By chance this conference took place at an especially critical point in the current crisis. Indeed, I was asked at the last minute to substitute for a European regulator who was faced with the collapse of a major domestic institution and could not leave his post. This week also proved the end of a concerted effort by the US regulators to portray the subprime debacle as a liquidity crisis. I will begin by reviewing the outbreak of the crisis and indicate why it quickly spread from the relatively small sub-prime related sector of the market for securitized debt to engulf other markets that seemed only tangentially related and quickly spread round the world. Then I will review some of the policy improvisation by the US authorities leading to the two-and-one half page proposal for a $700 billion Troubled Asset Relief Program (TARP).

Securitization and the outbreak of the crisis

Securitizations began with the Government Sponsored Enterprises (GSEs) -- Fannie Mae and Freddie Mac -- as a way of reducing the cost and increasing the flow of funding to the housing industry. Securitization permitted financial institutions to use capital more efficiently in an originate-and-distribute approach in which mortgages were pooled and securities were issued against the pool of mortgages to fit the particular preferences of various clienteles in the capital market. Although holders of securitized claims had to concern themselves with interest rate risk and pre-payment risk, they did not need to worry about credit risk. They could rely on guarantees from the GSEs.

Private securitizations began to grow as market participants found ways to substitute for the guarantees against credit risk supplied by the GSEs. Three main props replaced the GSEs: (1) Statistical
models that were sufficiently reliable to predict the excess servicing, over-collateralization, performance
triggers, subordination and residual tranching necessary to achieve the desired degree of safety; (2)
Ratings of asset-backed securities by Nationally Recognized Statistical Ratings Organizations (NRSROs)
– mainly Standard & Poors, Moodys’ and Fitch; (3) Insurance issued by monoline insurers. Private
securitizations were very innovative and increasingly complex leading to a virtual alphabet soup of new
instruments such as CDOs, CDO$^2$, CLOs, ABCP, SIVs and SIV-Lites. These innovations were so
successful that they constituted a virtual off-balance sheet banking system amounting to nearly $12
trillion worldwide.

In part this growth was driven by the fact that the demand for high quality assets greatly exceeded
the supply of investment grade corporate and sovereign bonds. Partly this was a consequence of the use
of ratings in the regulation of insurers, some mutual funds, pension funds and various other investors
subject to the prudent man rule. The implementation of the Standardized variant of Pillar 1 of the Basel II
further adds to the demand for highly-rated securities by reducing capital charges for banks that hold
these securities. Private securitizations provided a way to synthesize investment grade securities that
served to fill the gap.

This increasingly elaborate structure of private securitizations was shaken to its foundations when
confronted with the brute fact that the quality of subprime mortgages in recent years was inconsistent with
the optimistic ratings assigned to securities based on these subprime mortgage pools. The peak in
delinquencies in this kind of lending is generally expected 2 to 3 years after origination when low, initial
teaser rates are replaced by adjustable rates set at substantial margins above some benchmark market rate.
It was widely assumed that the worst likely performance was the cohort of subprime mortgages
and 2007 showed signs of deteriorating far more rapidly and at much higher rates than the 2000 cohort.
Indeed, an astonishing proportion of subprime mortgages underwritten in 2007 became 60-days
delinquent within 60 days.
This undermined confidence in the three principal supports for private securitizations. Many of the institutions that had played a leading role in underwriting sub-prime related debt and should therefore have had the most sophisticated and accurate statistical models suffered substantial losses from the declining value of sub-prime mortgages in the pipeline to be securitized and from subprime securities which they held. Since these institutions also played a central role in over-the-counter markets and interbank markets, concerns about counter-party risk mounted.

Confidence in the NRSROs was undermined by the realization that subprime-related securities were much more vulnerable to multi-notch downgrades than corporate bonds with similar ratings. Three notch downgrades are comparatively rare among corporate bonds and confined mainly to bonds that were initially rated as less than investment grade. In contrast, 68% of BBB rated subprime-related securities were downgraded at least three notches. This removed the investment grade imprimatur from these securities and forced some institutions to sell the securities into thin and declining markets. More broadly, loss of confidence in the NRSROs led to a marked decline in demand for other kinds of asset-backed securities in which investors relied heavily on ratings issued by the NRSROs.

Finally, when it appeared that the monoline insurers might have to make good on their guarantees, markets doubted that they would be able to support the $800bn in structured finance obligations they supported at yearend 2006. The average equity price of the monoline insurers fell precipitately and the average credit default swap rose to nearly 1000 basis points by the end of January 2008. Loss of confidence in the monoline insurers spread the crisis to other insured borrowers, especially some municipal obligations that had no relationship whatsoever to subprime mortgages.

