan. No income tax would be due (there could, under certain conditions, be capital gains tax).

The US Congress is likely to expand on these proposals by letting Fannie May (or Federal National Mortgage Association) and Freddie Mac (or Federal Home Loan Mortgage Corporation), two government-sponsored enterprises (GSEs) created by the Congress that are at the heart of the US system of socialized housing

finance, expand the scale of their operations, specifically by increasing the upper limit on the size of the mortgages they can extend or guarantee from its current level of $417,000.[1]

3. It represents a redistribution of income towards those low- and middle-income Americans who had taken on excessive mortgage debt. The bill is paid mainly by the shareholders of the mortgage lenders (that is what is meant by 'a little flexibility from their lenders' and by the American taxpayer, who will have to foot the bill of the increased subsidies attached to the loan guarantees and subsidized mortgage insurance offered by the FHA. If the Congress manages to get Fannie May and Freddie Mac involved in the game, the cost to the taxpayer could turn out to be significantly higher.

4. By subsidizing excessive and imprudent borrowing, it reinforces the moral hazard faced in the future by low- and middle-income Americans pondering the size of the mortgage they can enforce (if the market-friendly President Bush is willing to bail us out today, would a more market-sceptical President Barack Obama or President Hillary Clinton not do so again tomorrow?)

5. By leaning on the lenders to show greater leniency towards delinquent mortgage borrowers than would be required by the mortgage contracts and the dictates of the competitive environment, it will discourage future subprime lending and other higher-risk mortgage lending by banks and other mortgage finance institutions. This will further increase the role of the FHA, Fannie, Freddie and the federal home loan banks, and will further strengthen the role of socialized housing finance in the United States.

6. There is a reasonable prospect that federal legislation and federal regulation and supervision of the housing-finance industry will be changed in such a way as to reduce the likelihood of the excesses, the misselling and the misrepresentations that became rampant especially during the past five years or so. There has been a serious failure by the regulators to stop the rogue mortgage lending practices that have proliferated, and not just in the subprime market. The Fed, under both Chairman Greenspan and Chairman Bernanke, is one of the institutions that bears responsibility for this regulatory fiasco.

It is, unfortunately quite likely that the legislative and regulatory changes we will get will amount to a Sarbanes-Oxley-style regulatory overshoot, that is, regulation of the 'if it moves, stop it' variety. This will discourage future lending to low-income or credit-impaired would-be homeowners even when such lending is fundamentally sound.

1 Together, the three mortgage finance GSEs (Fannie Mae, Freddie Mac and the 12 federal home loan banks) have about $4.4 trillion of on-balance sheet assets. Fannie May has about $2.6 trillion, Freddie Mac has about $820 billion and the 12 federal home loan banks just over $ 1.0 trillion. Fannie Mae and Freddie Mac initiated the securitization of home mortgages.

Parochialism in US economic policy

Both sets of remarks were amazingly parochial. The President clearly believes that, except for oil and Chinese imports, the United States is a closed economy.

Bernanke's text contains a few rather generic references to global matters, but rather less than the topic deserved. Surely the fact that so much of the subprime exposure ended up in European and Asian financial institutions must have made it easier for the US lending excesses to occur. One also has to recognize the importance of international regulatory arbitrage as a factor limiting the ability of national regulators to impose even mild disclosure restrictions (let alone more serious regulatory constraints, whether for prudential or consumer protection reasons) on internationally mobile financial institutions.

Even in a lecture on 'Housing, housing finance, and monetary policy', it is surprising not to find the word 'exchange rate' in a section of the lecture titled 'The Monetary Transmission Mechanism Since the Mid-1980s'. During the past 20 years, the US economy has become increasingly open, as regards trade in both real goods and services and financial instruments. Transmission of monetary policy through the exchange rate undoubtedly has become more important, both for prices and for aggregate demand, during this period, and US real interest rates are increasingly influenced by global economic developments, as Bernanke himself has pointed out in a lecture on the global saving glut.

When all is said and done, the entire construction sector in the United States is 5% of GDP. The bit that is hurting badly, residential construction, is somewhere between 3% and 4% of GDP. Exports are 12% of GDP and growing in volume terms at an annual rate of over 11%. Import competing industries are also doing well. The combination of a sharp nominal and real depreciation of the US dollar and continued rapid growth outside the United States accounts for the strength of the externally exposed sectors of the US economy. It goes a long way towards offsetting the weakness of parts of the non-traded sectors, including housing. While increased credit risk spreads represent a tightening of monetary conditions, the weaker dollar represents a loosening of monetary conditions. There is no indication from Bernanke's address that the Fed pays any attention to this in its actual policy deliberations. This is especially surprising in view of Bernanke's recognition of these issues 'in the abstract', in some recent lectures.

Of course, housing troubles are not limited to the construction sector. Housing wealth is an important component of total net household financial wealth; real-estate assets can be collateralized and thus are a ready source of consumer spending power. Another Fed governor, Frederic Mishkin, argued at the same Jackson Hole conference that a fall in housing wealth could be a serious drag on consumer spending, assuming that the marginal propensity to spend out of housing wealth was 3.75% (a very precise number indeed).

Bottom line

A 25-bps cut in the federal funds rate on 6 September is unnecessary, likely, but by no means a foregone conclusion. By the time Congress is done augmenting the Bush small bailout of financially stressed mortgage-holders, there may be a fiscal

stimulus worth about 0.5% of GDP. With elections looming, this fiscal stimulus could be enacted rather swiftly. The anticipation of relief on both the fiscal and monetary side is likely to be enough to normalize credit conditions (albeit at spreads closer to long-run historical levels rather than at the anomalously low levels between 2003 and mid-2007) and to provide a boost to asset markets. The US housing market is in structural trouble, with excess capacity in most categories that will take years to work off. But that is a small enough part of the US economy not to be a serious drag on overall activity in the years to come.

Double counting 101: the useful distinction between inside and outside assets

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13 March 2008

Loan defaults create financial losers and winners, but the losses are highly concentrated in highly visible financial institutions while the winners are dispersed among millions of mortgage-holders that have been written down or written off. Here is a discussion how the subprime crisis has created winners and what it means for analysis of this unfolding situation.

The sky must surely be falling on the financial sector. Reported or estimated subprime related losses have, since last summer, gone from $50 billion, to $100 billion, $200 billion, $400 billion, even $800 billion. Let us call it $1 trillion, or even $2 trillion, just to be sure we catch most of the likely eventual losses. What have not been reported are the matching subprime-related gains, which without a shadow of a doubt also follow the sequence $50 billion, $100 billion, $200 billion, $400 billion, $800 billion, $1 trillion and $2 trillion. Why this failure to report the subprime-related gains?

