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Central Banking for the 21st Century: Is there something new under the sun?*

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Central banks have a venerable history that starts in the late 17th century with the establishment of the Swedish Riksbank and the Bank of England. However, the modern notion of central banking did not begin to emerge until late in the 19th century when central banks began to proliferate. The Bank of Italy was established in 1893 and the American Federal Reserve System in 1914. The spread of central banking to virtually every political jurisdiction is a 20th century phenomenon. Moreover, as the 20th century drew to close, students of central banking seemed to have settled on a clear consensus concerning the role of central banks. But, consensus among economists is often fickle and as soon as the 21st century opened the consensus began to fall apart.

The aim of this essay is to explain the 20th century consensus and analyze how it fell apart in the first decade of the 21st century. To begin, what was the consensus? On the *micro side*, the importance of clearly defined and fairly applied bank regulation is a *sine qua non* of good central banking. This was not always obvious and for a time in the

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post war period, the emphasis among central bankers was on macro goals and micro banking issues were forgotten.[1] The early post transition experiences in central and Eastern Europe, as well as the Asian crisis, gave clear proof to the importance of regulatory structures. In many transition countries (see Bonin, Hasan and Wachtel, 2009), banking crises occurred soon after the establishment of private banking systems and central banks because the bank regulators did not have the authority or expertise to function adequately.

On the *macro side*, the 20th century ended with an understanding of how a central bank should use either an exchange rate or short term interest rate instrument to target the inflation rate. The mid 20th century debates between the Keynesians and monetarists concerning the role of monetary policy petered out towards the end the century.

Just a few years ago, it seemed unnecessary to ask what the central banks were supposed to do. Inflation targeting and transparent regulation of banks were the answers. But events since the summer of 2007 have turned the consensus on its head. Surely, most observers would now agree that a fresh look at what central banks can and should be doing is worth undertaking.

We start with a closer look at the old 20th century consensus. We will then look at the 21st century challenges to the consensus and ask whether something new is really going on. I will suggest that there are four distinct features of the current crisis that distinguish it from the past and that will define 21st century central banking.

The 20th century consensus

The 20th century consensus is rally a late in the century development. Banking and central banking around the world in the middle of the century was quite different. In the early post war period central banks were often given a broad macroeconomic mandate that might include income distribution and unemployment in addition to price stability. Inflation was tolerated or even viewed as a benign consequence of efforts to attain other goals. The universal acceptance of the primacy of a price stability objective only emerged late in the century. Further, at mid century an independent banking sector was

[1] The banking crises in Asia in the 1990s caught the IMF by surprise. The fund was staffed with macro economic analysts and it did not have the organizational capability to respond to bank regulatory issues.

the exception rather than the role in both developed and less developed countries. Government ownership or control of banks was common. And the central bank was often an arm of the government finance ministry (see Cukierman, 2007) and frequently served as a government development bank as well. An independent central bank with clear macro objectives and a role in maintaining the soundness of the banking sector without the interference of policy makers only emerged late in the century. However, thinking changed rapidly in the last few decades of the 20th century and the consensus view spread rapidly around the world.

In this section, we will take a closer look at the late 20th century consensus. In addition, we will point out some weaknesses in the strength of the consensus.

First, on the micro side, the central bank is the lender of last resort (LLR) to depository institutions. That is it prevents runs on individual banks by a willingness to provide liquidity against collateral to solvent institutions. In this way the central bank protects the banking system against systemic crisis.

This role was first articulated by Walter Bagehot. It is interesting to note that Bagehot discussion in *Lombard Street* (1873) is a little different than the received 20th century wisdom. His description of the lender is bolder and broader than the typical 20th century central bank conception of the LLR. He does not limit that the LLR function to depository institutions. Bagehot advocates almost limitless lending to any market or institution attacked by panic or the potential for panic. Bagehot specifies that this lending be at high interest rates but that had more to do with stemming gold (capital) outflows than imposing a penalty on borrowers. The difference between Bagehot and the 20th century central banking consensus is prescient. We will see later that the central bank response to the 21st century crisis is a turn back to Bagehot's 19th century formulation. .

The emphasis on the LLR role of the central bank raises some concerns about the 20th century consensus that were not adequately addressed.

The LLR function has an important corollary which was often overlooked. There is a moral hazard presented by the expressed willingness of the CB to provide liquidity to banks that have no where else to go. So to avoid the moral hazard, the LLR function necessarily implies a regulatory and supervisory function as well. This link is an obvious one – if the LLR function is akin to a line of credit then it has to come with strings

attached – covenants caveats and the ability to measure credit risk. Thus, the LLR should have a banker's concern with its customers which means that there is an inherent link between the LLR and bank regulation and supervision.

The 20th century consensus often forgot that the LLR is a banking function. The emphasis on the macro stability role of central banks led some countries to separate bank regulation entirely from the central bank. The best known example of this is the UK where a broad financial sector regulatory agency, the Financial Services Authority, was established in June 1998.[2] Michael Foot (2006), one of the original FSA managing directors said that:

> There was also a concern within the Central Bank that the split [taking the bank regulatory staff out of the Bank of England] would make it more difficult in future for the Bank to play its role of Lender of Last Resort. Hitherto, it had committed its balance sheet on the basis of knowledge provided by its own staff as to the likelihood of that money being recovered. (Foot, 2006, Parag. 18)

The assumption was that the memo of understanding governing the relationship between the lender and the supervisor would adequately address the coordination problems. Needless to say the strict separation is being reexamined in the light of the Northern Rock experience.[3] Writing in the light of the current crisis, Stanley Fischer (2008), Governor of the Bank of Israel, noted that:

> …it is essential for the central bank to be very closely involved in the supervision of the financial institutions. This is the present situation in nearly all countries, with the central banks bearing the responsibility for the economy's financial stability, and having the unique capacity of being able to inject liquidity into the financial markets as necessary, and of being able to act as the "lender of last resort" in a financial crisis. …
>
> The need for a very close connection between the central bank and the supervision of banks features in an important report issued in April this year by the Financial Stability Forum (FSF) entitled "Enhancing Market and Institutional Resilience".
>
> The conclusion in the report – stressing the need for central bank involvement in the supervision of banks and other financial institutions with similar impact on financial stability – receives strong support from the current crisis. (Fischer, 2008)

[2] There is another notable example of the complete separation of bank supervision from the central bank – the Euro area. Bank supervision is nationally based while the ECB is responsible for lending. This is a result of the historical evolution of the Euro and has yet to be tested by any serious Euro area banking crises.

