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Permanence and innovation in central banking policy for financial stability

Michel Aglietta

Laurence Scialom

UMR 7166 CNRS

Université Paris X-Nanterre
Maison Max Weber (bâtiments K et G)
200, Avenue de la République
92001 NANTERRE CEDEX

Tél et Fax : 33.(0)1.40.97.59.07
Email : secretariat-economix@u-paris10.fr

Université Paris X Nanterre

Permanence and innovation in central banking policy for financial stability

Michel Aglietta[i] ***and*** ***Laurence Scialom***[ii]
Paris Ouest La Défense and Cepii
Paris Ouest La Défense

Introduction

Since the burst of the so-called "subprime" crisis in August 2007, central banks have been much solicited in their capacity of lender-of-last-resort. Every time such interventions arise, they reopen a lively debate over their righteousness and foster criticism on their supposed harmful side effects. With the present crisis a new chapter can be written in the historical saga of the lender-of-last-resort, as central bank interventions have been unusually lengthy and have implemented renewed techniques. The present paper hopes to contribute to the new chapter.

Lending in last resort aims at sustaining the financial system's overall stability The purpose was not self-evident at the time when banks like the Bank of England and the Bank of France were privately owned and competed with other banks for the business in securities trading. Revisiting the concept of financial stability, defined as a public good, and recalling how the doctrine emerged in the midst of recurring financial crises will provide a useful theoretical underpinning to the analysis of central bank behaviour in the ongoing crisis. It will supply a yardstick to assess the many innovations devised by central banks in the course of events in the sixth months between September 2007 and March 2008. Were some technicalities necessary to adjust the implementation of the doctrine to the changing lending practices? Or were they rather breakthroughs that transform the conception of financial stability itself?

We argue in this paper that the view on the lender of last resort shall not be normative and frozen in first principles! The reason is that financial stability is a policy objective that evolves over time. In the first part of the paper we emphasize the adaptability and continuity of the lender-of-last-resort doctrine beyond the diversity of financial structures from the 19th century to the present day. Therefore the development of new means by the central bank to better manage financial crises broadens and deepens the view on financial stability. The second part of the paper deals with the global credit crisis. We highlight that the lender of last

[i] Emeritus Professor at the University of Paris Ouest La Défense and economics consultant at Cepii

resort's role is not confined to providing emergency liquidity. It aims to provide orderly deleveraging in the financial system in order to preserve the financial intermediation process. Through the analysis of the central banks' innovative practices during the 2007-2008 financial crisis, we discuss the permanence of the lender of last resort doctrine in the current period. In conclusion we show that, since central banks have supplied direct funding liquidity to entities which were far from being commercial banks, this exposure raises a major problem. A redefinition of which financial intermediaries can be labelled "banks" and placed under the supervisory power of the central bank is a matter for future regulation.

Part 1: The principles of the lender-of-last-resort doctrine

When the historical central banks were first created, they had different functions. They were managers of the public debt. The genesis of central banks as bankers' banks took place in 19th century England. It was closely intertwined with the conception of money. For the *currency principle*, enshrined in the Bank Act of 1844 that split the Bank of England's balance sheets into an issue and a banking department, the paramount function of the Bank was to enforce the convertibility of its bills into gold. However recurrent liquidity crises in 1847, 1857 and 1866 demonstrated the need for flexibility in the supply of money. The Bank Act had to be *de facto* suspended though not *de jure.*

The required flexibility in the money supply was consistent with the alternative theory of money: the *banking principle*. Money is a debt that financial institutions endogenously issue as a counterpart of their asset building. This definition is all-encompassing. It covers the commercial bank model whereby credits make deposits. But it also fits the investment bank model in which asset acquisition is financed via leverage in collateralized borrowing. The general feature of endogenous money creation is its procyclicality, which makes it prone to financial crises.

*The general problem of the central banks' dual mandate*Currency and banking principles must be reconciled because each carries only part of the truth. The former forcefully advocates the overriding objective of anchoring the nominal unit of account. Whether via convertibility into an outside commodity (metallic standard) or via a policy rule, trust must be established in the expected long-run purchasing power of the unit of account. But with the

[ii] Professor of Economics, University of Paris Ouest La défense, EconomiX UMR 7166 CNRS, 200 ave de la République, 92001 Nanterre cedex, France. laurence.scialom@u-paris10.fr

latter it must be observed that financial cycles and subsequent crises arise in credit dynamics which are not precluded by a policy uniquely dedicated to the purchasing power of money. Financial instability became an international phenomenon with the rise of industrial capitalism. It is still very much with us.

Figures 1a and 1b display the general process of interaction in credit and asset prices that has nurtured financial crises over long periods of time. Because of the self-fulfilling nature of the process, fuelled by the mutual interaction between credit and asset prices, there is no self-adjusting market mechanism. Monetary policy only aggravated the matter by acting in a pro-cyclical way. Left alone, the process is driven to the extreme. As its magnitude increased in the 19th century from one business cycle to the next, more and more devastating losses plagued the depressive stage. As liquidity had dried up, more and more economic agents were pulled into the spiral of payment defaults. Despite bitter contentions and conflicts of interests, the view began to establish itself that something had to be done for the sake of the stability of the financial system as a whole.

Figure 1a. The euphoric stage of credit expansion and asset price rise

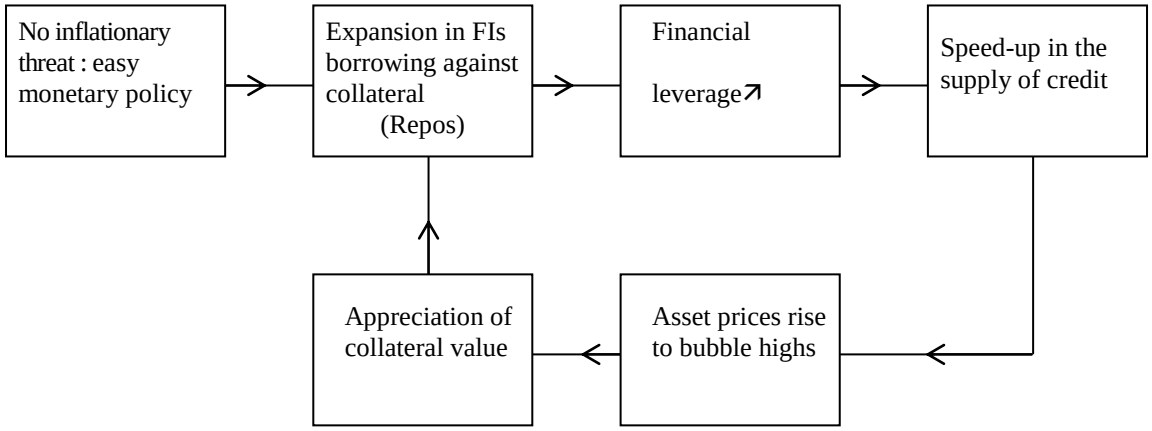
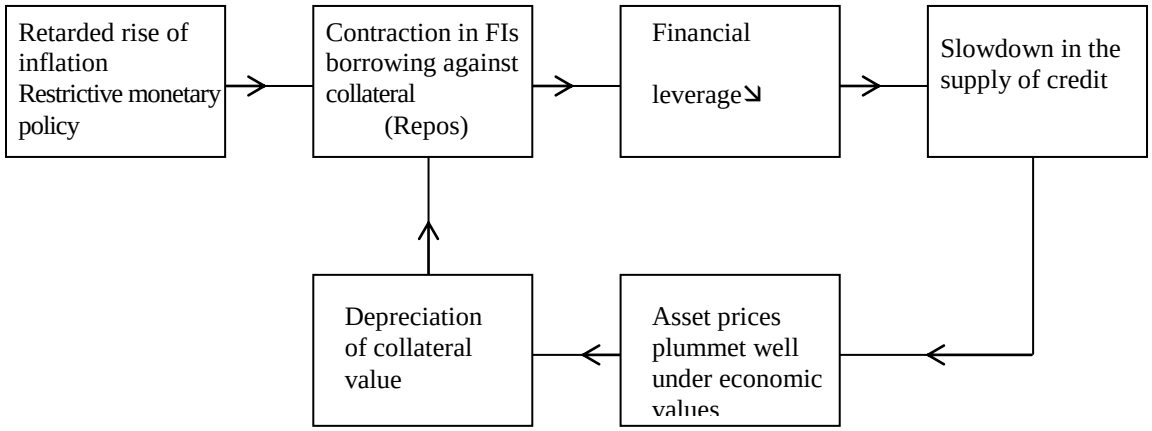