One reason, no doubt, is that there is a lot of ignorance and stupidity around; the distinction between inside and outside assets appears to be a difficult one for economists, especially financial specialists, brought up in a partial equilibrium tradition. I am lucky in having had Jim Tobin as my PhD adviser and mentor. Balance-sheet constraints, budget constraints, Walras' law, adding up constraints – it was the bread and butter of what he taught. A little general equilibrium does go a long way.

The second reason is that the losses are highly concentrated among a few hundred commercial banks, investment banks, hedge funds and similar shadow banking sector institutions, while the matching gains are widely dispersed among the many millions of homeowners who owed the mortgages that have been written down or written off. Mancur Olson's logic of collective action strikes again. In addition, many of the winners may not wish to advertise the fact that, given the amount by which the value of their property fell, they are better off now because they were able to force the bank that held their mortgage to eat their negative equity.

Inside and outside assets

For every financial asset there is a matching financial liability. That is, financial assets are inside assets. Inside assets are assets owned by a natural or legal person that are the liability of some other natural or legal person(s). Outside assets are assets of a natural or legal person that are not a liability of some other natural or legal person(s). When you net out all inside assets against the corresponding liabilities, you are left with just the outside assets, or the net wealth of the system. In a closed economy (foreign assets and liabilities present no conceptual problems but clutter up the argument), the outside assets are the stocks of natural resources (including land) and physical capital (residential housing, other structures, equipment, infrastructure), the human capital (the current and future labour endowments of the economy, that is, the resources embodied in current and future natural persons) and the productive resources (goodwill, synergy, monopoly power) embodied in legal persons such as incorporated firms.

There is an interesting argument about whether the labour endowments of the unborn should be included among a society's outside assets. In a society without hereditary slavery, future endowments of labour embodied in natural persons yet to be born are not owned by anyone alive today, and therefore do not constitute private wealth. They can, however, be viewed as part of the tax base, because the institution of the state (and the associated power to tax) is likely to endure as long as mankind. That issue will have to wait till some future occasion to be treated in earnest.

So residential property is an outside asset and constitutes net wealth. A mortgage is a liability of the homeowner and an asset of the mortgage lender (bank). The mortgage held by the bank is an inside asset and does not constitute net wealth.

Assume the bank securitizes the mortgages by selling them to an SPV that pools them and issues mortgage-backed securities against them (residential mortgage-backed securities or RMBS). Securities backed by residential mortgages are a liability of the SPV that issued them and an (inside) asset of whoever holds them, say an SIV owned by another bank. The SPV has as (inside) assets the mortgages it bought from the originator. The mortgages are still liabilities of the homeowner borrower. All CDOs backed by subprime mortgages (or by Alt-A or prime mortgages), by credit card receivables or by car loans are inside assets for which there is a matching liability. They are not net wealth. The cars themselves are net wealth.

Even a fall in outside residential housing wealth does not make you worse off

The US residential housing stock at the beginning of 2007 was worth around $23 billion. Let us assume that its value has declined by 10%. There has therefore been a reduction in the value of this outside asset of $2.3 trillion. I have argued elsewhere ('Housing wealth isn't wealth', 'OK then, housing wealth is wealth, but not NET wealth!' and 'The coming decline in UK house prices: how large and how helpful?') that because this outside asset yields its future income stream in kind,

in the form of consumable housing services, and because on average, homeowners expect to consume (over their lifetime) the housing services yielded by the stock of housing they own, a change in the value of residential property on average does not make anyone better off.

A fall in house prices redistributes wealth from those long housing (for whom the value of the house they own, the present discounted value of the future actual or imputed rental income of the property, exceeds the present discounted value of the future housing services they plan to consume) to those short housing (for whom the value of the house they own is lower than the present discounted value of the future housing services they plan to consume). Simply put, a decline in house prices redistributes wealth from landlords to tenants. On average, an American household is a tenant in its own home. Changes in house prices do not make the average American better or worse off, unless there is a lot of ownership in US housing by non-resident foreigners, in which case a decline in house prices would make the average US resident better off. The same point has been made by many others, including Mike Buchanan and Themistoklis Fiotakis.[1] It is also a viewpoint that, subject to all the aforementioned qualifications and further qualifications to be mentioned below) is shared by Mervyn King, the governor of the Bank of England, who first explained the issue to me in 1997.

This argument is false if the decline in house prices reflects the bursting of a bubble rather than a reduction in its fundamental value (the present value of future rentals). In that case the homeowners lose the bubble value, without a corresponding gain for the tenants through a lower present value of future rents. Other necessary qualifications come from the fact that the average expected remaining lifetime of housing consumers is likely to be less than the remaining lifespan of the existing stock of residential property. This is certainly true if the durability of the land is taken into account. In that case a fall in house prices can hurt homeowners more than it helps renters. But with reasonable discount rates, this effect is probably not very large.

Even if there is no net wealth effect from a change in home prices, this does not mean it will not have any behavioural effect. Unlike human capital, housing wealth can be collateralized. A lower value of residential housing, even if it does not make you worse off, may lower the amount you can borrow against the security of your property. Mortgage equity withdrawal becomes more restricted. This means that, through this credit or liquidity channel, falling house prices will have a temporary depressing effect on consumer demand (approximately, the level of consumer spending goes up with the change in house prices).

What banks lose on mortgages, mortgage borrowers gain

What follows is independent of whether you buy the argument that a change in house prices does not make the average American household worse off or better off. Mortgages, like any other IOU, secured or unsecured, are inside assets. If the value of the asset goes down for the investor (the bank holding the mortgage), the

1 M. Buchanan and T. Fiotakis (2004), 'House Prices: A Threat to Global Recovery or Part of the Necessary Rebalancing?', Goldman Sachs Global Economics Paper No. 114 (15 July).

value of the liability goes down for the borrower (the homeowner who took out the mortgage with the bank). There is no change in net wealth, no economy-wide net wealth effect.

There has been $800 billion worth of redistribution from banks and other mortgage lenders (and/or from those who invested in securities backed by the mortgages) to those who took out the mortgages (and/or from those who issued the mortgage-backed securities). The same is true for changes (up or down) in the value of any financial claim, bonds, options, CDS, complex financial structures like ABSs (Asset Backed Securities), CDOs (Collateralised Debt Obligations), CBOs (Collateralised Bond Obligations) or any of the other alphabet-soup financial instruments. Changes in the value of inside assets, like RMBS (Residential Mortgage-Backed Securities), represent pure redistribution between those who hold them and those who issue them; the point is most easily seen for options and other derivatives. All financial claims can, of course, be viewed as derivatives that are in zero net supply.