[3] Northern Rock is a large UK building society that experienced losses as a consequence of the US subprime mortgage crisis. There was a run on the bank in September 2007 and the bank was nationalized in February 2008.

There has been much discussion concerning the independence and organization of banking supervision (e.g. Quintyn and Taylor, 2004) and there is agreement that no particular model dominates. However, the inherent relationship between lending and supervision was often overlooked. It was not so clear a few years ago but it is now that the LLR is a banking function as well as being a source of liquidity. Separation of the LLR function from the supervisory role is problematic because lending involves credit risk and credit risk warrants monitoring or, in this instance, supervision.

There is another aspect of the 20th century consensus concerning the LLR that bears a closer look. The 20th century view of the central bank LLR function was defined earlier as the provision of liquidity to individual banking institutions. This belies an important aspect of modern banking. Money markets are well developed and there are ample sources of liquidity. Even many emerging market economies have both a Treasury bill market and an inter bank market. Thus, the LLR function as the consensus views it may be superfluous. It is hard to imagine that an individual bank with adequate collateral that cannot sell assets or borrow in existing markets.

A bank that requests a loan from the central bank is probably experiencing something more serious than a liquidity problem. In all likelihood it signals solvency problems or systemic issues in the banking system or some other reason why the markets for liquidity stop functioning. Thus the 20th century consensus view of the LLR may be an anachronism. However, as we will see later, the 21st century crises in the US, UK and the Euro area were liquidity crises of a different type. We will have more to say about the 21st century role of the LLR.

Second, we turn now to the 20th century consensus regarding the macro role of central banks. There are two aspects of macro monetary policy to examine. First, macro theory shows how monetary policy affects the economy with a model of the transmission mechanism. Second, central bankers choose the goals, targets and instruments for the implementation of monetary policy. In both instances, early 20th century debates gave way to a widely accepted late 20th century consensus.

Early macroeconomic theory discussions bounced from a Keynesian view that belittled the efficacy of monetary policy to a monetarist view that placed all policy

making bets on the money supply. Late in the century, a consensus emerged in the form of a broad transmission mechanism that relates monetary policy to the economy. Monetary policy actions impact economic activity in the short run and monetary policy is responsible for maintaining long run price stability. Goodfriend (2007) discusses the elements of the consensus.[4]

Similarly, there was considerable controversy in the mid 20th century concerning the goals, targets and instruments of monetary policy. However, the different views seemed to melt away in the last decade of the century as central banks began to recognize the primary importance of price stability. Although U.S. law gives the Fed other goals, the central bank clearly emphasizes price stability. It became fashionable around the world to make price stability the explicit goal of central banks through inflation targeting (Bernanke and Mishkin, 1997 and Truman, 2003). More than 20 countries now have a formal procedure for inflation targeting and many others do so implicitly. With remarkable consistency, a short term inter bank interest rate (or something very close to it) is the operating target of choice and the inflation rate itself (sometimes explicitly sometimes not) is the intermediate target of choice as central banks pursue price stability.

The macro consensus was not without its bumps. Although the primacy of price stability is well established, there are different opinions concerning the cyclical stabilization role of monetary policy. Similarly, inflation targeting emphasizes an explicit and clear statement and transparent policy but it need not preclude a response to cyclical fluctuations.

Inflation targeting is still rather new[5] and there are differences in opinion about what price index to target. There is no consensus about the choice of target which could be the overall inflation rate in consumer prices or a core inflation rate with energy and food prices stripped out. Furthermore, how should the target be influenced by indicators of future inflation such as commodity price inflation or surveys or other inflation forecasts? Finally, should inflation targets include a role for asset price inflation? These questions received little attention during the 1990s as inflation targeting was

[4] The one area where he finds a lack of consensus is the policy response to deflation as experienced in Japan. The Japanese problem was an area where micro and macro concerns intersect which will be a focal point of our discussion of the 21st century challenges to consensus.

[5] New Zealand was the first explicit adopter of inflation targets, in 1989.

enthusiastically supported. However, the recent financial crisis provides reason to examine the questions again. The increase in housing prices, an example of asset price inflation, contributed to the crisis. Moreover, commodity price inflation has made managing the crisis more difficult. We will return to these questions later on.

There is one little noticed aspect of the late 20th century macro consensus which is troubling. It does not concern the macroeconomic relationships themselves; the mid century wars between the Keynesians and the monetarists are long over. Nor does it involve the implementation of monetary policy. There is a hint to this problem in the very structure of our discussion; in the 20th century we looked at macro monetary policy and micro financial structure issues as separate concerns.

Typically, macro discussions viewed monetary policy to be independent of the micro concerns of the central bank. The macro policy discussions presume that there is a smoothly operating banking and financial system that provides a consistent and unchanging framework for the transmission of monetary policy to the economy. A profound and important early 21st century lesson is that this cannot be taken for granted.

There may be a strong and sound 20th century consensus concerning the role of central banks. However, it only works when it works. The 21st century, in its infancy, has presented some new realities that challenge the consensus

The late 20th century had its share of financial crises even in developed countries. However, we tended to examine systemic banking crises as the consequence of a specific regulatory failure or even more simply, a failure to regulate. Two prominent examples come to mind. First, the post privatization Mexican banking crisis of the mid 1990s (see Gil Diaz, 1998) occurred because privatization of banks in 1991-92 was accompanied by financial sector liberalization and the failure to put regulatory structures in place. The banks had every incentive to lend vigorously (the new owners paid dearly for the banks) although credit departments had little expertise. Similarly, the capabilities of bank supervisors had atrophied after a decade of state ownership. The liberalization eliminated requirements that banks hold Treasury securities but failed to put in place a system of reserve requirements for the banks. Even without corrupt behavior, the structure invited poor judgment and allowed for little oversight.