Thus, by undermining confidence in the three main supports for private securitizations, the subprime problem led to a loss of confidence in other kinds of securitizations, a drying up of new issues and a collapse of secondary market activity. Subprime-related losses heightened concerns about counterparty risk that led to a sharp decline in interbank lending and a hoarding of liquidity.

*The Authorities View the Problem as a Liquidity Crisis*
By August 2007, it should have been clear that the financial system was faced with the prospect of insolvencies at many of the Large Complex Financial Institutions (LCFIs) that were heavily involved in the securitization process. Indeed in recent years, some had earned nearly half their profits from this source. (See Table 1 for a list of the 16 LCFIs.) But it was clear that some of these institutions were now facing massive losses. These included losses from holding downgraded securities, losses from honoring implicit guarantees backing-up off balance sheet vehicles, money market mutual funds and sometimes even hedge funds. They also included losses from funding a pipeline of assets that could no longer be securitized and the loss of an important component of bank revenue. Several institutions faced a challenge to replace lost capital and, indeed, to increase capital as a precaution against loss of access to funding. Table 2 shows that, although some institutions succeeded in raising capital, the amounts raised fell short of the losses incurred. Nonetheless, the US authorities framed this problem as a liquidity crisis. There was without doubt a lack of liquidity in many markets, but the reason was concern over counterparty risk. It was known that large losses were overhanging the system, but the precise allocation of those losses was and remains unclear.

The Fed responded not only with a series of aggressive cuts in the discount rate, but also with a series of innovative attempts to inject liquidity into the system through extending auctions to a broader range of institutions and accepting lower quality collateral. During March, the Fed crossed a regulatory Rubicon without the appropriate weapons. It’s hastily improvised rescue of Bear Stearns set precedents may have contributed to future damage.

Traditionally, the US has taken the view that investment banks do not pose systemic risk. They are unlikely to be subject to a run by their customers, since customer funds are strictly segregated from the firm’s own funds and could be easily transferred to another firm in the event of a failure. In addition, investment banks hold mainly marketable securities and should be able to deleverage rapidly without suffering illiquidity losses in the event of a funding shock. Finally, access to systemically important, large payment clearing and settlement systems was through large banks. The demise of Drexel Burnham
Lambert (DBL) in 1990 tended to confirm this view. The Fed and Bank of England acted as honest brokers to unwind the positions of DBL, but there was no bailout. Spillovers were so minimal that the stock market rose the day that Drexel declared bankruptcy.

In the meanwhile, the nature of investment banking changed markedly. Investment bank portfolios shifted in favor of lower quality, less liquid assets which made it much more difficult to deleverage in the event of a funding shock. The leading investment banks became increasingly global with funding operations in the US, the UK and Japan. While this diversified the funding base, it also increased coordination costs in the event of a shock since each local regulator would need to sure that local residents were protected. In addition, net leverage increased sharply from 2000 to 2007, with Bear Stearns the most leveraged of the big five investment banks. There was also a growing reliance on third party repos to fund the balance sheet. Since 1990, the repo market has grown markedly. In 1990 secured repo credit was 13% of federally insured deposits. By 2007 it had become 60% of federally insured deposits. Two-thirds of the repos mature or must be rolled over overnight. For third-party term repos where values might fluctuate substantially counterparties must have confidence that the firm can provide additional margin when necessary, Investment banks became increasingly involved in over-the-counter derivatives markets, especially the booming credit default swap market.

After the collapse of its two sub-prime related hedge funds in June of 2007, Bear Stearns was viewed with increasing concern. Its share price plummeted and credit default swap premium rose sharply. Nonetheless, regulators and the management of Bear Stearns claimed to have been stunned by the speed of its collapse and claimed that it was the victim of a run. By the end of the week, March 14, 2008, the authorities were faced with the unpleasant choice of watching Bear Stearns apply for bankruptcy or bailing it out.

The authorities feared the spillover consequences of a declaration of bankruptcy. Stays, which are central to the bankruptcy process for nonbanks, can cause severe systemic spillovers when applied to a firm like Bear that trades actively in global markets. Stays may cause clients and counterparties to lose access to funds. Viable borrowers may lose access to collateral and undrawn credit lines. More
fundamentally, lack of clarity regarding position vis-à-vis the insolvent bank may inflict possible damage on counterparties which are unable to hedge their uncertain positions and cause dislocations in interbank markets as traders attempt to assess the ultimate damage. One key concern for the authorities was damage to primary dealers who facilitate government borrowing.