Redistribution can matter for aggregate demand. It will not, in general be neutral. But the non-neutralities have to be documented and substantiated carefully. The size of the losses on inside assets by themselves (multiple trillions no doubt before this crisis is over) bears no necessary relationship to the size of the aggregate demand effects.

Asymmetries

1. The person owing a debt (a mortgage, in the subprime case) may not value it in the same way as the person owning it. In other areas there have been spectacular examples of this. Most workers enrolled in defined-benefit company pension plans probably put a positive present discounted value on their expected future stream of pension benefits. For a long time, the companies that owed the matching liabilities kept them off-balance sheet. Out of sight, out of mind, and before long these future pension liabilities were not viewed as liabilities at all. The realization that they were indeed unsecured liabilities has crippled much of the US domestic steel and automobile industry.

2. When default risk increases but default has not (yet) occurred, the marked-to-market value of the bank's asset (the mortgage) goes down, but the borrower is still servicing the debt in full. While the homeowner owing the mortgage should also mentally mark it to market, that is, allow for the prospect that (s)he will service the mortgage in full in the future, the continuing full debt service in the present may, because of liquidity and cashflow constraints, restrain household spending.

3. Consider a household that purchases a home worth $400,000 with $100,000 of its own money and a mortgage of $300,000 secured against the property. Assume the price of the home halves as soon as the purchase is completed. With negative equity of $100,000 the homeowner chooses to default. The mortgage now is worth nothing. The bank forecloses, repossesses the house and sells it for $200,000, spending $50,000 in the process.

The loss of net wealth as a result of the price collapse and the subsequent default and repossession is $250,000: the $200,000 reduction in the value of the house and the $50,000 repossession costs (lawyers, bailiffs, etc.). The homeowner loses $100,000, his original, pre-price collapse equity in the house, the difference between what he paid for the house and the value of the mortgage he took out. The bank loses $150,000, the sum of the $100,000 excess of the value of the mortgage over the post-collapse low price of the house and the $50,000 real foreclosure costs. The $300,000 mortgage is an inside asset, an asset to the bank and a liability to the homeowner-borrower. When it gets wiped out, the borrower gains (by no longer having to service the debt) what the lender loses.

The legal event of default and foreclosure, however, is certainly not neutral. In this case it triggers the repossession procedure that uses up $50,000 of real resources. This waste of real resources would, however, constitute aggregate demand in a Keynesian-digging-holes-and-filling-them-again sense, a form of private provision of pointless public works.

4. Continuing the previous example, how does the redistribution, following the default, of $100,000 from the bank to the defaulting borrower – the write-off of the excess of the face value of the mortgage over the new low value of the house – affect aggregate demand?

   There is one transmission channel that suggests it is likely, had this redistribution not taken place, that demand would have fallen more than it does following the default. The homeowner-borrower is likely to have a higher marginal propensity to spend out of current resources than the owners of the bank, since residential mortgage borrowers are more likely to be liquidity-constrained than the shareholders of the mortgage lender.

5. Finally, we have to allow for the effect of the mortgage default on the willingness and ability of the bank to make new loans and to roll over existing loans. Clearly, the write-off or write-down of the mortgage will put pressure on the bank's capital adequacy. The bank can respond by reducing its dividends, by issuing additional equity or by curtailing lending. The greatest threat to economic activity presumably comes from new lending.

The magnitude of the effect on demand of a cut in bank lending depends of course on who the banks are lending to and what the borrower uses the funds for. If they are lending to other financial intermediaries who are, directly or indirectly, lending back to our banks, then there can be a graceful contraction of the credit pyramid, a multi-layered deleveraging without much effect on the real economy. If bank A lends $1 trillion to bank B, which then lends the same $1 trillion back to bank A again, there could be a lot of gross deleveraging without any substantive impact on anything that matters.

With a few more non-bank intermediaries tossed in between banks A and B, such intra-financial sector lending and borrowing (often involving complex structured products) has represented a growing share of bank and financial sector business this past decade.

A group of people cannot get richer by shining each other's shoes or taking in each other's laundry. Similarly, financial institutions (intermediaries) cannot get richer by lending to each other. They can only get richer by intermediating, that is, by lending to the real economy. Of course, a more efficient structure of intermediation adds to the productive potential of the economy (by better matching savers with profitable investment opportunities), but the degree of efficiency of the structure of intermediation (markets and institutions) needs bear no relation to the gross volumes of inside assets issued by the financial intermediaries.

Somehow, the financial markets and those buying shares in financial intermediaries forgot about the mutual shining of shoes theorem. A bubble or Ponzi [[explain?]] finance scheme developed that caused the gross value of intermediation and leverage in the financial sector to rise massively. When the bubble burst, there was a loss of net wealth equal to the bubble component in the valuation of the financial sector. The subsequent deleveraging and contraction of balance sheets do not, however, destroy net wealth.

Some of the lending of the financial sector went to the real economy: households and non-financial corporations. There will undoubtedly be an increase in the cost and a reduction in the availability of such lending beyond what we have seen already. The effect of this on spending by households and non-financial firms (consumption and investment) is not, of course, equal to the reduction in bank lending to these sectors.

There are other outside sources of funds for non-financial corporates, and both households and firms can maintain spending by reducing household saving and corporate retained profits respectively. So there is many a slip between the cup of the massive deleveraging and inside asset blowout in the banking and non-bank financial sector on the one hand and, on the other hand, the lip of private consumption and investment. I consider the estimate of David Greenlaw, Jan Hatzius, Anil K Kashyap and Hyun Song Shin in their paper 'Leveraged Losses: Lessons from the Mortgage Market Meltdown', that a one dollar loss in bank assets reduces spending on goods and services in the long run by just under 44 cents, to be an order of magnitude too large; it also is bound to be far from a structural effect, that is, an effect invariant under plausible changes in the economic environment driving these two endogenous variables.

A little statistical rant (don't read unless you are interested in identification, endogeneity and simultaneity).

The authors calculate/calibrate a value for the ratio of total credit to end-users (either the non-leveraged sector or just households and non-financial corporates) to the total assets of the leveraged sector (banks, the brokerage sector, hedge funds, Fannie Mae and Freddie Mac, and savings institutions and credit unions). They then treat this ratio as a constant, which means that once they have the change in the value of the total assets of the leveraged sector, they know the change in credit to the end-users.

The next step is the empirical estimation of a correlation between the growth rate in (real) credit to end-users and the growth rate of real GDP.

There are just too many ways to poke holes in the empirical argument. To start with, as noted by the authors, the credit variable used domestic non-financial

debt, includes financing from non-leveraged entities and therefore does not correspond to the credit variable of the theoretical story.