The US Savings and Loan crisis can be characterized in similar terms. It began with a macro shock as high short term interest rates made the S&Ls (traditional holders of mortgages in the old days of the 1980s when mortgages were by and large long term, fixed rate, and unsecuritized) unprofitable. The regulators (with the cooperation of an over eager Congress) took one step after another to relax regulatory constraints and supervisory oversight in order to give these banks profit making opportunities. Regulatory forbearance and legislative changes were used to help right the losses from maturity mismatch inherent in the structure of these institutions. The approach created moral hazards which led to misguided expansion, some corruption and a massive crisis as eager bankers responded to the incentives.

Both the Mexican and US crises are viewed as the result of poor judgments in changing regulatory policy. Lessons were learned from these mistakes and the 20th century consensus was unscathed. The crises that emerged in the 21st century might be more of the same. Mistakes are made and lessons will be learned. As the Biblical prophet Ecclesiastes said:

> What has been is what will be, and what has been done is what will be done; there is nothing new under the sun.

Or is the 21st century really different? The second part of this essay provides an answer to this question. Although the crisis looks like many of its predecessors, there are important challenges to the central banking consensus. Some changes have already been made, on the fly, in response to crisis but additional changes that require careful development and legislative action will take some time.

The 21st century crisis

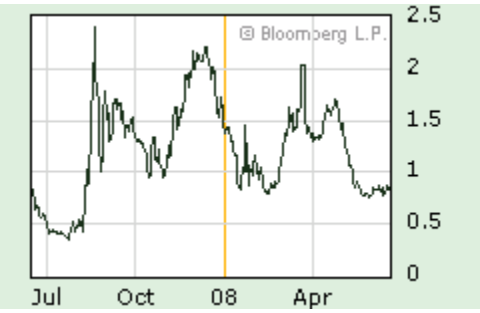
The story of the banking crisis of the 21st century begins in early 2006 when the US housing market began to slow down. Housing starts and sales began to decline and prices stopped increasing. This slowdown was viewed by macroeconomists as a positive development that would keep the economy from overheating. Some small signs of financial trouble appeared in early 2007. The second largest sub-prime mortgage lender in the US, Century Financial Corporation, filed for bankruptcy and there were announcements of losses by sub prime mortgage units of banks and by hedge funds that

had to revalue asset backed securities. The financial crisis leaped ferociously into the headlines in early August 2007 when credit spreads widened dramatically.

On August 9, 2007 BNP Paribas froze redemptions on three of its investment funds because it could not value the assets backed by US subprime mortgages. This was an important step because it signaled the extent to which large banks and not only risk seeking hedge funds faced problems with mortgage assets and it demonstrated the international scope of the problems. Suddenly and dramatically, 'money markets seized up.' That is, market participants were reluctant to conduct transactions and interest rate spreads widened in certain key markets rapidly to magnitudes rarely or never seen before.

The spread between asset backed and nonfinancial corporate commercial paper in the US is historically very small. For AA rated, 30 day paper the premium on asset backed paper averaged 6 basis points (bp) in June and July 2007 and never exceeded 10 bp. It was 13 bps on August 8, 2007 and 51 bps just five days later. The spread averaged 54 bps in August and 84 bp in September 2007. Markets calmed down in the fall (the average spread was 35bp in October and 46 in November). However, further market concerns increased it to 145 bp average for December. Even with all of the efforts to 'calm' the markets, the average spread in the first two weeks of June 2008 was still 52 bp.

Similarly, the TED spreads demonstrated the international dimension of the crisis. Bloomberg data for the spread between 3 month LIBOR and 3 month US Treasury rates are shown below. Historically the spread is usually less than 50 bp. On August 8, 2008 it was 44 bp and on August 20 it peaked at 240bp. It has stayed above 75bps since that time.[6]



[6] The spikes in LIBOR rates may overstate the situation since there has been some criticism of the way in which daily LIBOR is calculated.

The speed with which this market liquidity crisis emerged was striking and central banks in the US and Europe responded immediately (see Borio, 2008). The first of a series of central bank efforts to restore liquidity to money markets occurred on August 9. The ECB injected €95 billion of overnight funds and the Fed injected $38 billion with an extraordinary auction of funds.

The Fed soon began to loosen monetary policy. On August 17 it reduced the discount rate by 50 bp and announced the availability of term financing for up to 30 days. The target for the Fed funds rate was reduced by 50 bp in mid September. The clear willingness of central banks to intervene muted the sense of imminent crisis but the financial news over the fall months was not good. Major financial institutions announced write downs of assets and losses. There were major reorganizations of firms notably involving off balance sheet activity through so-called Structured Investment Vehicles. Efforts to raise additional capital were announced by Citigroup and UBS among others.

In the UK, there was a run on a major mortgage lender, Northern Rock, which culminated with emergency loans from the Bank of England on September 13. The central bank took further steps in October when it guaranteed the bank's deposits. Efforts to turn the business around or find a buyer were unsuccessful and Northern Rock was effectively nationalized in February 2008.

The spikes in interest rates during the summer were attributed to illiquidity and increased perceptions of counter party risk. That is, financial firms were hoarding cash. As noted, spreads narrowed in the fall, although they remained far above historical norms, as central banks added liquidity to the market. Towards the end of the year, spreads began to widen again. The spread between AA rated asset backed and nonfinancial corporate commercial paper in the US was wider in December than it had been earlier on. Further, the spread between US Treasury and agency securities which was typically around 20 bps doubled in August and doubled again in December. The widening spreads in December seemed to reflect concern about credit risk rather than just liquidity.

The Federal Reserve responded on December 12 by introducing a new lending facility, the Term Auction Facility and increasing swap lines with other central banks. Throughout the fall, US banks were reluctant to make use of the discount window so the

Fed introduced this new procedure in order to remove the stigma of borrowing and to provide funds for longer periods of time. The first auction was for $20 billion and the amounts were increased through the spring of 2008, reaching $150 billion.