Figure 1b. The depressive stage of credit contraction and asset price slump



Bagehot's lending in last resort: the first response to overall financial instability

Lending in last resort has brought out the gist of the art of central banking, although it took a long time before it became recognized. As soon as 1802, Thornton had highlighted the responsibility of the Bank of England in supplying liquidity to sound banks in times of panic, but there was no follow-up on his advice. Devastating financial crises destroyed much wealth in the trough of the business cycle. It took a very long time and the acumen of a single man for the Bank of England to adopt reluctantly a stance in money markets that *de facto* made it the bankers' bank.

Bagehot was not a monetary theoretician. He was a practitioner and a financial journalist who acutely knew the workings of the London market. He observed that sound firms were trapped in liquidity stringency. Unable to find lenders for the cash needed to meet the payments due, they became weak links in a contagious chain of failures. There should be a lender, whose liabilities were always trustworthy, ready to lend for the sake of overall financial stability. Such a lender could be none but the Bank of England. It ought to lend without limits to solvent but illiquid firms that could not borrow in the market because the widespread mistrust of would-be lenders dried up liquidity. Insolvent firms should be sold to new owners for what they were worth.

However this predicament required an operational principle to distinguish intrinsic insolvency from threats of failure due to liquidity stringency. Bagehot (1873) proposed a distinctive

criterion compatible with the model of figure 1b. What had to be done was to manage orderly deleverage in the financial system. Therefore the quality of the collateral presented by borrowers was the distinctive criterion. Bagehot proposed to solve the problem of fair value in a crude but relevant way (there were no rating agencies providing ratings through the cycle). Depressed market prices were of no use. The Bank of England should accept collateral at pre-crisis value and assess the solvency of the financial firms seeking its help by using such pricing.

Furthermore, to safeguard against moral hazard more effectively, Bagehot insisted that the central bank should lend at punitive rates. This provision would be both a risk premium for the central bank and a deterrent for borrowers. Finally central bank interventions in last resort should be kept as unpredictable as possible. This is the constructive ambiguity that central bankers are fond of, an attribute of the radical discretion that is the essence of monetary sovereignty. Lending in last resort shall not be viewed as an implicit contract, incomplete as it is. Financial stability depends entirely upon the unique character of universal and unconditional acceptance of central bank money. This is called sovereignty.

Indeed lending in last resort is an extraordinary operation that escapes market contracts providing a superior public good: the continuity of payments/settlements in the money markets, e.g. the integrity of the clearing mechanism for the whole economy. This operation allows liabilities to perpetuate, whereas they would otherwise have been destroyed by the spillover of the failed debts.

Bagehot's doctrine is therefore a paramount achievement that is still well alive today. Thus we now need to examine how the operating principles have been adjusted to the many changes that have occurred in the financial systems. Lending in last resort will always be controversial in the ethereal theoretical sphere, while not in the financial community, because its impact is twofold. On the one hand, it anticipates systemic risk because the social cost of letting insolvency spread is much higher than the private cost of the original failure. On the other hand, it can induce moral hazard if it fosters reckless behaviour against which it provides collective insurance. Stopping contagion, while keeping moral hazard at bay, was Bagehot's purpose.

The difficult adoption of Bagehot's lender of last resort principle in the US

Failure to lend in last resort can have most dramatic consequences. A prominent example is the US Great Depression. Another, more recent experience, was Japan's debt deflation in the 1990s. Initially there was a lack of market liquidity. The Wall Street crash in October 1929 led to a scramble for liquidity. At the end of that year, deflation in equity prices had been communicated to primary commodities and durable goods industries, a situation quite at odds with that of early 2008 where a huge pool of speculative capital is rushing together to successive classes of assets.

The Federal Reserve lowered its discount rate from 6% in August 1929 to 2.5% in June 1930. But money stock continued shrinking unabated. According to Friedman and Schwartz's monetarist view, akin to the currency principle, the central bank should have undertaken blanket open market operations to avoid the seizure of credit markets. However Ben Bernanke demonstrated with detailed bank data that the underlying problem was not money scarcity. It was the disorderly deleverage in the banking system that totally disturbed the process of financial intermediation, leading to a widespread credit crunch. Indeed after mid-1930, the crisis changed in nature and in magnitude. Three waves of extended bank failures, one every year, completely wrecked the banking system, leading to the Bank Holiday of March 1933. The drastic change in regulation that followed, severed commercial banks from financial markets.

The lesson to be drawn and that was indeed drawn later, is that central bank intervention in last resort does not only provide money at critical points in time. Sometimes, with isolated incidents that threaten to become contagious, it might be sufficient. But with the damage in bank balance sheets on which the fate of other banks heavily depend emergency liquidity funding must go hand in hand with bank consolidation. And only the central bank has the ability to monitor the whole process. In doing so the central bank is encouraged to innovate in its operational modes.

With the return of financial crises in the wake of the financial systems deregulation, the lender of last resort came back in fashion with the 1970 Penn Central failure and the 1972 UK secondary banking crisis. Since then, there have been innumerable banking and financial market crises worldwide that have solicited the intervention of central banks. Interventions have covered a wide range of problems from securing the payment system in September 2001 to restoring confidence in distressed financial markets in October 1998 and dealing with the global credit crisis of August 2007 onwards. The Fed undertook specific interventions in

financial institutions and dramatic changes in interest rates to restore confidence in distressed markets in the name of risk management. The first two episodes are worth mentioning.

The payment systems episode was illustrated by the break-up in communication lines in the wake of the September 11 terrorist attack. The Fed massively injected liquidity through both the fed funds market and the discount window. It was a timely response to a huge but isolated shock that involved operating risk. Without this emergency supply the overnight money market would have gone to the roof. Instead it fell almost to zero, which indicates that the intervention was indeed unlimited. Each day for a whole week, the Fed injected between $36 and $81b against a daily average of $5b in normal times. Other central banks acted concurrently and emergency swap agreements were concluded between central banks in the world's main financial centres

The LTCM episode in Autumn 1998 was a forerunner of what is magnified in the present-day crisis. The issue is excessive leverage in the shadow banking system (hedge funds, conduits, SIVs — Special Investment Vehicles) with heavy counterparty risks to big banks acting as prime brokers. LTCM was a large, heavily leveraged hedge fund, with counterparty links to the main international investment banks. It was aggressively involved in a strategy of fixed income arbitrage, betting on a reduction in spread between speculative and investment grade securities. Since the end of August, a shock wave from the Russian crisis had made spreads on risky securities spike because a flight to quality wiped out the financial markets. By the end of September, private borrowers could no longer find any credit and with mammoth losses on its exposure, LTCM was unable to meet the margin calls demanded by its lenders.