More painfully, the authors seem blithely unaware of the difference between causation and correlation, or prediction and causation. What they perform is, effectively, half of what statistically minded economists call a Granger causality test but should be called a test of incremental predictive content. They run a regression of real GDP growth on its own past values and on past values of real credit growth and find that past real credit growth has some predictive power over future GDP growth, over and above the predictive power contained in the history of real GDP growth itself: past real credit growth helps predict, that is, Granger-cause, real GDP growth. Lagged real credit growth is (barely) statistically significant at the usual significance level (5%).

When you do this kind of regression for dividends or corporate earnings and stock values, you find that stock values Granger-cause (help predict) future dividends. Of course, anticipated future dividends determine (cause) equity prices, so causation is the opposite from Granger causation.

The authors are undeterred and treat the estimate of GPD growth on credit growth as a deep structural parameter.

The authors recognize the issue but completely fail to address it. They use the so-called TED spread (the price difference between three-month futures contracts for US Treasuries and three-month contracts for eurodollars having identical expiration months, a measure of bank default risk) and a survey-based measure of banks' willingness to lend as statistical instruments for credit growth.

Instruments are variables that are highly correlated with the variable that you are trying to purge of endogeneity and simultaneity problems, but independent of the random disturbance in the equation you are estimating.

It is a well-known but ruthlessly suppressed fact in the econometrics profession that there are no instruments, there is just implicit theorizing. The correlation between the instruments and the variable to be instrumented (credit growth in this case) can of course be tested and reported, but the second key assumption – independence of the instruments from the disturbance term in the GDP growth equation – is untestable and simply has to be maintained.

Without boring the readers (if I still have any) with further details of why the empirical work is, at best, utterly unconvincing, let me report that the 3.0% contraction in credit growth ($ 910 billion) to the end-users which the authors assume will result from the decline in the assets of the leveraged sector, will according to their instrumented equation reduce real GDP growth by 1.3 percentage point over the following year, the 44 cents mentioned earlier.

The authors could be right about the effect of deleveraging in the leveraged sector on real GDP growth, but the paper presents no evidence to support that view.

How do we value the outside assets?

In the case of residential property, house prices (the sum of the value of land and structures) provide all the relevant information. For physical capital, there is the problem that part of it (publicly owned infrastructure) is not priced anywhere. For privately owned capital, the asset should be valued at the present discounted value

of its future earnings. Where the capital is held by unincorporated businesses or by unlisted companies, it is very hard to get an estimate of their value. When capital equipment is owned by listed corporations, it will contribute to the market value of the corporation, but only in conjunction with the goodwill and other going concern value of this legal person. The stock market value of the firm will not do either, unless the firm is 100% equity-financed. Otherwise we have to add the value of the company's net financial debt to its equity. Valuing human capital (the present value of current and future labour earnings, either of those currently alive or of current and future generations) is a bit of a nightmare.

There can be little doubt, however, that net wealth in the United States (and to a lesser extent in the rest of the North Atlantic region) has taken a beating. The value of the residential housing stock and of commercial property is down. The value of corporate debt plus equity is down. With employment falling and subdued wage growth, the value of human capital is also likely to be down, unless the appropriate stochastic discount factors act very strangely.

So let us quantify these net wealth effects of changes in the value of outside assets. Let us also study the distributional effects of the massive changes in the values of inside assets. But let us not forget that for every loser in the valuation game for inside assets there is a matching winner, and that the asymmetries do not all point to a stronger negative effect on demand. Defaulting mortgage borrowers, in particular, are likely to have high marginal propensities to spend out of current resources. Not having to service their mortgage debt any longer could give a major boost to consumer spending.

Conclusion

Things are tough enough without us exaggerating the problems through egregious double, triple, quadruple and higher multiple counting. Economic prospects for the United States are poor, but nowhere near as bad as the growing crescendo of the moans emitted by the losers in the inside asset revaluation game would have us believe.

Bagehot, central banking and the financial crisis

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The current crisis is a modern form of a traditional banking crisis. The 125-year-old Bagehot's doctrine tells us how governments should react: lend to solvent but illiquid financial institutions. While easy to state, the doctrine is hard to apply. The key question to assess the future consequences of current central-bank policy is whether the subprime mortgage crisis arises in the context of a moderate or a severe underlying moral hazard problem.

The present financial crisis poses two main questions: whether it is similar to past crises and how central banks should intervene to preserve the stability of the system.

The current financial turmoil seems extraordinary because it has unexpectedly affected the heart of the functioning of our sophisticated money markets. Despite the Northern Rock episode, the main contours of the current crisis seem very distant from scenes of crises past where newspapers were full of photos of depositors queuing to withdraw their money during a panic. Yet this crisis is just a modern-market form of a traditional banking crisis.

An old-fashioned bank run happened if enough people tried to withdraw their funds from a bank; even if the bank was solvent, it might not be able to meet all the withdrawals and thus the fear of bank failure could become a self-fulfilling prophecy. In the current crisis, participants in the interbank market take the place of long queues of withdrawers. They have stopped extending credit to other banks that they suspect to have been contaminated by the subprime loans and which therefore may face solvency problems. The commercial-bond market and SIVs are facing similar trouble.

Both the old and new forms of crisis have at their heart a coordination problem. In the current one, participants in the interbank market and in the commercial-bond market do not renew their credit because of fear others will not either. Witness the demise of the investment bank Bear Stearns at the heart of the dealing on SIVs.

In reaction, central banks have intervened massively, injecting liquidity and allowing banks to access fresh cash at the discount window in exchange for collateral that includes the illiquid packages of mortgage obligations. Have central banks done the right thing or are they provoking the next wave of excessive risk-taking by bailing out banks and markets? Is monetary policy the only tool available for the central bank to address the market crisis?

Bagehot's wisdom

Bagehot advocated in 1873 that a lender of last resort in a crisis should lend at a penalty rate to solvent but illiquid banks that have adequate collateral. The doctrine has been criticized as having no place in our modern interbank market, but this is wrong. Bagehot's prescription aims to eliminate the coordination problem of investors at the base of the crisis. It is still a useful guide for action when the interbank market stalls.[1] It makes clear that discount-window lending to entities in need may be necessary in a crisis.

Bagehot's doctrine, however, is easy to state and hard to apply. It requires the central bank to distinguish between institutions that are insolvent and those that are merely illiquid. It also requires them to assess the collateral offered. Central banks, because of information limitations, are bound to make mistakes, losing face and money in the process. This does not mean they should not try.