Over the first few months of 2008, new information indicated that losses in the US mortgage market were increasing. In mid-March, Bear Stearns, a major US investment bank with large mortgage exposures faced bankruptcy. In a move unprecedented in modern times, the Fed used its emergency authority to make a loan directly to this non-bank financial institution and then arranged for it to be taken over by JP Morgan Chase. This bail out of an investment bank has been criticized for the moral hazard it introduces. Although, the shareholders were virtually wiped out, the Fed and the Treasury arranged financing of the take over which exposes them to credit risk on the Bear Stearns portfolio of mortgage backed assets.

At the same time, the Fed introduced two new lending facilities. First, the Term Securities Lending Facility announced on March 11, 2008, provided for loans of treasury securities to the primary dealers. Second, the Primary Dealer Credit Facility utilized the Fed's emergency authority in a historically unprecedented manner to lend directly to the dealers against a wide range of collateral including corporate securities and mortgage backed securities. The primary dealers in treasury securities are not banks; they are investment banks and broker dealer firms. These new facility provided liquidity to the dealer and investment bank community in the wake of the Bear Stearns bankruptcy.

Extensive lending by the Fed has altered its balance sheet dramatically. In mid 2007, the Fed held almost $800 billion in Treasury securities. A year later, the amount was reduced by about $250 billion due to the new credit facilities. The composition of the balance sheet is important because the Fed now faces significant credit risks on its portfolio.

The next major development in the US markets involved the government sponsored mortgage enterprises, FNMA and FHLMC. Although these institutions were founded as government agencies with the task of providing liquidity to the mortgage market, they have been private corporations for many years. They do enjoy access to emergency borrowing from the Treasury which has always been interpreted as an implicit government guarantee that has enabled them to fund their activities at favorable interest

rates. They expanded rapidly in recent years and were heavily exposed to various sub prime mortgage instruments with increasingly high foreclosure rates. As their stock prices declined, it became difficult for the firms to raise more capital. The government made its guarantee of the GSEs explicit on July 13, 2008 when the Secretary of Treasury, Henry Paulson, announced a joint Fed Treasury plan to provide lending to FNMA and FHLMC if needed.

As the summer ends, the sense of financial sector crisis or the fear of imminent melt down of financial markets seems to have abated. Interest turns now to the longer term implications of the crisis. Will the US mortgage giants wind up in public ownership? Will the government support investment banks and other financial institutions in trouble? Will there be a substantial fiscal cost to the government of such takeovers? Will the inadequacies of the capital allocation mechanisms in the US have long term consequences for growth? And, finally, what changes in regulatory structure will emerge as a consequence?

Although the story of the crisis is not over, we will turn to the features of both the crisis and the responses so far that mark the start of 21st century as very different from its predecessor.

New things under the sun: 21st century challenges to central banks

The world economy is in the midst of a serious financial crisis that threatens to reduce economic activity globally. However, our interest here is not the ups and downs of the world economy but the unique features of this episode. We identify four features of the crisis that distinguish it from its 20th century predecessors. Something new is going on – in fact there are four new things under the sun.

1. **Crisis in markets**. The 20th century LLR is designed for institutions in crisis while the current crisis appeared in markets rather than institutions. As a result, the Federal Reserve responded to the situation by innovating on the fly because its LLR function was not geared to a world wide market crisis. Traditionally, the LLR serves solvent institutions in need of funds to continue business operations that cannot liquidate assets quickly enough. In the last year we have seen instead that the markets where liquidity is usually traded or obtained have stopped functioning at critical times

Banks were unwilling to lend to one another even over short periods reflecting an enormous desire to stay liquid and increasing fears of counterparty risks. This was a market problem that created problems for all participants. In the absence of a smoothly operating LLR function that could gradually fill the gaps, these fears snow balled and a virtual panic ensued.

In a speech on May 13th Bernanke indicated that the 20th century model was not good enough:

> However, it became abundantly clear that this traditional framework for liquidity provision was not up to addressing the recent strains in short-term funding markets. In particular, the efficacy of the discount window has been limited by the reluctance of depository institutions to use the window as a source of funding. The "stigma" associated with the discount window, which if anything intensifies during periods of crisis, arises primarily from banks' concerns that market participants will draw adverse inferences about their financial condition if their borrowing from the Federal Reserve were to become known.

The liquidity crisis of 2007 was not a liquidity crisis faced by institutions. Thus, it is no wonder that banks did not go beyond the stigma and approach the discount window. Instead there was an illiquidity of markets and, as Bernanke says, "the traditional framework was not up to addressing the recent strains in short-term funding markets." The Fed's policy innovations since December 2007 – TAF, PDCF, TSLF – are revolutionary. They redefine the LLR function for the 21st century profoundly. The Fed has extended the term of its lending, the amount of credit made available, the collateral accepted and the institutions eligible to participate. Lending through the discount window will never be the same again.

It appears that the crisis caught the Fed by surprise. Although there was some institutional weakness in the US – a few hedge funds and a few non bank mortgage lenders closed -- the depository institutions with a link to the central bank were not in trouble. Thus, there was no traditional LLR role to play. The very efficiency and depth of modern money markets masked the emerging difficulties. But, the spillovers from the credit risk premiums in money markets were severely underestimated. We cannot fault the Fed and other central banks from reacting earlier to market problems because there were no signals of market problems in advance.

In the 20th century central banking consensus, the LLR function was available as a response to *institutions* in crisis. That is, there is a set of privileged institutions that have access to central bank lending for liquidity needs. Here is how the US Federal Reserve Board of Governors web site describes it:

> The discount rate is the interest rate charged to commercial banks and other depository institutions on loans they receive from their regional Federal Reserve Bank's lending facility--the discount window….. All discount window loans are fully secured.

It is no wonder that there is very little borrowing through this facility. In the US, the discount window – the hallmark of central banking - atrophied from lack of use. From 1990 to last summer monthly average borrowings were never as much as $1 billion. In the first six months of 2007 (as the crisis percolated beneath the surface), the average was $111 million. And even as the markets 'seized' borrowing was $272 m in July, $975m in August and only $1567m in September. The stigma about going to the discount window is very strong.[7] The Fed lends through the discount window when banks come and ask. With market liquidity drying up, one would think that banks would come and ask. Banks seemed to prefer crisis to the stigma of going to the Fed.