The central bank was confronted with a dual issue: the direct impact of the LTCM debacle on the banking system on the one hand, the general flight to quality on the other. To solve the first problem, LTCM's debt had to be consolidated. To handle the second, the Fed had to get involved with mass psychology. How was it possible to re-establish trust in the midst of universal mistrust? The New York Fed was the coordinator in LTCM's rescue. It organized a bank consortium ; which took over the Fund's management in order to pilot an orderly reduction in its indebtedness and it proceeded with a $3.5b debt equity swap.

To restore confidence the Fed decided to cut interest rates by 25bp on three successive occasions on September 29, October 15 and November 17. Oh, the miracle of the alchemy that creates collective beliefs! The first one was fully anticipated and had no impact. It even

deepened the crisis. The second was crucial. Taken outside the routine of FOMC's meetings, it was a complete surprise in an act of sheer sovereignty. It demonstrated to market participants that liquidity was lacking only because they thought it was lacking. With the end of the one-way selling pressure of asset holders, the central bank's sovereign decision anchored the floor price of short-term securities, setting a benchmark upon which the market could resume its job of valuing differentiated risks. The third intervention was a message of confirmation. It reassured and convinced the financial community that the central bank was determined to provide all the liquidity necessary for the correct functioning of financial intermediation.

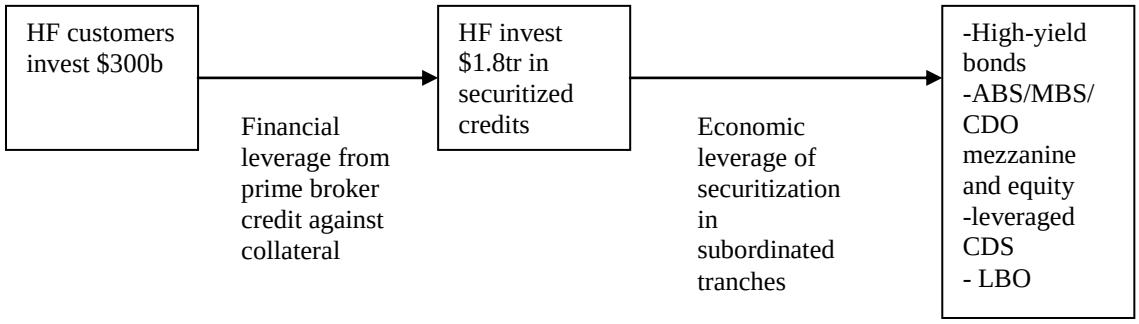
Part 2: A new sort of liquidity crisis brings the lender of last resort to adopt innovative practices

The challenge for central banks of a new type of liquidity

The LTCM episode was a forerunner of the 2007-2008 financial crisis. It introduced the main features currently exacerbated by the different factors that have increased the financial system's procyclicity. Amongst these characteristics the huge development of the "*originate and distribute"* model, has drastically changed the banking business. This model rests on the securitization of any type of credit sold as illiquid securities tranches to the investing community. Credits are "structured". The financial intermediaries in the chain of securitization processes are not commercial banks making on-balance sheet maturity transformation. They are off-balance sheet structures intimately connected to investment banks: hedge funds and hedge fund-like entities —conduits and SIVs are nothing but hedge funds in disguise. This unregulated model has a considerably higher leverage capacity than that of the commercial bank model. It has become known as the "*shadow banking system".*

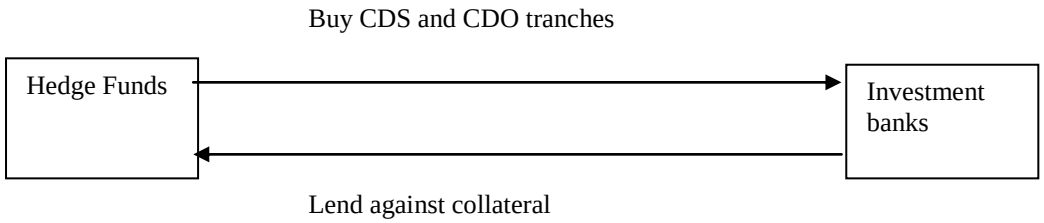
The hedge fund finance model combines two types of leverage: a financial leverage for the different liquidity funding devices against collateral and an embedded economic leverage for the purchase of subordinated securities tranches (figure 2). In securitized markets, the financial leverage is 6 ($1.8tr assets with $300bn capital) This leverage increased before the crisis, because hedge funds invested in leveraged products to boost their returns.

Figure 2. Double leverage on securitized credit



Leverage generates large counterparty risks between hedge funds and prime brokers (figure 3).

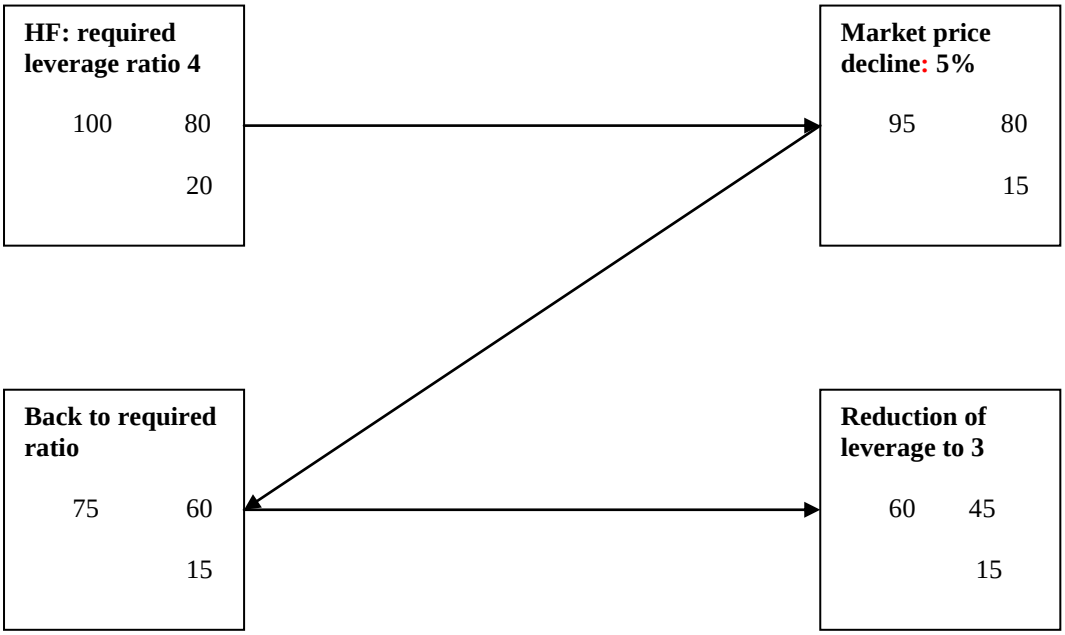
Figure 3. Counterparty risk



In good times, hedge funds use leverage aggressively to invest in more and more risky assets. They get the best price for their borrowing in making the most of the competitive market for prime brokerage. In bad times, hedge funds are very sensitive to the lack of liquidity resulting from their porfolios' declining value. The more hedge funds engage in leverage, the more of their liquid assets they must sell to provision their losses on the illiquid assets in stressful markets. This type of behaviour spreads distress from one market to another.