Poor collateral versus massive liquidity

The collateral should be valued under normal circumstances, that is, in a situation where the coordination failure of investors does not occur. This involves a judgement call in which the central bank values the illiquid assets. A central bank that only takes high-quality collateral will be safe, but will have to inject much more liquidity and/or set lower interest rates to stabilize the market. This may fuel future speculative behaviour. Some of this may have happened in the Greenspan era, in the aftermath of the crisis in Russia and LTCM, and after the crash of the technological bubble. The ECB and the Federal Reserve have accepted now partially illiquid collateral that the market would not. This seems appropriate and releases pressure to lower interest rates to solve the problem, something that should be done only if there are signs of deterioration in the real economy. The problem is that central banks are extending the lender-of-last-resort facility outside the realm of traditional banks to entities, like Bear Stearns, that they do not supervise and, therefore, on which they do not have first-hand information. How does the Fed know whether Bear Stearns or other similar institutions are solvent? It seems that the Fed is not following Bagehot's doctrine here.

Finally, if banks and investors are bailed out now, why should they be careful next time? This is the moral hazard problem: help to the market that is optimal once the crisis starts has perverse effects in the incentives of market players at the investment stage. The issue is that only when the moral hazard problem is moderate does it pay to eliminate completely the coordination failure of investors with central bank help. When the moral hazard problem is severe, a certain degree of coordination failure of investors – that is, allowing some crises – is optimal to maintain discipline when investing and, amending Bagehot, some barely solvent institutions should not be helped.

Therefore, a key question to assess the future consequences of current central-bank policy is whether the subprime mortgage crisis arises in the context of a

1 See X. Vives and J. C. Rochet (2004)'Coordination Failures and the Lender of Last Resort: Was Bagehot Right after all?', *Journal of the European Economic Association* .

moderate or a severe underlying moral hazard problem. The important extent of asymmetric information in this market points to a severe problem. Be as it may, this issue will determine whether current help will plug the hole for good, or only temporarily, to make a larger one in the future. The challenge for central banks is to find the right balance between preserving current stability and imposing discipline for the future. Bagehot's doctrine is still a reference today.

The financial crisis: why it may last

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The subprime crisis was first characterized as a liquidity crisis, but a month and billions of dollars of liquidity injections later, the situation has not improved. Perhaps it was not about liquidity, after all.

Since the month of August, economists have been trying to understand why something that was supposed to be positive for global growth, namely the diversification of risk through securitization, has turned out to be the source of the recent crisis. The first reaction was to characterize this as a liquidity crisis: some banks were having undue difficulties in securing funds in the interbank market, and thus central banks reacted by providing liquidity through open-market operations. Many central bankers and academics started smiling with an 'I told you so, there was so much excess liquidity, this was bound to happen', and adopted a tough anti-moral hazard stance. More than a month, and many billions of dollars of extra liquidity injections, later, the situation in money and credit markets has not improved. Central banks have added liquidity to a situation of already excess liquidity to tackle an apparent liquidity crunch, and yet nothing has got better. Perhaps it was not about liquidity, after all.

What we are experiencing is a combination of reduction in the value of global collateral, deleveraging, reintermediation, and risk aversion. Let us explain these four items in turn.

The expansion of the US housing market followed the standard stages of a bubble: an initial surge based on some fundamental factors, such as low interest rates, immigration and a increased desire to invest in housing as a store of value. Technological improvements in mortgage markets, such as better assessment and management of risks due to massive computing improvements, facilitated this expansion. After a few years, the expansion took a life of its own, speculation increased and both activity and prices deviated heavily from fundamentals. The last stages become a bubble, with the phenomenon of subprime credit at the heart of the final acceleration. Many of the mortgages underpinning this housing expansion were resold. They were securitized, meaning a loan would become a tradable asset, and packaged, meaning many loans were put together to form a single asset. The resulting bundles, called credit derivatives, were then sold worldwide, most of them with high AAA ratings because the large number of loans that they included meant a very small risk on any single one of them. This was a smart

idea, as long as many of these individual loans would not sour together. Which is exactly what happened – and was foreseen to happen – when the whole US housing market started to slow down. Delinquencies started to rise and the value of many of these derivatives, especially those packaging the later vintages of subprime mortgages, had to be revised down. As a result, the holdings of assets of many financial market participants worldwide were marked down in value, and their value as collateral declined along the way.

Many of these assets were held by banks. It was a seemingly easy way to bolster profitability, holding AAA-rated assets that yielded more than government bonds and could be sold or used as collateral in money markets. In order to further enhance profitability, many of these assets were held by banks off balance sheet, so as to lower the capital cost of holding risky assets, in innovative forms (now well-known as conduits and vehicles). The result was that banks were holding more risky assets for a given level of capital. When the value of these assets had to be marked down and the conduits brought into the balance sheets, the prudential ratios were not met any more and banks had to sell some of these assets, whose prices declined. With deteriorated balance sheets, banks had to cut down on loans.

The unexpected increase in delinquencies induced many market participants to think, all of a sudden, that the ratings of many of these instruments were suspect and that all banks in many countries were potentially at risk. As a result, risk aversion and volatility increased and the demand for risky assets declined. Finally, the reduced demand for risky assets led to banks being less able to sell their loans and mortgages, and thus to have to keep them in their balance sheets. The result is substantial reintermediation of credit, the outdoing of securitization, with three consequences: first, banks may run into regulatory limits as their balance sheet suddenly changes; second, banks need more cash to service all these new commitments and they become reluctant to lend just in case further surprises appear; third, banks become reluctant to lend to other banks because counterparty risk, the possibility that a fellow bank might be unable to pay back a loan, has increased. Instead of lending cash to each other as they normally do, banks hoard cash and liquidity dries up. As central banks inject liquidity, banks just accumulate more and more. The system is in a liquidity trap.

What is the right response from a risk management standpoint to a sudden increase in balance-sheet risk, volatility and uncertainty? Reduce positions dramatically – which in the case of banks implies curtailing lending – and, very slowly, start to rebuild leverage only when both uncertainty and volatility decline and the capital base has been restored. In other words, credit growth and the demand for risky assets are likely to decline for an extended period of time.

What are the implications for policy of this episode? First, this crisis was not the result of interest rates being too low. For any given risk-free rate, banks can always choose which level of risk to take on board, and it is now clear that banks chose, in some countries, to hold a lot of risk. The way to stop this process would have been tighter supervisory control, not higher interest rates. In fact the problem has occurred in countries with very different monetary policy approaches to asset prices and different monetary policy stances. The phenomenon of subprime mortgages was the result of weak underwriting standards and excess demand for the asset class, not of low interest rates. Whether these exposures were on- or off-balance sheet is a critical determinant of where the surprises are. This shows that monetary

policy should deal with two objectives, price stability and financial stability, but we know that tackling two objectives with one instrument is not an efficient arrangement. Monetary policy should ensure price stability, supervision should ensure that risk management is appropriate and both should work together. Spain, a country with one of the most overvalued house markets by some metrics and one of the loosest monetary-policy stances (it has enjoyed negative real interest rates for many years now), has little or no subprime problems and its financial sector has not engaged, as far as is known, in the risk accumulation process that is at the heart of the current crisis. It probably had the right macro-prudential settings.