The authorities chose instead to improvise a bailout in which the Fed engineered a sale of Bear to JPMorgan Chase facilitated by the purchase of $30 billion in investment grade Bear assets by an SPE financed by a $29 billion loan from the Fed and $1 billion in subordinated debt from JPMorgan Chase. Although there was considerable public debate over whether Bear shareholders would receive $2 or $10 per share and whether it constituted sufficient market discipline, less attention was paid to the fact that all creditors and counterparties, the entities which should have the strongest incentives to discipline risk-taking by Bear, were protected from loss. This could not help but encourage more risk-taking in the future. Moreover, having made this kind of intervention once, any similar firm that encounters stress will want to bargain for similar aid from the Fed. This is likely to delay and complicate private sector solutions in the future.

If Bear had been a bank, the Fed would have had a much more attractive range of options. In particular, it could have relied on Prompt Corrective Action measures with mandatory triggers for regulatory intervention to ensure that Bear would seek a market solution before its situation became desperate. The authorities would have had the power to act quickly and decisively before insolvency and the FDIC could have established a bridge institution to continue systemically important services.

Unfortunately, the authorities lack the authority to enforce Prompt Corrective Action measures and establish a bridge bank for investment banks. But a similar model could be devised. A number of issues would need to be resolved. Should least cost resolution principles apply with a parallel process for determining systemic risk exceptions? What authority should underwrite the costs of establishing a bridge institution for investment banks? How should that authority be reimbursed? What authority should serve a prudential regulator to oversee a prompt corrective action regime? What authority should make the decision to take control rights from the shareholders and establish a bridge institution? What
authority should act as a receiver to oversee the bridge institution? These are difficult questions, but surely not insoluble. Answers have been found in the case of commercial banks and should have been devised for subsequent troubles at non-bank financial institutions.

There was one significant exception, however, to the general trend of hastily improvised bailouts. After trying to broker a merger of LB with other, stronger institutions, the US authorities declined to bail it out and sent the holding company, Lehman Brothers Holdings International (LBHI) to the bankruptcy courts for protection under Chapter 11 of the US bankruptcy code, the largest bankruptcy in US history. Although LB was by far the smallest and one of the least complex institutions on the list of Large Complex Financial Insitutions (LCFIs), it was nonetheless of sufficient systemic importance that its collapse led to substantial spillovers on global capital markets. Credit risk spreads rose to record highs, equity prices fell by 4% worldwide when the bankruptcy was announced and government bond yields declined sharply as foreign exchange carry trades were unwound.

Understandably, after the US government had subsidized the merger of Bear Stearns, a much smaller, less complex investment bank, the market expected that when Lehman Brothers (LB) began to show a similar weakness (see Table 3), it would receive similar treatment. Why then was LB permitted to fail? The Fed and the Treasury claimed they lacked authority to bail it out. It is also likely that they wished to limit moral hazard by engaging in a bit of “constructive ambiguity”. Moreover, since the Fed had had a team of examiners in LB ever since the collapse of Bear Stearns, they knew much more about the condition of LB and may have believed they could predict and control the spillover costs. They may have thought that counterparties and creditors had sufficient warning about LB’s weakening condition to take precautionary measures. But, of course, in a complex and integrated financial system, regulatory action or inaction can have unintended consequence through indirect exposures and linkages that are apparent only after the fact.

Lehman’s total reported assets were roughly $700 billion. Table 4 shows its corporate structure at the end of 2007. It included 433 subsidiaries in 20 countries. This corporate complexity greatly impeded
the orderly resolution of the firm, created significant spillovers to other institutions and markets and led
the Group of 7 finance ministers to pledge (Guha 2008) “to do everything in their power to prevent any
more Lehman Brothers-style failures of systemically important financial institutions.”

One of the major concerns was that LB was the sixth largest counterparty in over-the-counter
derivatives markets. But back offices succeeded in processing billions of dollars of contracts and the
International Swap Dealers Association organized an auction to determine settlement prices. Because
derivatives contracts in which LB was a counterparty were usually marked to market daily and collateral
was adjusted each evening to reflect changes in market prices, losses were relatively light. Losses were
much greater, however, with regard to credit default swap contracts written on LB. Those selling
protection on LB are in a similar position to bondholders and received a similar price. Buyers of $100 of
default protection will receive $91.375, a substantial loss for sellers of protection.