Figure 4 illustrates the leverage destabilizing mechanism. As much as securitized assets have been downgraded, the plummeting value in the portfolio of assets raises counterparty risks. Prime brokers impose higher margins (hair cut) triggering double deleveraging: first for the decline in asset value, second for the higher margin. Let us consider a hypothetical hedge fund leveraged at 4 times the cash invested by its clients and that prime brokers do not want to or cannot provide financing at a higher leverage ratio. If the value of the hedge fund's portfolio were to decline by 5%, the hedge fund would have to sell 25% of assets to maintain a leverage ratio of 4. Furthermore, if prime brokers impose a leverage of 3 instead of 4, the hedge fund would have to sell 40% of assets.

Figure 4. Distressed asset sales on bear market and balance-sheet contraction



Therefore, while the speculative boom is under way, hedge funds provide extra liquidity to financial markets via leverage. However, they propagate systemic risk in bear markets whenever the slump in the markets drastically curtails their collateral value. Incipient losses lead to a liquidity dry up, which in turn, induces investment banks to upgrade the margin calls that hedge funds try to meet through the distress sale of whatever assets they can sell.

This sweeping change in the structure and functioning of the financial system magnifies the pro-cyclicity due to the adoption of new accounting rules immediately validating market prices. Since market-wide events are perceived simultaneously by all market participants, their reactions are synchronized and fuel the price decline and the reappraisal of risks (Adrian T and Shin H.S, 2008). With mark-to-market accounting, changes in asset prices rapidly impair the net worth of all the participants in the financial system. Consequently, in times of stress, a tightening in market liquidity quickly translates into changes in the banks and market intermediaries' (shadow banks) equity base. There is a dynamic interaction between the liquidity and solvency of financial institutions, because if market participants have misgivings about the solvency of their counterparts, they cut off their access to funding and so themselves cause the solvency problem that they fear.

All market participants know these new interrelationships between market illiquidity and funding illiquidity [iii] and the blurred frontier between illiquidity and insolvency in a market-based financial system. This common knowledge largely explains the new characteristics of the liquidity crisis which gives to uncertainty — in the Knightian sense — a crucial role.

In Summer 2007, despite the small size of the US sub-prime mortgage sector relative to the world financial system, its difficulties led to disruptive developments in many financial market segments the world over. One major surprise was the amplitude and rapidity of the transmission to the very core of the financial system, e.g. the inter-bank market. The heart of this crisis is a rise in uncertainty — unknown and non-measurable risk. The financial instruments and derivative structure underpinning the recent growth in credit markets, are complex and difficult to evaluate. The growing uncertainty surrounding the valuation of structured credit instruments affected their liquidity and caused difficulties in the asset-backed commercial paper (ABCP) the shadow banks issue to fund their CDO holdings. Widespread uncertainty about the distribution of exposure to sub-prime losses across financial institutions made it impossible to distinguish sound from unsound financial institutions, then leading financial institutions to refuse to provide funding to each other due to concerns over counterparty credit risk. The fear that some yet to be identified institutions might next reveal large exposure to sub-prime made banks sceptical about the creditworthiness of any financial institution, especially those with the greatest willingness to borrow in money markets. So we were faced with a typical "lemons" problem.

On August 9th, BNP Paribas announced that the quotation of three of its funds needed to be suspended and that it would freeze withdrawals from them, stating that illiquidity in the respective markets prevented it from valuing assets. This announcement was a powerful market trigger. The inter-bank market came under extreme strain, Europe's overnight interest rate spiked and financial institutions started to hoard term liquidity, simultaneously causing a gridlock in funding markets. Central banks immediately supplied very large quantities of reserves in response to pressing bank demand.

The disruptions in inter-bank trading were compounded by the banks' uncertainty about their own liquidity needs. It is an unusual crisis because it is not related to a quantitative lack of liquidity, rather to a concern about the availability of funding to meet prospective future

[iii] Funding illiquidity occurs when solvent financial institutions have difficulty borrowing immediate means of payment to meet liabilities falling due.

commitments. Accordingly, three-month wholesale markets dried up as banks sought to pile up funds internally and ran to the safe quality of Treasury Bills.

This crisis reveals the powerful and potentially devastating self-reinforcing dynamics between market and funding illiquidity (IMF, April 2008). The Central Banks as Lenders of Last Resort are supposed to provide funding liquidity both to individual institutions and to the market as a whole, either through market interventions or bilateral lending. By signalling their willingness to sustain liquidity through their actions and active communication policy, central banks can try to restore confidence in the financial system by limiting the fire sales of assets and supporting inter-bank lending. Nonetheless they have to adjust their tools and types of actions to the specificity of this crisis. This last point will be the next focus in our analysis.

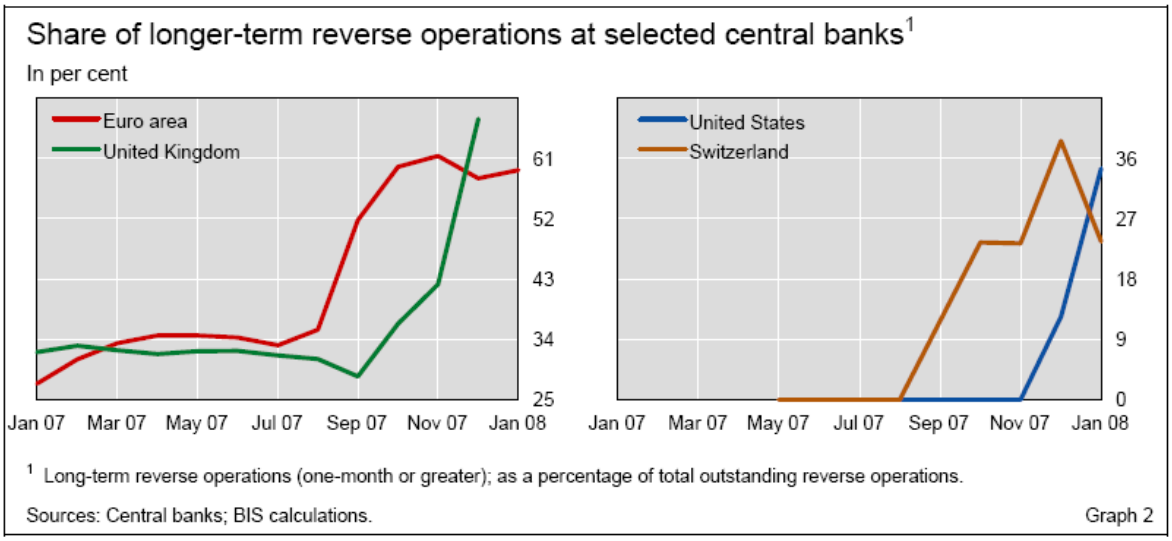
The central banks' innovative initiatives

Because of the specific nature of the financial distress, central banks' tools and practices were renewed and adapted during the crisis. The adaptation process engaged by each central bank was conditioned by the operating frameworks they have in place (Borio C. and Nelson W, 2008). Monetary operating frameworks establish the means by which central banks implement their desired monetary policy stance. It includes the rate policy which signals the desired policy stance, the liquidity management operations with a key distinction between discretionary operations and standing facilities (lending and deposit facilities), the maturity and frequency of discretionary operations, the counterparty arrangements and the range of eligible collateral. All these components of the monetary operating frameworks may vary considerably from country to country. So, the need for innovations in the central banks' tools and practices largely depends on the existing monetary operational framework. For instance, counterparty arrangements differ largely among countries. In the euro area as well as in Australia and Switzerland, the range of eligible counterparties is very broad and common across operations. At the other end of the spectrum, in the United States and to a lesser extent in Canada, the set of counterparties for discretionary operations is considerably smaller than that with access to standing facilities.