Second, the right monetary policy response to a sharp decline in the demand of risky assets may not be a liquidity injection, but a reduction in the price of risky assets that offsets, at least in part, the decline in its demand. Liquidity injections are trying to address the symptoms, not the underlying malaise, which can be summarized in an increase in the cost of capital as reintermediation becomes widespread. Central banks must assess whether the increase in the cost of capital needs to be offset in order to maintain price stability, and cut rates if needed.

Third, moral hazard is better dealt with during the upside than the downside. It is clear that, from a political standpoint and especially if the asset is housing, it is very difficult to adopt policies opposed to moral hazard when asset prices are spiralling downwards – and even more if the poorer classes of the population are affected, as it is the case with the subprime problem in the United States. It is also clear that in today's integrated capital markets, the system is more resilient to small shocks but more fragile when faced with big shocks, and thus considerations of 'too big or too many to fail' [[not sure what this means]] soon arise. And experience shows that, in general, moral hazard becomes secondary when the stakes are high. Two examples come to mind. The first one is the Asian crisis in 1997. At the time, the theory was that bank-deposit guarantees should always be limited to avoid moral hazard. The IMF went to Indonesia and announced the closure of several banks, and a bank run ensued. From that moment, the orthodoxy changed: first declare a blanket deposit guarantee, then announce a bank restructuring process. One wonders why this lesson was not applied in the Northern Rock case in the United Kingdom. The second example is the saga of the Stability and Growth Pact (SGP) in Europe. The attempts to implement the programme of sanctions during a growth slowdown were highly criticized and, at the end, some forbearance was applied and the SGP was reformed by strengthening its preemptive arm: to deal with moral hazard during good times. The same applies to the financial sector: supervision and regulation have to work towards systems that control more effectively building up banks' leverage during good times.

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Fallout from the credit crunch

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Economists cannot say: 'We told you so.' Economists do not have perfect foresight. But like doctors after the outbreak of a contagious disease, economists can tell you how the disease might spread, so that you may be better prepared. Here are some of the possible dangers ahead.

For years economists and policy-makers have worried about the fragility of the US economy, and particularly about the unsustainability of the US housing boom, but when the shock finally occurred, everyone – central banks, commercial banks, hedge funds, private investors - appears to have been unprepared. The big surprise was the nature of the shock. Suddenly banks stopped lending to one another, except on punitive terms. Liquidity dried up, threatening the existence of otherwise well-functioning banks and businesses. The crisis of confidence jumped across US borders with ease, as the recent run on Northern Rock has shown. How will this financial turbulence affect the world economy?

Economists obviously do not have perfect foresight; so I will not try to anticipate the future. But economists can do what doctors do after the outbreak of a contagious disease. They can tell you how the disease might spread, so that you are prepared. This is my purpose: not to make a forecast, but to warn of possible dangers.

Expectations inertia

Investors tend to imagine that the world will continue to be approximately like it is now. Before the US Federal Reserve reduced the benchmark interest rate by one-half a percentage point on Tuesday 18 September, financial markets were in despair; afterwards they were euphoric. Such myopia is dangerous. So far, economic activity – production, employment, consumption, investment and trade – has remained largely unaffected by the credit crunch. Many seem to believe this will continue. Equally dangerous.

If the credit crunch persists, there can be no doubt that economic activity will suffer. The Fed's interest rate cut will not prevent US home foreclosures, nor will it eliminate the glut of unsold homes. If US house prices continue to fall and unemployment continues to rise, consumers will doubtlessly reduce their spend-

ing, and the fall in demand will aggravate the rise in unemployment, hurt the US stock market and thus lead to a further fall in spending.

Meanwhile, it is worth keeping in mind that the United States is not the only country where house prices have risen much faster, on average, than national incomes. On the contrary, house prices in Australia, Denmark, France, Ireland, Spain, Sweden and the United Kingdom have all increased faster, over the past ten years, than in the United States. Of course the United States is a special case on account of its subprime mortgage lending towards the end of its housing boom. There, mortgage lenders with poor credit records could buy houses virtually interest-free for a few years, before the rates were adjusted steeply upwards. But the danger of international contagion remains. The US housing slump may well lead investors in Europe to reassess the value of their properties. If that happens, then consumption spending is likely to fall in the countries listed above, leading to weaker labour markets.

This could happen at a time when the Chinese economy has overheated and will need to slow down, and when the Japanese economy is stagnating. There are no other countries to take up the slack, to serve as a motor for the world economy as the United States has done for so long.

Germany

In short, a recession in the United States is possible and this recession could spread to other countries, primarily through loss of confidence within financial markets and house price contagion. Germany, needless to say, need not worry about a housing slump, since its housing market has already been in a state of slump for over a decade. But that does not mean that Germany is immune from the dangers of the current financial turbulence. The German economy is heavily dependent on its exports, and these would clearly suffer if world economic activity declined. Furthermore, as we have seen, the fallout from the US credit crunch can affect the balance sheets of German banks.

Of course these dangers may not materialize, just as contagious diseases need not spread. It is useful, however, to know where the dangers lie.

Even if times ahead are troubled, the long run is likely to look much more settled. In the short run, a housing slump could well make private investors and central banks outside the United States less eager to hold dollars. A survey by the US Treasury Department last year indicates that about one-third of foreign-held US corporate debt consisted of asset-backed securities and about half of that was mortgage-related. Petrodollars held in the Middle East and Russia are particularly mobile. If foreign money leaves the United States, the dollar would fall. In the longer run, US exports would rise, shrinking the huge US trade deficit. Moreover, a recession in the United States would lead to lower imports, further reducing the trade deficit. At the same time, China may well let the yuan rise against the dollar, leading to a rise in its domestic spending relative to its exports. Once US consumers spend less and Chinese consumers spend more, the large global imbalances, which have cast a shadow on the world economy for the past decade, would begin to disappear.

Four mega-dangers international financial markets face

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The financial turmoil has been worsening as lagged adjustment processes play out. This article outlines economic dangers that may arise as they unwind, including a scenario in which the United States suffers extended stagflation.

Day after day new, alarming news emerges from the world's financial markets, and day after day the public is surprised by how bad it is. But instead of wringing our hands, let us ask ourselves an important, unconventional question: What is more surprising: that financial markets have turned from bad to worse, or that we continue to be surprised by each successive piece of adverse news?

I suggest that our repeated surprise should be more surprising. This issue is important, because if we were better at recognizing the financial risks we face, we could do more to avoid them. If banks, investment houses and American homeowners had done a better job in recognizing the risks in the subprime mortgage market, we could have spared ourselves the current crisis.