A second major concern was LB’s key role in the Repo market, which totals roughly $11 trillion
and is the short-term, collateralized lending market that banks, broker/dealers, and hedge funds use to
finance securities positions. The Fed attempted to address the risk that the market would seize up by
allowing broader use of the Primary Dealer Credit Facility through expanding the list of eligible
securities. In addition a group of global banks announced plans to use their own capital to establish a $70
billion private sector credit facility for those securities not eligible for the Fed facility. The Fed also
announced an increase in its Treasury Securities Lending Facility to $200 billion.

What turned out to be more disruptive, however, were the traditional exposures to LB’s
outstanding debt. Among the largest unsecured creditors were the US federal government’s Pension
Benefit Guaranty Corp. and the German government’s deposit-insurance arm (McCracken, 2008) and
money market mutual funds. The latter proved to be one of the most important channels of contagion.
One of the oldest money market funds, the Reserve Primary Fund, was forced to write-off $785 million of
short and medium-term notes and became the first money market mutual fund to “break the buck” in 14
years. This triggered $184 billion in money market mutual fund redemptions and forced fund managers to sell assets into illiquid markets. This spilled over into commercial paper markets including not only asset-backed commercial paper, but also non-asset backed commercial paper that had held up reasonably well and was a key means of financing corporations and banks. The interbank market seized up entirely with the almost complete collapse of confidence in counterparties in money markets. Spreads between the euro-dollar interbank rate and the comparable US Treasury rate rose to nearly 450 basis points, more than double the already high spreads that prevailed before the LB bankruptcy.

In addition, failed trades proved particularly disruptive. Prior to LB’s bankruptcy, portfolio managers placed thousands of trades with LB’s broker dealer (LBI), many of which were subsequently transferred for settlement to LBI affiliates throughout the world. After the bankruptcy, these failed to settle and this has led to civil proceedings on three continents. The UK administrator said that about 43,000 trading deals were still “live” in the London subsidiaries alone and would need to be negotiated with each counterparty (Hughes, 2008).

But the fundamental problem was that LB was managed as an integrated entity with minimal regard for the legal entities that would need to be taken through the bankruptcy process. LBHI issued the vast majority of unsecured debt and invested the funds in most of its regulated and unregulated subsidiaries. This is a common approach to managing a global corporation, designed to facilitate control over global operations, while reducing funding, capital and tax costs. LBHI, in effect, served as banker for its affiliates, running a zero balance cash management system. LBHI lent to its operating subsidiaries at the beginning of each day and then swept the cash back to LBHI at the end of each day. The bankruptcy petition was filed before most of the subsidiaries had been funded on September 15th and so most of the cash was tied up in court proceedings in the US.

Lehman also centralized its information technology so that data for different products and different subsidiaries were comingled. This was an efficient way of running the business as a going
concern, but presents an enormous challenge in global bankruptcy proceedings. LB stored data in 26,666 servers, 20,000 of which contained accumulated emails, files, voice mail messages, instant messages and recorded calls. The largest data centers were in New York, London, Tokyo, Hong Kong and Mumbai. Moreover, LB used approximately 2,700 proprietary, third-party and off-the-shelf programs each of which interacted with or created transactions data. The bankruptcy administrators must preserve, extract, store and analyze data relevant to the entities they are dealing with. This problem was made more difficult by the success of the administrators of LBHI in selling two important entities that were rapidly declining in value because of loss of human capital: its investment banking operations and its asset management business.

Most of the US investment banking operations -- the assets, not the legal entities – were sold to Barclays. This necessitated bringing a Securities Investor Protection Corporation (SIPC) proceeding, which put all LBI accounts under the control of the SIPC Trustee and permitted the broker-dealer to be liquidated. Nomura bought most of the investment banking business in Asia and continental Europe and LB’s asset management business was sold in a management buyout. But this meant that the data was owned by Barclays, Nomura and the now independent asset management division and so bankruptcy administrators are dependent on the new owners for access to data to determine the assets and liabilities of each legal entity. The administrator of the 4 London subsidiaries complained that 9 weeks after the bankruptcy, he has yet to receive a confirmation of the assets owned by these subsidiaries.