Such significant differences in the domestic monetary operational device largely explain the differences in the lender-of-last-resort innovations needed to respond to the specificity of the inter-bank market crisis. Nevertheless, central bank interventions to alleviate the recent financial turmoil exhibit large similarities.

The first challenge faced by central banks was the changing maturity composition in banks' net demand for funding liquidity with an increase in the net demand for term funding relative to overnight funding. This phenomenon was partly due to the large scale reintermediation of conduits. Indeed, during the market crisis, some market participants purchased assets from or extended credit to the off-balance sheet vehicles that they had created and the money market funds that they managed even though they had no contractual obligation to do so (Basel Committee on Banking Supervision, April 2008). Such decisions might reflect reputation concerns, but mainly the counterparty risk involved in a disorderly deleveraging of the conduits. The need for longer financial assistance resulted from this reintermediation process. To a varying degree, all central banks increased the availability of term funding supplied to the market through discretionary operations.

Figure 5



Source : BIS Quarterly Review, March 2008

The second challenge faced by central banks was a breakdown in the usual liquidity distribution channels. In their open market operations, many central banks do not deal directly with all the commercial banks and securities firms but only deal with a pre-specified range of counterparties who redistribute the liquidity into the banking system. During the period of stress that began in August 2007, the banks' reluctance to lend to each other inhibited a smooth distribution of reserves and constrained several central banks to adapt their tools. The need for such innovations in central bank liquidity operations was reinforced by the banks' reluctance to use standing facilities, discount windows or marginal lending facilities to avoid

disclosing their financial weakness. The purpose of the standing facilities is to support settlement in the payment system by providing collateralized overnight loans to direct participants in the payment system, who are experiencing temporary shortfalls in their settlement balances. Generally, banks pay a penalty rate for this direct source of liquidity, but the set of counterparties and the eligible collateral are wider for standing facilities than for open market operations. Nevertheless, using such bilateral lending was perceived by banks as a stigma which signals their financial difficulties to the other market participants. So, banks with liquidity needs will do everything they can to avoid signalling their weaknesses because transparent provision of liquidity in such circumstances can be interpreted as a confirmation of vulnerability, causing their inter-bank counterparties to react in the exact manner that the financial support is supposed to prevent. This stigma has been strongest in the United States probably because a similar facility had been used to provide emergency liquidity assistance in the past. Because of the stigma, there was relatively little use of standing facilities even on days when inter-bank rates rose above the interest rates on the facilities. This stigma was particularly powerful in countries where differences between open market operation and standing facility counterparty groups and eligible collateral were most pronounced. The Fed tried to alleviate the stigma by reducing the discount rate spread in the fed funds by 50 basis points on August 17. That also actually means a reduction in the penalty rate.

From September 18, 2007 to April 30, 2008, the Federal Reserve followed a policy of sharp reduction in its federal funds rate (seven cuts totalling 325 basis points) coupled with a reduction in the premium on primary lending from 100 to 50 and then to 25 basis points.

Table n°1: Central Bank Counterparties

	Federal Reserve	**E.C.B**	**Bank of England**
Regular Open Market Operations			
Counterparties	20 primary dealers	300 to 500 banks (potentially 1700)	About 40 banks and securities firms
Range of eligible collateral	Narrow	Wide	Intermediate
Pricing	Bid price: Fed funds rate as guideline	Bid price above minimum rate	Fixed price
Standing Facilities			
Counterparties	7500 credit institutions	2400 credit institutions	About 60 banks
Range of eligible collateral	Wide	Wide	Intermediate
Pricing	Fixed price	Fixed price	Fixed price

Source: IMF, Global Financial Stability Report, April 2008.

In order to ensure that liquidity provisions are distributed efficiently even when the unsecured inter-bank market was under stress, and to avoid the stigma associated with standing facilities, the Fed announced a temporary Term Auction Facility (TAF) [iv] on December 12, 2007. The TAF is a credit facility for terms of 28 or 35 days that allows a depository institution to place a bid for an advance from its local Federal Reserve Bank at an interest rate that is determined by the result of the auction. This new policy tool differs from open market operations because it involves all of the over 7000 commercial banks in the country rather than just the 20 primary dealers and the collateral accepted is much broader [v] than with the standard repo. It also differs from the discount window because it offers anonymity to the bidders and so it did not carry any stigma. Moreover, the TAF rules allow banks to pledge collateral that might otherwise have very low market value. According to S. Cecchetti (2008), with the TAF, the Fed is taking collateral at a price that is almost certainly above what the banks could get for it anywhere else.

Because of a lack of confidence in the assets created from the securitization of bank loans, more especially mortgage-backed securities, it has become very difficult for banks to exchange these assets for cash. Banks have on their balance sheets an "overhang" of these assets that they cannot readily sell or use to secure borrowing. This overhang has created uncertainty about the banks' financial position. As a result, they have been reluctant to lend even to each other. So, the illiquidity of certain class of securities and in some cases the disappearance of the market they are traded in, is the main cause of the funding problem faced by banks. Moreover, worsened by the mark-to-market accounting principle, the solvency of financial institutions was also threatened by market illiquidity. In order to tackle these serious funding and solvency problems, central banks worldwide have extended their lending facilities but also widened the range of collateral accepted for their operations. They also created new tools to finance part of the overhang of illiquid assets by exchanging them temporarily with more easily tradable assets. The banks could then use these liquid assets to finance themselves more normally. The Fed and the Bank of England became involved in such innovative practices whose aims are to improve the liquidity position of the banking system and enhance confidence in financial markets.

[iv] http://www.federalreserve.gov/monetarypolicy/taf.htm
[v] Any collateral eligible to secure discount window loans.

This way, the Term Securities Lending Facilities (TSLF) announced on March 11 was an additional step by the Fed to directly improve liquidity conditions in key credit markets. It is a more precise tool for addressing the dislocations in the credit market by striking at the core of the financial problems, namely mortgage-backed securities. Under the TSLF, the Fed temporarily swaps more of its Treasury holdings for private sector troubled assets. As with TAF, this new liquidity tool works primarily by changing the composition of the asset side of the Fed's balance sheet. More precisely, according to the Federal Reserve's Board of Governors "Under this new Term Securities Lending facility the Federal Reserve will lend up to $200 billion of treasury securities to primary dealers secured for a term of 28 days (rather than overnight as in the existing program) by a pledge of other securities including federal agency debt (including debt issued by Fannie Mae and Freddie Mac), residential-mortgage-backed securities (MBS) and non-agency AAA/Aaa-rated private label residential MBS… securities will be made available through an auction process [vi]". So the range of TSLF (bonds for bonds transactions) collateral is the same as for TAF loans (bonds for cash transactions) which is similar to that for the discount window.