Why does the public repeatedly underestimate the repercussions of the present financial crisis? The answer is simple: most of us are short-sighted; we cannot imagine a future that is radically different from the present. In particular, most of us do not understand that economic events often unfold gradually due to the operation of important lagged adjustment processes embedded in the economy. The public, the media and politicians would do well to give these lagged adjustment processes close attention. After the Titanic's hull was punctured, it took hours for its hull to fill with water; thus the passengers could not imagine that it would sink.

In my judgement, there are currently four major dangers facing the world economy, and all of them are obscured by the fact they play themselves out slowly.

Four dangers

The first danger we have witnessed since August 2007. The subprime mortgage crisis gave rise to a liquidity crisis in the international banking system, due to uncertainty about who holds the losses. This is leading to reduced lending to firms and households. But that is not the end of the story, because the reduced lending will lead to reduced consumption and investment. With a lag, reduced sales of

goods and services will reduce stockmarket valuations. And, with another lag, the lower stockmarket prices will – in the absence of any favourable fortuitous events – intensify the banks' liquidity crisis.

The second danger lies in the dynamics of US house prices. As more and more US households find themselves unable to repay their mortgages, foreclosures are on the rise, more houses are put on the market, the price of houses falls further, with further lags, which leads to more foreclosures and declines in housing wealth. This dynamic process plays itself out only gradually, as households face progressively more stringent credit conditions and house sales prices gradually become lower.

The third danger results from the interaction between wealth, spending and employment. As US households' wealth in the housing market and the stockmarket falls, their consumption begins to fall and will continue to do so, again with a lag. This decline in consumption is leading to a decline in profits, of which more is on the way, which in turn will lead to a decline in investment. The combined decline in consumption and investment spending will eventually lead to a decline in employment, as firms begin to recognize that their labour is insufficiently utilized. The decline in employment, in turn, means a drop in labour income, which, with a lag, leads to a further drop in consumption.

And that leaves the fourth (and possibly the nastiest) of the dangers, one that concerns the latitude for monetary policy intervention. As the Fed reduces interest rates to combat the crisis, the dollar is falling. This is leading to higher import prices and oil prices in the United States, putting an upward pressure on inflation. The greater this inflationary pressure – which is currently in excess of 4% – the more difficult it will be for the Fed to reduce interest rates in the future, without running a serious risk of inflaming inflationary expectations and starting a wage-price spiral. US firms and households will gradually recognize this dilemma and the bleak prospect of little future interest rate relief will further dampen consumption and investment spending.

Eventually, of course, the decline in spending will lead to a decline in inflation, but this will only happen with a lag. The longer the lag turns out to be, the longer the period over which the US economy will endure stagflation, that is, a cruel combination of rising prices and falling aggregate demand. Much hinges on how persistent US inflation is. More persistent inflation will inevitably give rise to higher inflationary expectations, leading gradually to higher inflation and so on. It took central banks over a decade, in the 1980s and early 1990s, to get inflationary expectations under control, and the fruits of this battle are now in danger of being lost.

Global implications

The international financial crisis and the decline in the US economy will inevitably have an adverse effect on the growth of the world economy. Europe and the emerging markets of Latin America and the Far East cannot fill the gap that the US economy leaves. There exists no economic mechanism whereby a drop in the US aggregate demand will be matched by a correspondingly large increase in aggregate demand elsewhere. Germany and other European economies highly exposed to the vagaries of international trade will certainly feel the pinch.

In the longer run, the prospects for the world economy look much brighter. Eventually US house prices will stabilize, rising exports will help the US economy recover, the fall in world demand for goods and services will reduce the price of raw materials, US households will learn the importance of saving and global imbalances will correct themselves. These rosy prospects lie in the mists of the future. Meanwhile, however, we are well advised to stay focused on the four dangers.

Federal Reserve policy responses to the crisis of 2007–8: a summary

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The nature of the ongoing financial turmoil that began in August 2007 has rendered traditional monetary policy responses ineffective. This article summarizes the US Federal Reserve's response to the crisis.

Central bankers are conservative people. They take great care in implementing policy; they speak precisely; they explain changes completely; and they study the environment, trying to pinpoint where the next disaster looms. Good monetary policy is marked by its predictability, but when the world changes, policy-makers change with it. If a crisis hits and the tools at hand are not up to the job, then central-bank officials can and will improvise. In August 2007, the world changed and the traditional instruments of monetary policy were not up to the task.

For some time now, there has been a consensus among monetary economists on the fundamentals of policy design. These agreed principles of best practice extend from central-bank design to operational policy: central banks should be independent but have clearly defined policy objectives for which they are held accountable; the policy-makers' operational instrument should be an interest rate; and officials need to be transparent and clear in communicating what they are doing and why they are doing it. Furthermore, there is agreement that the central bank is the right institution to monitor and protect the stability of the financial system as a whole.

An important part of the consensus has been that central banks should provide short-term liquidity to solvent financial institutions that are in need. But, as events in 2007 and 2008 have shown, not all liquidity is created equal. And critically, the consensus model used by monetary economists to understand central-bank policy offers no immediate way to organize thinking about this sort of problem.

The crisis

By the beginning of 2007, the stage was set for a crisis. Prices of homes in the United States were at unprecedented levels and borrowing by the owners (as a fraction of the inflation-adjusted value) was higher than ever before. The quality of newly originated mortgages was declining substantially. And, most importantly,

the securitization of these mortgages – where they were put into large pools that formed the collateral for what are known as mortgage-backed securities – had spread well beyond the government-sponsored enterprises (Fannie Mae and Freddie Mac) that traditionally engaged in this task.

On 9 August 2007, the crisis hit and central banks swung into action, supplying large quantities of reserves in response to stresses in the interbank lending market. The spread on 3-month versus overnight interbank loans exploded. And, as problems worsened into the winter, the spread between US government agency securities – those issued by Fannie Mae, Freddie Mac and the like – and US Treasury securities of equivalent maturity rose as well. Investors shunned anything but US Treasury securities themselves.

As the crisis deepened, it became painfully clear that traditional central-bank tools were of limited use. Reductions in the target federal funds rate, the objective of Federal Reserve policy in normal times, had little impact on interbank lending markets. And while the purchase of securities through open-market operations enabled policy-makers to inject liquidity into the financial system, they could not ensure that it went to the institutions that needed it most.

The policy response

In response to intensifying financial-sector problems, Fed officials created new lending procedures in the form of the term auction facility (TAF) and the primary dealer credit facility (PDCF), and changed their securities lending programme, creating the term securities lending facility (TSLF). The TAF offers commercial banks funds through an anonymous auction facility that seeks to eliminate the stigma attached to normal discount borrowing. The PDCF extends lending rights from commercial banks to investment banks (technically to the 19 primary dealers with whom the Fed does its daily open-market operations). And the TSLF allows investment banks to borrow Treasury bills, notes and bonds using mortgage-backed securities as collateral. All of these programmes offered funding for terms of roughly one month at relatively favourable interest rates.