The first new lending facility introduced in December 2007, the Term Auction Facility, was aimed at overcoming the stigma and providing liquidity to markets (see Armantier, Krieger and MacAndrews, 2008). It allowed institutions to bid on loans from the Fed and to offer a broad range of collateral. Thus, institutions could post collateral which might be illiquid and hard to value. No borrower would be allocated more than 10 per cent of the total amount offered at the auction. Thus, institutions with specific liquidity needs could obtain funds without any stigma attached. The facility tried to pump funds directly to the places where the interbank market was not functioning well. Further support for the market was provided by foreign exchange swaps arranged between the Fed and both the ECB and the Swiss National Bank. This provided dollar liquidity for non-US banks.

[7] The Fed has been aware of this very strong stigma for some time. Several efforts were made in the last decade to lessen the stigma and ease and encourage access to the window. Bank behavior did not change noticeably.

The new element here is that the central banks were responding to a market liquidity crisis and not to individual institutions. The facilities introduced in the spring offered liquidity to non-bank institutions as well. It seems that the 21st century central bank will be less focused on the depository institutions and will pay more attention to market conditions. Bagehot, writing in 1873, seemed to support this approach. As noted earlier, his view of the LLR function was much broader than that of the central banks of the 20th century. In regard to a "domestic drain" (demand for cash or liquidity) he wrote:

> In opposition to what might be at fist sight supposed, the best way for the bank or banks, who have the custody of the bank reserves to deal with a drain arising from internal discredit, is to lend freely. The first instinct of everyone is to the contrary….But every banker knows that this is not the way to diminish discredit. This discredit means, 'an opinion that you have not got any money,' and to dissipate that opinion, you must, if possible, show that you have money: you must employ it for the public benefit.

He advocated the aggressive and free use of reserves as the way to manage a panic. I think that Bagehot would have supported the Fed's innovative lending to markets.

We have already noted that a lending function entails an ability to scrutinize the borrower. Thus, central bank lending to non bank market participants should go hand in hand with supervisory authority over these institutions. In the next section we will develop further reasons for central bank regulatory authority over non bank financial institutions.

Critical liquidity markets are likely to have many participants in addition to the banks and other financial institutions. They could be financial institutions that the central bank does not or cannot supervise and foreign institutions. Thus, there might be a renewed interest in the direct regulation of these markets.

Market regulation has been out of favor for some years but it is not new. In the 1930s there was a perception (no longer widely held) that market abuses were responsible for the macroeconomic collapse. Abuses in the stock market were thought to be the cause of the depression. As a result, extensive market regulation was enacted. The SEC was created and regulation of stock issuance, registration, market operations and trading was introduced. Market regulation, at least for equities, was a hallmark of the 20th century. However, there was a tendency to move a way from such rules based oversight

and in favor of principles based regulations.[8] However, recent experience may breathe new life into rules based regulation for market activity and instruments.

For example, more transparent rules for international interbank lending or trading of derivatives may have moderated the increases in spreads noted above. Similarly, standardization of mortgage contracts and information about borrowers may have muted the sub prime mortgage crisis. Of course, it is unclear whether new rules for the issuance or registration and standardization of complex traded securities and rules for markets where trading occurs will be enacted. A shift in approach to more rules based regulation would require new legislation and international coordination.

In March 2008, the US Treasury released a "Blueprint for Financial Regulatory Reform" which includes a hodge-podge of specific and general recommendations. In several places it hints at stronger market rules. For example, it calls for enhancements to the oversight of mortgage origination. Importantly, it calls for legislation that would merger the SEC and the CFTC in order to enhance regulation of securities and derivative markets. Investment companies and advisors would be subject to self regulation based on principles but the ultimate effect of these changes would be to extend regulatory rules to instruments that were previously free of oversight.

The response of central banks in 2007 to the market crisis has a further important feature. The central banks began lending directly to non-bank financial institutions. They did so because systemic risks in markets and institutions necessitated such lending. But, these innovative responses to crisis have far reaching implications. The second new thing in 21st century central banking is nonbank systemic risks.

2. **Systemic risks in new places.** Banks are still a source of systemic risks which requires special attention, but banks are no longer the only possible source of such risks. The Fed has acknowledged this with its new lending facilities and its intervention into the Bear Stearns situation. In testimony to Congress, Bernanke (April 2008) said:

> "….on March 13, Bear Stearns advised the Federal Reserve and other government agencies that its liquidity position had significantly deteriorated and that it would

[8] For example, the British Bankers Association ("Principles, not rules, key to regulation," April 2007) reports that "Principles based regulation is the key to the future success of international markets according to over 50 senior representatives from the British and Swiss financial services industries." http://www.bba.org.uk/bba/jsp/polopoly.jsp?d=145&a=9936&artpage=all

> have to file for bankruptcy the next day unless alternative sources of funds became available.
> This news raised difficult questions of public policy. Normally, the market sorts out which companies survive and which fail, and that is as it should be. However, the issues raised here extended well beyond the fate of one company. Our financial system is extremely complex and interconnected, and Bear Stearns participated extensively in a range of critical markets. The sudden failure of Bear Stearns likely would have led to a chaotic unwinding of positions in those markets and could have severely shaken confidence. The company's failure could also have cast doubt on the financial positions of some of Bear Stearns' thousands of counterparties and perhaps of companies with similar businesses. Given the exceptional pressures on the global economy and financial system, the damage caused by a default by Bear Stearns could have been severe and extremely difficult to contain."

One cannot imagine a clearer statement that the Fed felt that systemic risks warranted its intervention. But, Bear Stearns was not a bank and was not subject to any formal Federal Reserve regulatory oversight. .