By allowing the primary dealers to temporarily swap illiquid assets such as MBS for highly liquid Treasuries "the TSLF intends to promote liquidity in the financing markets for Treasury and other collateral and thus foster the functioning of financial markets more generally" [vii]. With this extension of the Fed's long-standing securities lending program, it is expected that, if primary dealers can exchange MBS for Treasury bills through TSLF, then traders and asset managers would be less reluctant to hold them back again. As reported by S Cecchetti (2008), in the 27 March 2008 first auction, the Fed offered $75billion face value securities. It received $86.1billion in bids and the winning bid was 33 basis points. This means that for 33 basis points a dealer could exchange a residential mortgage-backed security that might be selling at discount, bearing a risk premium of up to several hundred basis points for a Treasury security. So, TSLF constitutes an institutional response to the market valuation problems faced by this sort of assets but it also increases credit risk for the central bank.

[vi] Press Release : http://www.federalreserve.gov/newsevents/press/monetary/20080311a.htm
[vii] Press release: http://www.federalreserve.gov/newsevents/press/monetary/20080311a.htm

On 21 April 2008, the Bank of England announced a "special liquidity scheme" (SLS) which seems quite similar to TSLF[viii]. Indeed, this scheme allows banks and building societies to swap some of their illiquid assets for liquid Treasury Bills for up to three years. More precisely, the Bank of England presents the new device as follows:

- "The assets swaps will be for long terms. Each swap will be for a period of one year and may be renewed for a total of up to three years.
- The risk of losses on their loans remains with the banks.
- The swaps are available only for assets existing at the end of 2007 and cannot be used to finance new lending."

Under theses swap arrangements, the banks remain the owner of the illiquid assets they offer to the Bank of England. When a swap transaction ends, the assets are handed back to the banks in exchange for the return of the Treasury bills.

In a briefing note providing information about the purpose and nature of this initiative, the Bank of England explains: "Banks will be required to pay a fee to borrow the treasury bills. The fee charged will be the spread between the 3-month London Interbank interest rate (Libor) and the 3-month interest rate for borrowing against the security of government bonds, subject to a floor of 20 basis points." This means that the banks borrow from the Bank of England through the SLS at an unsecured rate (LIBOR) even if their borrowing is collateralised by mortgage-backed securities. Nevertheless, as previously mentioned, banks are reluctant to lend mutually at the LIBOR rate, so, we totally agree with Willem Buiter when he notes that the market rate for borrowing against the type of MBS collateral the banks are offering to the Bank of England will be higher than LIBOR and concludes that by doing so the Bank of England does not subsidize the banks. It corrects a form of market failure — the illiquidity of such assets [ix]. The briefing note previously quoted also clarifies the haircuts applied for the valuation of the illiquid assets: "The Bank of England will decide the margin between the value of the Treasury bills borrowed and the value of the assets banks are required to provide as security. For example, if a bank were to provide £100 of AAA-rated UK residential mortgage-backed securities, it would, depending on the specific characteristics of the assets, receive somewhere between £70 and £90 of treasury bills." Moreover, the SLS holds that if the value of the assets pledge as security decreases, the banks must compensate this fall by providing more assets or by returning some of the Treasury bills it received in the

[viii] Press release: http://www.bankofengland.co.uk/publications/news/2008/029.htm

[ix] F.T. April 25, 2008, http://blogs.ft.com/maverecon/2008/04/is-the-bank-of-england-subsidising-the-banks-through-the-special-liquidity-scheme/

swap arrangement, and if the assets pledged as security were to be downgraded, the banks would need to replace them with other highly-rated assets.
With such provision, the Bank of England seems largely protected against credit risk. Nevertheless, the Bank of England bears the risk of joint default by the borrowing bank and the issuer of the illiquid assets. The probability of such joint-default is not equal to zero because MBS backed by mortgage originated by the bank offering the MBS to the bank of England in the SLS or by a corporate belonging to the same financial conglomerate are not forbidden.

On March 14, 2008, the Federal Reserve Bank of New York issued a loan directly to Bear Stearns. Since it is not a commercial bank under the strict regulatory umbrella that accompanies membership in the Federal Reserve System but an investment bank, Bear Stearns could not obtain a traditional discount loan. This was really an extraordinary move. Not since the 1930s had the Fed actually made a loan based on paragraph 3 of section 13 of the Federal Reserve Act which authorizes the Federal Reserve Banks — with the previous agreement of the Board of Governors — to lend to any individual, partnership, or corporation provided that the borrower is unable to obtain funding from a bank. *In addition to this exceptional lending through the discount window, the Fed provided special financing in connection with the acquisition of Bear Stearns by J P Morgan. Indeed the Fed funded up to $ 29 billion of Bear Stearns' less liquid assets while JP Morgan met the first $1billion loss.*

On March 16, the Federal Reserve announced the setting up of a new procedure called the Primary Dealers Credit Facility (PDCF) which is an overnight loan facility that provides funding to primary dealers[x] in exchange for a large range of eligible collateral including all investment grade corporate securities, municipal securities, mortgage-backed securities and assets-backed securities for which a price is available. The program was announced to last for six months or longer if events warrant. The loan rate is the Federal Reserve Bank of New York's primary credit rate, currently 25 basis points above the target federal funds rate. This new facility was a sort of systematization of the Bear Stearns liquidity assistance. By giving all the large investment banks direct access to discount window borrowing, this new facility represents a complete break with the past. Previously, investment banks did not have access to

[x] Primary Dealers are banks and securities brokers-dealers that trade in US government securities with the Federal Reserve Bank of New York.

either discount window borrowing or the TAF which were both restricted to regulated depository institutions. This program is also authorized under paragraph 3 of section 13 of the Federal Reserve Act which allows lending to non-banks under "exigent and unusual circumstances". Such provision suggests that there is a fundamental difference between PDCF and the Fed's normal operations. Indeed, the privileges for banks that come from belonging to the Federal Reserve System — access to emergency liquidity — come with regulation costs so that banks with direct access to Fed credit do not take excessive risks. Yet, although the primary dealers are subject to capital requirements, they do not fall under the same constraining regulatory framework as the banks.

Investors concerns about financial institutions became more marked over the summer as mortgage-related assets deteriorated further. At the beginning of July, Fannie Mae and Freddie Mac suffered very strong pressure. Investors lost confidence in them, their access to liquidity and capital market dramatically impaired and their stock prices dropped sharply. In order to curb this liquidity crisis, on July 13, the Board of governors of the Federal Reserve System announced that it has granted the Federal Reserve Bank of New York with the authority to lend to Fannie Mae and Freddie Mac. All lending would be at the primary credit rate and collateralized by U.S. government and Federal agency securities. This direct access to emergency liquidity assistance gave the two G.S.E [xi] a respite concerning liquidity pressure but didn't constitute a response to their undercapitalization. The solution to the solvency problem was given on September 7 when the U.S. government seized control of the two mortgage finance companies. At the same time, the Treasury and the Fed have established a Government Sponsored Enterprise Credit Facility (GSECF) which provides loans to Fannie and Freddie with a maturity between one week and one month against collateral consisting of RMBS issued by the two GSE and by advances made by the Federal Home Loan Banks. This is a Treasury facility and not a Fed facility. So it means that in this operation the New York Fed acts as agent of the Treasury providing its expertise not its own financial resources. Moreover, the Treasury has established a GSE Mortgage Backed Securities Purchase program (GSEMBSPP) through which it purchases GSE mortgage backed securities outright in the open market. This is really new. It is the first time that an intervention takes the form of such an outright purchase rather than a repo operation or other collateralised loan or swap. This operation supports both the RMBS market and the two GSEs.