Beyond creating these new facilities, the Fed made adjustments to existing procedures. First, it extended the term of its normally temporary repurchase agreements to 28 days and accepted mortgage-backed securities rather than the normal Treasury securities. Second, the Fed extended swap lines to the ECB and the Swiss National Bank that allowed them to offer dollars to commercial banks in their currency areas. And third, they provided a loan that allowed an investment bank, Bear Stearns, to remain in operation and then be taken over by JP Morgan Chase.

These new programmes are very different from the ones that had been in place prior to the crisis. To understand the difference, it is important to realize that a central bank's contact with the financial system is through its balance sheet, and there are two general principles associated with managing these assets and liabilities. First, policy-makers control the size of their balance sheet, that is, the quantity of what is commonly known as the monetary base. By changing the level of the monetary base (really commercial-bank reserve deposits at the central bank), Fed officials keep the market-determined federal funds rate near their target.

Second, the central bank controls the composition of the assets it holds. Given the quantity of assets it owns, the Fed can decide whether it wants to hold Treasury securities, foreign-exchange reserves, or a variety of other things. Each of the new programmes implemented by the Fed involved changes in the assets the Fed holds. And in nearly every case, officials provided either reserves (cash) or Treasury securities in exchange for low-quality collateral. By the end of March 2008, the Fed had committed more than half of its nearly $1 trillion balance sheet to these new programmes:

- $100 billion to the TAF
- $100 billion to 28-day repo of mortgage-backed securities
- $200 billion to the TSLF
- $36 billion to foreign-exchange swaps
- $29 billion to a loan to support the sale of Bear Stearns
- $30 billion so far to the PDCF

Changes in the composition of central-bank assets are intended to influence the relative price a financial assets, that is, interest rate spreads. So, by changing its lending procedures, Fed officials hoped that they would be able to reduce the cost of 3-month interbank loans and the spread between US agency securities and the equivalent maturity Treasury rate. At this writing, these programmes have met with only modest success.

While the ECB ponders, the Fed moves – and cleverly at that

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The Fed move, to cut the discount rate while keeping the federal funds rate unchanged, is both innovative and shrewd. It allows banks to liquefy discredited mortgage assets at low cost while leaving open the decision on monetary policy. It also leaves in the Fed's hands the more powerful tool of cutting the federal funds rate if its action does not succeed in quieting market fears.

The Fed has moved smartly and ahead of the crowd. While markets and analysts have debated whether the Fed, the ECB and the Bank of Japan should change their policy orientation, the Fed has invented a new response: lower interest-rate costs while keeping the policy stance unchanged.

What did the Fed do? The Fed provides liquidity to the banking system mostly through its regular sales on the open market. These sales, in effect renewable very short-term loans, are designed to keep the open-market rate – the so-called federal funds rate – at the Fed's pre-announced target level. The Fed did not change this target level, so it remains at 5.25%, just where it has been for more than a year. The federal funds rate, however, is not the only game in town. While the open market is where normally banks and other eligible financial institutions go to find the cash they need, or to download temporarily excess cash, the Fed stands ready to lend cash on an emergency basis through its discount window. The rate at which it does this emergency lending is called the discount rate.

To make sure that the discount window is not used to bypass the open market, the interest rate charged at the discount window is higher than the open-market federal funds rates, normally by a full percentage point. Also, the list of collateral assets that must be deposited with the Fed as a guarantee is more restrictive than those commonly required in the open market.

On 17 August, the Fed lowered the discount rate from 6.25% to 5.75%. But it did not change its target for the federal funds rate; that remained at 5.25%. In essence, it made recourse to the emergency-lending discount window less expensive without changing its target for what the market interest rate should be. It also announced that it would accept as collateral a wider range of assets, including the troubled mortgages, and that it would lend for longer periods, up to 30 days.

What is smart about this is that the Fed has in one stroke relieved pressure on the credit market without changing the federal funds rate and, simultaneously,

has kept its options open for its next decision due 18 September. The Fed has had its cake and eaten it too.

The thing to fear is fear itself

Whether the current crisis is a temporary hiccup or the beginning of a serious financial meltdown remains very much an open question. In my recent Vox column 'Subprime crisis: observations on the emerging debate', I argue that the subprime crisis is perfectly digestible without wider trouble, but that panicky market reactions could well drive financial markets down worldwide. We are now in one of these delicate moments when potentially irrational market expectations drive outcomes, which then make expectations look rational ex-post. Breaking this vicious circle is a necessary step in stopping the stampede. Only central banks can do this; the Fed is first in line do so.

The Fed, however, faces a delicate balancing act. It has been worried about a resurgence of inflation and this is why it has kept the federal funds rate at 5.25% (a rather high level) for more than a year. Before the crisis picked up speed, it obviously intended to wait and see before embarking on a path of declining rates. Most observers thought that this caution made a lot of sense. If the crisis now subsides, such a stance still makes sense. This is why the Fed does not want to rush in and cut the federal funds target rate. But if the crisis persists and/or deepens, the Fed can shift its concerns away from inflation and towards a possible recession. It is of the essence, then, still to wait and see.

It is also essential to do everything that is humanly possible to significantly reduce the very real possibility that the crisis deepens. By reducing the discount rate and accepting the infamous mortgage-linked assets as collateral, the Fed is offering markets a very strong reassurance. They can now find cash, and use the hot potato as collateral, in virtually unlimited amounts, at a cost, of course, but a very moderate one. The odds of a meltdown have now decreased.

The ECB's next move

Attention will now move to the ECB. The debate on whether the ECB should give up its long-held plan to raise its interest rate at its 6 September meeting is swelling. Some argue that changing its mind would be a loss of face, a very silly view since the situation has radically changed, but silliness is part of life. Others call for a pause before the next step – basically a wait-and-see stance. Yet others want to see the ECB completely reverse tack and lower the interest rate to deal with the crisis. For the ECB, too, this is a catch-22 situation. An innovative reaction is required. It might be difficult to do better than follow what the Fed did today.

Central-bank legend has it that governors earn – or destroy – their reputations in times of crisis. For months, Fed watchers had tried to gauge Bernanke. All they had to chew upon was what he was saying and not saying, not what he was doing because there was nothing particularly challenging in his actions. The elegant solution just adopted will undoubtedly kickstart the Bernankemania that was becoming overdue and dispel the long shadow of the maestro, his larger-than-life predecessor. A good omen for these troubled times.