The 21st century central banks have acknowledged that systemic risks warranting their attention can come from non bank financial institutions. A question that will be debated for a long time is how far along the continuum of financial institutions does the potential for systemic risk go? Traditionally, banks are a potential source because their principal liabilities are transactions deposits. Interestingly, the biggest liability on the balance sheet of Goldman Sachs is overnight borrowing. It seems that the Fed has just acknowledged that there is not much difference between banks and investment banks. Explicit recognition of this might lead to profound changes in regulation. So the next new thing is that the central banks need to respond to and eventually regulate the potential for systemic risks from non-bank institutions.

Much of the financial regulation in the US has its origins in Depression era legislation. Among the best known enactments of that period was the Glass Steagall Act that separated commercial banking and investment banking businesses by restricting the activities of banks.[9] The pendulum of bank regulation began to swing in the opposite direction in the 1980s and culminated with the Gramm-Leach-Bliley Act in 1999 that

[9] The motivation for this legislation was the widely held view that the activities of the banks in the equity markets were responsible for the market crash, a view that is completely discredited now.

virtually eliminated the restrictions on bank activities. The only remaining restriction on the activities of investment banks is that they cannot issue deposits.

The consolidated activities of large banks and investment banking organizations can be quite similar. The table below compares the balance sheets of two trillion-dollar financial conglomerates – Bank America and Goldman Sachs.[10] For sure, there are differences in the balance sheets. BA is still a traditional bank with lending and deposits the biggest balance sheet entries. The investment bank is more active in the securities business and, obviously, has non-deposit forms of financing. However, both institutions make extensive use of collateralized purchases and sales in the money markets. Further, much of the financing of both institutions is short term. There is a major difference in the balance sheets that is due to regulatory impact. Goldman Sachs as a securities firm is not subject to the same capital requirements as Bank America. Its capital asset ratio is 3.8%, less than half of that of the Bank America.

	Goldman Sachs	**Bank America**
End 2007 data	% of total firm assets	
ASSETS		
Cash	1.1	3.8
Securities	51.1	25.0
Loans & receivables	13.2	51.3
Collateralized (e.g. RPs)	32.4	10.9
Other	2.2	9.0
LIABILITES		
Deposits or unsecured short term borrowing	7.8	60.4
Collateralized (e.g. RPs)	22.6	12.8
Other borrowing	62.3	13.8
Other liabilities	3.5	4.4
CAPITAL	3.8	8.4

A comparison of the annual reports indicates broad similarities in the activities and investments of these two institutions. The business models may differ but in the end we are looking at two financial conglomerates. They offer the same potential for introducing systemic risks. And, their capital adequacy and examination by regulators should be based on the riskiness of their balance sheets rather than their legal status.

[10] The data are for the end of 2007 and were collected from Goldman's 10K and BA's call report. There are broad differences in accounting and reporting for these forms so the comparison is suggestive.

The comparison of capital ratios invites the following question? Are the differences in the structure, activity and risks in commercial banks and investment banks or securities firms sufficiently different to warrant such large differences in capital holding? Bankers would argue that they are over regulated and hold too much capital. In fact, the full implementation of Basle II might lead to lower capital requirements for large banks and that is one of the reasons why its implementation has been delayed in the US. Prior to 2006, investment banks and non bank financial institutions in the US had been increasing their leverage ratios.

Our second new thing is that there are important non bank institutions that will be increasingly the concern of central banks. How this will manifest itself in regulatory changes is impossible to say. Of course, the broad risk based regulatory blanket of Basle II includes such institutions. However, it remains to be seen whether legislation and regulators will continue to accept the vast differences in leverage ratios between investment banks and commercial bank holding companies which otherwise appear to be very similar.

The March 2008 US Treasury proposals mentioned earlier includes many things that had been under discussion earlier but had been given significant impetus by current events. Many of the proposals involve efforts to simplify and rationalize the American financial regulatory structure but several proposals are clear and important statements that the 21st century is already very different. First, the report acknowledges that the Fed should be able to lend to non-depository institutions and therefore calls for giving the Fed access to information about its potential loan customers. Second, as mentioned already, the report calls for a complete revamping of market regulation by combining the SEC and the CFTC and suggesting new ways of rule making for financial markets. Third, it calls for an enhanced role of the central bank as an overall market stability regulator.

The Treasury blueprint recognizes that rule making for markets needs to be revamped and that a central bank is responsible for monitoring systemic risks across the financial system (see Jaffee and Perlow for a discussion of the proposals). Systemic risks can occur in new and unpredictable places and the central bank and other regulators need to both look for the risks and be prepared to deal with them.

3. **Crisis with regulation.** In the previous section, we discussed systemic risks arising from institutions other than the traditional depository institutions. A related issue is that crises can arise even when there is a thoroughly structured and responsible regulator.

The US crisis stems from a rapid increase in housing prices which might be termed an asset price bubble. Interestingly, the run up of house prices in the US was not extraordinary if we compare it to experiences in other developed countries (e.g. Australia, UK). The American 'bubble' was driven by very low interest rates in the post 2001 era; perhaps monetary policy was too loose for too long. But loose monetary policy and asset price inflation are not unusual. However, some of the institutional features of the housing boom led to unusual developments.

The expansion of the housing sector relied on institutional and instrument innovations that took place largely outside of the regulated financial sector. That is, the development of new mortgage instruments, the marketing of existing instruments and the securitization of these instruments fed the bubble. It can reasonably be argued that the regulatory oversight of these new instruments and markets has been inadequate. Specifically, the mortgage brokers issued new varieties of sub prime mortgages with relaxed lending standards.[11] The issuers of sub prime mortgages were virtually unregulated companies that sold the mortgages to banks and investment banks that eagerly repackaged them into complex securities. This 'originate to distribute' model was new and attractive because every step – issuance, sale, packaging, MBS sales, etc. – generated fees and revenues for the participants. At the same time, these instruments did not stay on the balance sheets of regulated institutions – so, the regulators never really looked (see Calomiris 2008). The mortgage brokers are largely unregulated as is the securitization activities of banks and other financial institutions. The problems that ensued emerged outside of the areas mandated to regulators. However, that would be a

[11] Between 1987 and 2006 the number of mortgage brokers increased from 7000 to 53000 and their share of mortgage originations went from 20 to 58% (see James Barth, Dubrovnik XIV presentation).

weak excuse. If the Fed, the SEC, etc wanted to articulate an opinion – its force would have been felt. They did not do so.[12]

But, what if the regulators had looked? Would they have seen the accumulation of risks or would they have reacted in the same way as the private sector credit risk managers. By using past experience for rating extra marginal shifts in behavior, the most sophisticated credit risk approaches simply failed. The US credit ratings agencies will spend a long time rationalizing this failure.