[xi] G.S.E. : Government Sponsored Enterprises

With the Freddie Fannie rescue we face a change in the nature of the crisis from a widespread liquidity crisis to a solvency crisis taking place in a context of liquidity vanishing. Such a change induced a correlative alteration in the Fed role. From the Fannie Freddie episode, the Fed is not only restricted to its lender of last resort and market maker roles but it is also involved in more complex bail-out packages.

On September 14, in response to the worsening of the liquidity and credit crisis, the Federal Reserve Board announced an enhancement to its existing liquidity facilities which took the form of a significant broadening in the collateral accepted at the PDCF and TSLF programs as well as an increase of the amounts offered under TSLF.

From September 14 to September 19, the American Financial System experienced one of its most dramatic period.

Bank of America purchased Merrill Lynch on September 14 for roughly $50 billion while Lehman Brothers, filed for bankruptcy protection and hurtled toward liquidation after it failed to find a buyer. The decision not to put public money behind a bail-out of Lehman Brothers increased short-term volatility and uncertainty and rapidly induced a complete freezing of money markets. The importance of Lehman's counterparty role on the over the counter and opaque CDS's market has probably been under-estimated by the Treasury and the Fed.

On September 16, The Federal Reserve Board with the full support of the Treasury Department authorized the Federal Reserve of New York to lend up to $85 billion to the American International Group (AIG) –one of the biggest insurance company in the world- under section 13 (3) of the Federal Reserve Act in return for a government stake of 79,9 per cent and effective control of the company. The AIG facility has a 24 month term and bears a penalty rate of three month libor plus 850 basis points giving AIG a strong incentive to repay it as soon as possible. The Fed loan to AIG has been secured on all AIG's assets including those of its subsidiary companies.

In this context of widespread liquidity freeze, few money market mutual funds experienced significant demands for redemptions by investors. In ordinary circumstances they would have been able to meet those demands by selling assets. However as many money markets have become extremely illiquid including asset backed commercial paper, the Fed decided, on September 19, to create a new facility specifically dedicated to money market mutual funds (AMLF).

The financial turbulence has demonstrated that global channels for distributing liquidity across borders may become seriously impaired. Indeed, the interbank markets are linked

across countries by the activity and funding needs of banks doing cross-border business on a large geographical scale and holding assets and liabilities denominated in varying currencies. That's why, in addition to domestic operational responses, central banks have further strengthened their cooperation throughout the turmoil. It was particularly and systematically the case from mid-September 2008 when the Fed trying to address dollar funding pressures worldwide announced a significant expansion of reciprocal currency arrangements with foreign central banks including an approximate doubling of the existing swaps lines with the European Central Bank and the Swiss National Bank [xii]. On September 2008, in response to continued strains in short-term funding markets, ten central banks announced further coordinated actions to expand significantly the capacity to provide US dollar liquidity. As regards the specific actions in the euro area, the Federal Reserve and the ECB decided to double their temporary reciprocal currency arrangements (swap lines) from USD 120 billion to USD 240 billion. This reciprocal swap facility has been authorised through 30 April 2009..

Summary of the steps taken by the ECB, the Fed and the Bank of England during the financial turmoil

	ECB	**Fed**	**BoE**
Exceptional fine-tuning (frequency, size of operations, conditions)	+	+	+
Exceptional long term open market operations	+	+	+
Broadening of eligible collateral		+	+
Change in the lending standing facility		+ **(reduction in the penalty rate and access to the discount window for investment banks through PDCF)**	
Broadening of Counterparties		+ **(TAF)**	+
Temporary swaps of illiquid assets for treasury bills		+ **(TSLF)**	+ **(SLS)**
Direct loan to investment bank, GSE's, insurance and Money Market Mutual Funds		+ **(Bear Stearns, PDCF, AIG, Fannie and Freddie, Money Market Mutual Funds)**	
Coordinated actions among central banks to provide foreign exchange liquidity	+	+	+

[xii] The US dollar Term Auction Facility started in December 2007. According this arrangement the ECB agreed with the US Federal Reserve to grant loans in dollars to euro area banks. The scope of this facility has been expanded with the decision on 18 September to start providing USD funding to European counterparties also on an overnight basis and to increase the amounts offered in the existing operations at longer maturities (28- and 84-days).

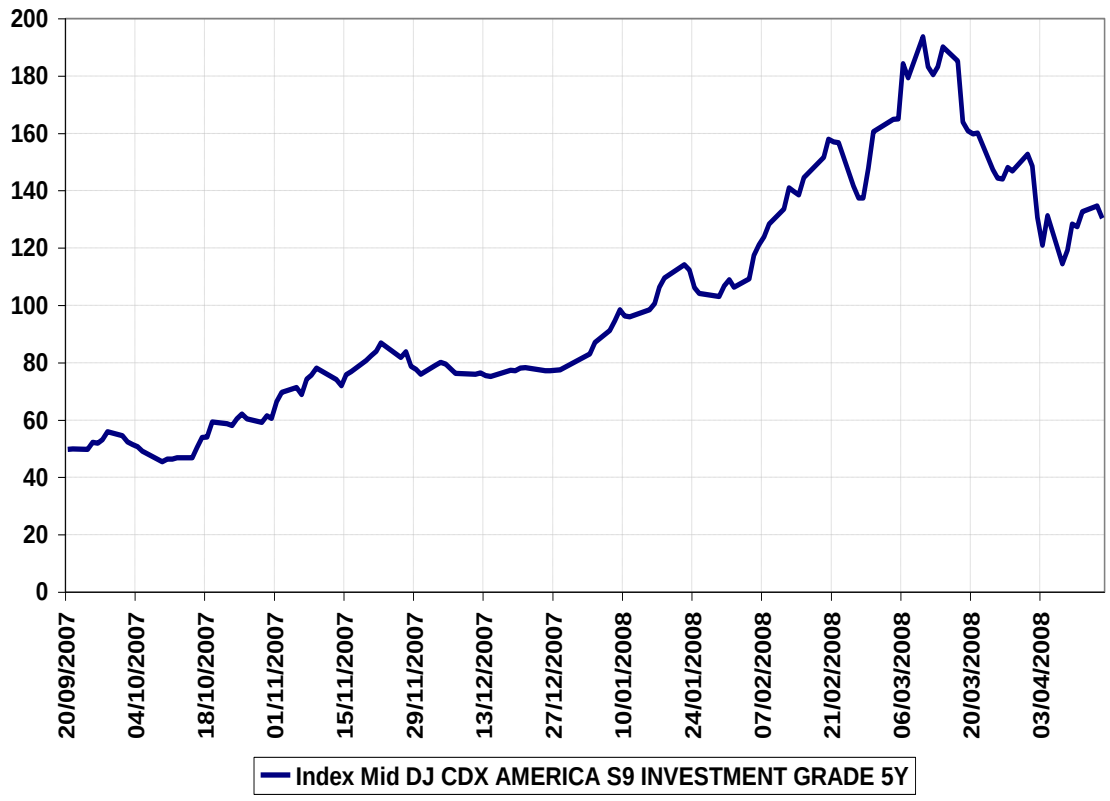
Were the central banks paraphernalia really successful?

As shown above, central banks have indulged in a lot of technicalities since August 2007: they have played around with maturities in their interventions, widened the range of accepted collateral, resorted to auction in order to set up a new facility. They tried to follow the pattern of bank liquidity needs more closely. But does it make a difference for the stress that plagues money and credit markets? Looking at the indicators displayed below, we may have doubts.