The US administrators expressed the optimistic view that they would be able to complete the resolution within 18 to 24 months, but the presiding judge reminded the administrator that the biggest impediments to a timely completion of the administration are the timetables of the other insolvency fiduciaries around the world. The administrators in London warned that it may take years for creditors to get their money back, noting that they were continuing to work on Enron, which failed 7 years ago, which was about one-tenth the size and complexity of Lehman (Hughes, 2008).
The conclusion I would draw from the LB experiment is not that all systemically important institutions should be bailed out, but rather than regulators and supervisors should focus on devising orderly resolution plans that will enable them to unwind even the largest most complex institution with minimal spillover to the rest of the financial system. A useful first step would be to require that each institution create and maintain a plan for winding down the institution just as they now maintain plans for business continuity. (The bankruptcy administrator of LBIH has claimed that the hastily prepared bankruptcy filing has cost as much as $75 billion in lost value (McCracken, 2008).) If the regulators deem the plan unworkable, the institution may be required to reduce its complexity or set aside a higher capital charge. An institution that is too complex to fail is simply too complex and presents too great a threat to the rest of the financial system.

The TARP version 1 response to this near financial collapse revealed a fundamental failure to understand the true nature of the problem and a blatant disregard for basic standards of public policy. Sound public policy should: (1) start from a clear diagnosis of the problem; (2) have clear goals that address the problem; (3) be efficient both in the sense of accomplishing the goals as least cost and minimizing distortion of incentives; and (4) be equitable both in the sense of treating similar entities comparably (horizontal equity) and in the sense of not exacerbating the income distribution (vertical equity); and (5) minimize costs to taxpayers. TARP version 1 was deficient in each respect.

A year into the crisis, Secretary Paulson’s continued to characterize the crisis as a liquidity problem caused by illiquid mortgage assets choking off the flow of credit. While it is certainly true the subprime-related mortgage assets have become illiquid, that cannot explain the breakdown in other markets. Concern over counterparty risk is the key problem.

His proposal was to spend $700 billion to buy these illiquid mortgage assets. The effect of this approach all depends on the price that is paid. But many of these securities are illiquid because it is very difficult to determine the price. Indeed, without a credible guarantee a liquid secondary market for these
securities is unlikely to be restored. On close inspection, many of the securities are simply too heterogeneous and require too much analysis to be easily traded. In principle the current price of subprime-related debt reflects current defaults, anticipated future defaults, a risk premium for uncertainty and an illiquidity discount. But it is very difficult to disentangle and quantify these factors and the Treasury is almost certain to suffer from adverse selection in such purchases since the seller will inevitably be better informed. Moreover, the Treasury was very unclear about the price it intended to offer.

If the purchases were to be made at “fair value” somehow determined, then it does not address the capital shortage problem that is the underlying cause for the breakdown of interbank markets. Moreover, if participation in the Treasury auction forces institutions to accept write-downs, whether their assets are purchased or not, many institutions will simply not participate.

If the purchases are made at a premium, it would address the capital problem, but in a way that is inefficient and inequitable although it would address (at least indirectly) the capital problem by providing a subsidy. But the subsidies would be distributed without making an assessment of which institutions are viable and might be wasted on many firms that do not require a subsidy. In addition, distributing subsidies in this way will tend to reward some of the most imprudent, incompetent investors at the expense of taxpayers who are generally much less well-off than the executives and traders who made the crucial errors. And it would distort incentives for taking risk in the future.

Luckily Congress bulked at the first version of TARP and the Treasury has changed its focus. There is now an emphasis on recapitalizing institutions although there is still no clear strategy for protecting taxpayers and ensuring that the capital subsidies restore health to the banking system. But giving up the assumption that the crisis is merely a liquidity problem ends a year of what amounted to forbearance and may signal the start of a more effective approach.
<table>
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<tr>
<th>LCFIs</th>
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* Yearend 2007 (unless otherwise specified). **After the most recent list of LCFIs (Bank of England 2007b) was published, a consortium of three banks (RBS, Fortis and Santander) acquired ABN AMRO.

1 Source: Bankscope. Data on subsidiaries refer to majority-owned subsidiaries for which the LFCI is the ultimate owner with a minimum control path of 50.01%.
Table 2. Bank Losses Relative to Capital Injections

![Bank Losses/Capital Injections Graph]

BIS Quarterly Review, Dec. 2008
Table 3. By August 2008 CDS Spreads for Lehman Brothers were as high as they had been for Bear Stearns.

TCPP is the date of the Treasury Capital Purchase Program.
Table 4. Corporate Structure of Lehman Brothers (yearend 2007).

<table>
<thead>
<tr>
<th>Country</th>
<th>Majority-owned subsidiaries</th>
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<td>NETHERLANDS</td>
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<td>FRANCE</td>
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<tr>
<td>JAPAN</td>
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<td>KOREA REP. OF</td>
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<td>INDIA</td>
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<td><strong>TOTAL</strong></td>
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<td><strong>number of countries</strong></td>
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Source: Bankscope. Majority-owned subsidiaries.
References