Another dimension of this phenomenon is seen in the US mortgage markets where the government sponsored enterprises, FNMA and FHLMC, are flirting with insolvency. These institutions are subject to regulation and even have their own dedicated regulator, the Office of Federal Housing Enterprise Oversight, OFHEO. Financial crisis can occur in the presence of reliable regulatory structures. In the past, crisis in the presence of regulation occurred because the regulators purposely look away. This was the case in Japan in the 90s and in the US in the 80s when regulatory forbearance served to intensify the problems. That is the regulators chose to withhold action in order to allow the institutions to self correct and grow out of their difficulties. In the 21st century we see crises emerging in the presence of active regulation -- *crisis with regulation.*

There are other examples of crises of this sort, in Scandinavia albeit just before the 21st century. The Scandinavian banking crises of the 1990s were overshadowed by emerging markets crises a few years later; they are not as flashy or dramatic. They are good examples of the phenomenon, massive banking crisis in countries with good regulatory structures. Lars Jonung (2008) summarized the story:

> The three …Nordic countries opened their capital accounts fully first at the end of the 1980s.
> Financial liberalization affected the incentives of lenders and borrowers in a fundamental way. Bank lending could now be expanded without any binding regulatory restrictions. Banks entered into a fierce competition for market shares. A lending boom started, channeling credit to the asset markets, mainly to the real estate and stock markets, causing rising asset prices … Asset prices grew more rapidly than consumer prices. Rising asset prices formed the basis for rising collateral values, further fuelling credit expansion in a cumulative process.

[12] The late Ed Gramlich who was serving on the Board of Governors did raise questions about mortgage developments publicly and within the Fed but he was pretty much ignored as a liberal nay sayer. See Gramlich (2007).

> The private sector, previously strongly rationed in the credit market, used the growth of asset prices as collateral for absorbing more debt. As lending from banks and other financial institutions in national and foreign currencies, in particular for property purchases, increased, the volume of bank loans as a percentage of GDP rose markedly….
> In this process, the rate of inflation and inflation expectations increased further. Real after-tax interest rates …. were negative…. The financial system experienced a period of extreme expansion….
> The macroeconomic outcome was a strong boom…
> At this point in time, policy-makers did not perceive the risks inherent in the process of financial integration. Initially they were unwilling to change either monetary or fiscal policy. Monetary policy was confined to safeguarding the pegged exchange rate…. Fiscal policy remained expansionary at this stage.

In Jonung's description regulatory malfeasance does not play a role. However, liberalization led to a removal of constraints on the banking sector and a credit boom. And if he has to lay the blame, he places it at the foot of macro policy makers for not realizing that monetary and fiscal policies were too expansionary. The growth in credit was not hidden. We can guess how contemporaneous observers would have looked at it prior to the crisis. They would have started with the observation that the Scandinavian financial systems were rather shallow. The ratio of credit to GDP in the mid 1980s was between 30 and 40%, rather low for highly developed countries. Financial liberalization and concomitant deepening of financial markets would have been viewed as an important engine of economic growth.

The current American experience with mortgage markets and the earlier Scandinavian crisis show that the presence of responsible regulation is not a guarantee that crisis can be avoided. Innovation by financial institutions and lags in understanding its implications make it hard to avoid crises altogether. Perhaps for this reason, the Treasury reform proposal calls for the establishment of the Fed as an overall financial market stability regulator. However, it is not clear how the Fed would react prospectively to new crisis prone areas or whether it would mop up the mess when a crisis occurs.

The Scandinavian experience of the 1990s offers suggests an additional lesson for the 21st century central bank. That is, micro and macro policies are closely tied together which is the last new thing we will describe.

4. **Micro macro linkages.** The late 20th century infatuation with inflation targeting might put blinders on macro policy makers. They seem to have forgotten those earlier 20th century monetarist lessons about the quantity of money and credit. It might not be necessary to monitor monetary aggregates in order to maintain an anti-inflationary monetary policy. Inflation targeting does the job. However, that does mean that credit expansion does not matter. Maybe not the rate of growth of monetary aggregates in the old monetarist sense but how rapidly financial deepening is taking place is a valid concern for monetary policy. Credit expansion, even without any inflationary indications, can have other implication.

The conclusion that banking crises can happen in developed countries with sound and reliable regulatory structures has implications for the role of central banks when bubbles occur. There was a flurry of literature a few years ago asking whether central banks should prick bubbles (see the references in Mishkin, 2008). I won't review the pros and cons here but the general conclusion was that it is too dangerous a route to follow. No one is particularly able to see a bubble in the making and efforts to prick them run the risk of destabilizing the macro economy and responding to false signals.

Greenspan was clear in his approach to bubbles – let them burst of their own accord and then use monetary policy to protect the banking system and the economy from the fallout (see Blinder and Reis). Blinder calls this the mop up after approach and it worked well after the 1987 market crash, after 9/11 and after the tech bubble burst in 2001-02. A lesson – apparently unlearned by the Fed – from Scandinavia is that the mop up after approach can not always be counted on to mitigate the effects of a big bubble bursting.

Other central banks are concerned with this macro-micro link. The central bank of Croatia has successfully controlled the inflation rate for several years (the 2001-07 average annual inflation rate was 2.7%). However a continuing credit boom has them constantly fretting (money and credit aggregates have grown as much as 15 to 20% in the last few years). Is Croatia experiencing a salubrious financial deepening or embarking on a dangerous bubble (see Kraft and Jankov)? They worry constantly; do no know how to tell the difference nor what to do if they conclude that it is a bubble.