Nonetheless a radical innovation stands out. It happened in mid-March 2008. While Bear Stearns was about to file for bankruptcy protection, the Fed did not allow it to do so. For the first time ever, it decided to lend directly to an investment bank. It triggered the immediate expectation that the whole investment banking profession had been placed under the Fed's franchise. This belief was confirmed by the PDCF that extends the umbrella of the lender of last resort to the entire investment banking industry. The Fed removed from the market the awesome belief that a rolling collapse of the biggest investment banks had become a real possibility. The long-run consequences of such a landmark in bank regulation have yet to be drawn. However, in the short run, it has had noticeable effects

The cost of insuring against default through credit default swaps is directly expressed as a spread over the rates on similar treasury bonds. Higher spreads mean higher effective insurance premiums. This is a basic measure of stress in the credit markets as a whole. Figure 6 depicts the spread.

Figure 6. Spread of 5-year investment grade over bonds

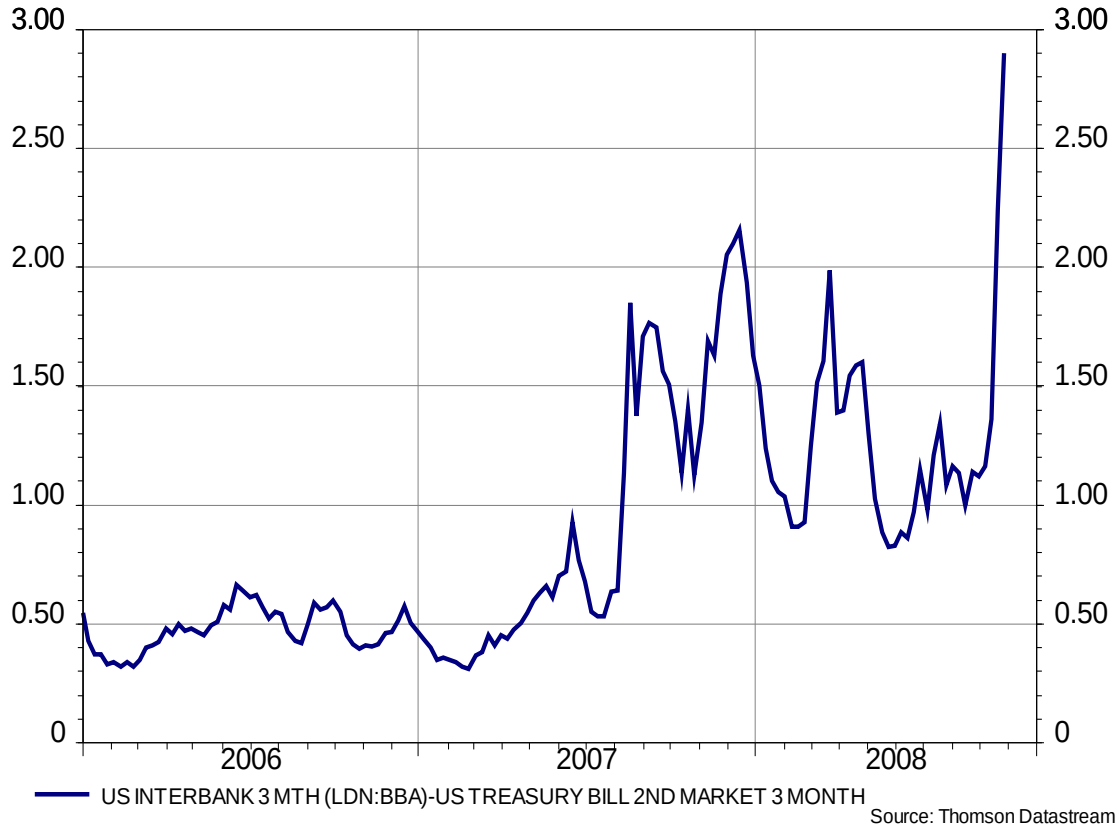


Source: Bloomberg

One can see that the spread has more than doubled in the early months of 2008 after the plateau of 80 bp reached in late December 2007. Then the spread surged almost unabated. Even the heavy Fed's reaction at the end of January only had a very short-run effect. The spread culminated with the Bear Stearns's demise. Since the Fed's dramatic decision the spread has substantially receded, though it stays at a very high level compared to the pre-crisis situation.

Another indicator probes into the turmoil on the interbank money market. This is the 3-month LIBOR spread over treasury bills of the same maturity , the so-called TED spread (figure 4)

Figure 4. Spread of Libor over treasury bills



In quiet times the spread is almost constant at 40bp. It spiked to 180 as soon as the crisis started, reflecting the acute banks' needs for 3-month funding. Despite the multi-faceted central bank actions, renewed tensions in credit markets foster new waves of funding needs. The spread had fluctuated around the 150bp level for several months following the Bear Stearns rescue and the working of the PDCF. However the crisis worsened considerably in September following the distress and nationalisation in the GSEs and in AIG. Because AIG was a huge counterpart in the CDS markets, turmoil erupted and jeopardised the money market funds that are sellers of credit protection. The wholesale money market seized up and to be supplemented entirely with central bank credit lines, including huge swaps to supply dollars abroad. In this context the TED spread spiked at the unprecedented level of 300 basis points, revealing the acute state of distress and lack of confidence.

Conclusion

In September 2008 the crisis gained considerable momentum. Despite spectacular actions by US monetary authorities, liquidity stringency had become more and more acute and widespread. However bold and innovative, the multiple new facilities to provide access to central bank money in emergency did not succeed to quiet markets. Furthermore the scramble for liquidity had reached European banks. The rush for evaporating liquidity to make dollar payments outside the US prompted the largest co-ordinated intervention ever by the main central banks on September 18. However the systemic crisis had moved beyond LLR innovations. It had become commonly understood, since July 2008 with the rescue of Fannie Mae and Freddie Mac, that the root of piled-up losses stemmed from insufficient bank capital and massive risk undervaluation that could not be cured by liquidity injections.
Therefore the role of the US central bank and its relationship with the Treasury has changed while the crisis has matured. The essence of stand-alone LLR policy is reactive and tactical. It was hoped that restoring orderly market liquidity would enable banks to overcome temporary financial fragility. However overleveraged investment banks had recurrent problems of short-term funding in wholesale markets, as much as the value of their collateral was plummeting. It is why the central bank created facilities tailored to brokers dealers. The US central bank handled new rounds of liquidity stringency with new types of credit lines from December 2007 to March 2008. Because it lodged credit risk on its balance sheet, it got the backing of the Treasury. However the central bank kept the initiative.

The relationship changed completely while capital problems had become paramount from July 2008 on. The Fed has extended more liquidity and for longer than before, but it has become the arm of the Treasury in much more complex rescue packages. The stake of emergency plans turned to nationalising de facto too big or too connected financial institutions. However from the GSEs to AIG, the policy was still reactive and piecemeal. Nonetheless while interbank markets seized entirely and world Stock markets slumped altogether on September 18, Hank Paulson and Ben Bernanke were convinced that a decisive action was needed. They proposed a threefold plan: a giant public resolution fund to buy bad debts, an unlimited credit lines to money market funds granted by the Fed under a blanket Treasury guarantee, an interdiction of short selling in the Stock market..

Therefore crisis management has become global and strategic. It opens the way to regulatory and supervisory reform, whereby the Federal Reserve will be granted much extended power over a larger banking system, encompassing investment banks and interconnected shadow

banks. The Fed is studying ways and means of countercyclical macro prudential policy to complement monetary policy in pursuing the dual objective of financial stability and price stability.

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