It is no longer fashionable to monitor credit aggregates in the US but it is worthwhile to ask whether a credit boom played a role in the ongoing crisis. Bank credit growth in the US in the 5 years ending August 2007 was 9.3% per year. Growth over the last three calendar years 2005-07 was 10.4, 11.0 and 10.2%, respectively. These figures suggest that the US experienced a credit boom in recent years which might have contributed to the weakening of credit standards and of financial institutions.

This observation raises important questions about monetary policy in the 21st century. The 20th century consensus was that inflation should be the sole concern of the central bank policy makers. The Federal Reserve sometimes seemed embarrassed that its legislative mandate includes maximal employment as well as stable prices. The dual mandate was one of the reasons why formally adopting inflation targets was unlikely. In contrast, the much younger central bank, the ECB, faced no ambiguity. The primary objective of the ECB is to maintain price stability. Nevertheless, both central banks acknowledge that they play a role in maintaining financial stability although these concerns are viewed as being independent of monetary policy.

The challenge that central banks face is that monetary policy actions have an effect on financial stability. That is a credit boom might have cumulative effects on stability without having any evidentiary effect on inflation. If this is so then macro monetary policy should be affected by stability indicators in addition to inflation indicators. Central banks have hardly begun to understand the relationship between macro policy and their micro concern with financial stability. Asset prices, including the prices of equities and houses, and credit booms are all affected by monetary policy and all have implications for financial sector stability. However, how and when central banks should respond to these phenomena is largely unknown. In fact, it is more common to argue that central bankers should not respond to such things. However, if in the 21st century, the link between financial stability and macro policy strengthens, then central banks will have to begin thinking about the issue.

Conclusion

The first financial crisis of the 21st century jumped into view a little more than a year ago. And central banking has changed profoundly as a result. The central bank

responses of the last few months are irreversible and central banking will not be the same again. At the same time, the changes in the policy environment are far from over. The evolution of regulatory structures and the outlook towards non banks and markets will continue unfolding well after the crisis passes. Both changes in attitudes about the role of regulation and specific legislative action are unlikely to occur rapidly and might not altogether. However, this analysis of the new elements implies that such change should occur.

We have seen that there are four new things, and maybe more, under the sun that will make the 21st century central banking consensus different:

1. Crises occur in markets rather than individual institutions
2. Systemic risks arise in new places
3. Innovation means that crisis can occur in the presence of sound regulation
4. Macroeconomic policy has implications for financial stability.

A 21st century consensus is likely to emerge that responds to these new realities, But, as usual, innovation in the financial industry guarantees that new instruments and markets and problems will pop up outside of the grasp of the new consensus. Bubbles and excesses will appear in places that were not previously imagined. Just like in the 20th century, the central banking consensus will lag innovation. And, perhaps, the Biblical prophet was right and there really is nothing new under the sun after all.

REFERENCES

Amantier, O., A. Kreiger and J. McAndrews. The Federal Reserve's Term Auction Facility, Current Issues, Federal Reserve Bank of New York, July 2008.

Bagehot, Walter. *Lombard Street* (1873)

Bernanke, Ben. Developments in the Financial Markets, April 3, 2008, Testimony to US Senate Committee on Banking,
http://www.federalreserve.gov/newsevents/testimony/bernanke20080403a.htm

Bernanke, Ben, Liquidity Provision by the Federal Reserve, May 13, 2008,
http://www.federalreserve.gov/newsevents/speech/bernanke20080513.htm

Bernanke, B. S., and F. S. Mishkin. 1997. "Inflation Targeting: A New Framework for Monetary Policy?" *Journal of Economic Perspectives* 11 (Spring) pp. 97-116.

Blinder, Alan and Reis, "Understanding the Greenspan Standard," Jackson Hole Conference, Federal Reserve Bank of Kansas City.

Bonin, John, Iftekhar Hasan and Paul Wachtel. Banking In Transition Countries. Oxford Encyclopedia of Banking, 2009.

Borio, Claudio. The financial turmoil of 2007-?: A preliminary assessment and some policy considerations. BIS Working papers 251, March 2008.

Calomiris, Charles W. The Subprime Turmoil: What's old? What's new? What's next? Federal Reserve Bank of Kansas City, Jackson Hole conference, August 2008.

Cecchetti, Stephen. Crisis and responses: The Federal Reserve and the financial crisis of 2007-2008. NBER Working Paper 14134, June 2008.

Cukierman, Alex. CEPR discussion paper 6441 Sept. 2007
Fischer, Stanley, Address to Capital Markets Conference, May 21, 2008.
http://www.bankisrael.gov.il/deptdata/neumim/neum278e.htm

Foot, Michael. "Restructuring UK Financial Supervision: The UK Experience," in *Central Bank Modernization,* edited by Neil Courtis and Peter Nicholl. 2006
Accessed on the web (August 12, 2008)
http://info.worldbank.org/etools/library/latestversion.asp?229958

Gil-Diaz, Francisco, The Origin of Mexico's 1994 Financial Crisis, Cato Journal (17), 1998.

Goodfriend, Marvin, JEP, Fall 2007

Gramlich, Edward. Booms and Busts: The case of subprime mortgages, August 2007. http://www.urban.org/UploadedPDF/411542_Gramlich_final.pdf

Jaffee, Dwight and Mark Perlow. Investment bank regulation afte the Bear rescues, 2008.

Jonung, Lars, "….", *Comparative Economic Studies*, December 2008.

Kraft, Evan and Ljubinko Jankov. Does Speed Kill? Lending booms and their consequences in Croatia, *Journal of Banking and Finance*, 29 (2005), 105-21.

Mishkin, Frederic S. How should we respond to asset price bubbles? Federal reserve Board of Governors speech, May 15, 2008.

Quintyn, Marc and Michael W. Taylor, Should Financial Sector Regulators Be Independent? IMF Econmic Issues #32, 2004
http://www.imf.org/external/pubs/ft/issues/issues32/index.htm

Truman, Edwin. Inflation Targeting in the World Economy, Petersen Institute, 2003.