

US banks' behavior since Lehman's collapse, bailout uncertainty and ambiguity¹

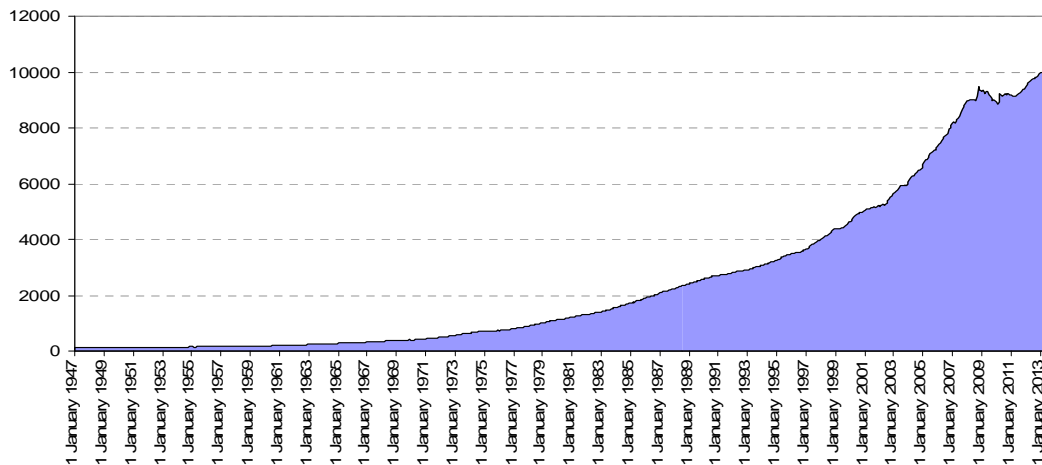
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I. Some evidence

There has been a dramatic shift in the behavior of the US banking system in terms of both credit growth and demand for reserves since the collapse of Lehman Brothers in September 2008. . Between January 1947 and August 2008, total US banking credit expanded at an average yearly rate of 7.15%. Since Lehman's collapse until June 2011, this rate dropped to a mere 0.65% – about one-tenth of its previous normal long-term rate of growth. Figure 1 illustrates this dramatic change in the behavior of US banking credit prior to and after the downfall of Lehman Brothers. Figure 2 shows that, although there was some resumption of credit growth after summer 2011 this rate never came close to the rates observed in the pre-Lehman's collapse era.²

**Figure 1: Total US commercial banks' credit (Billions of \$):
January 1947- May 2013**

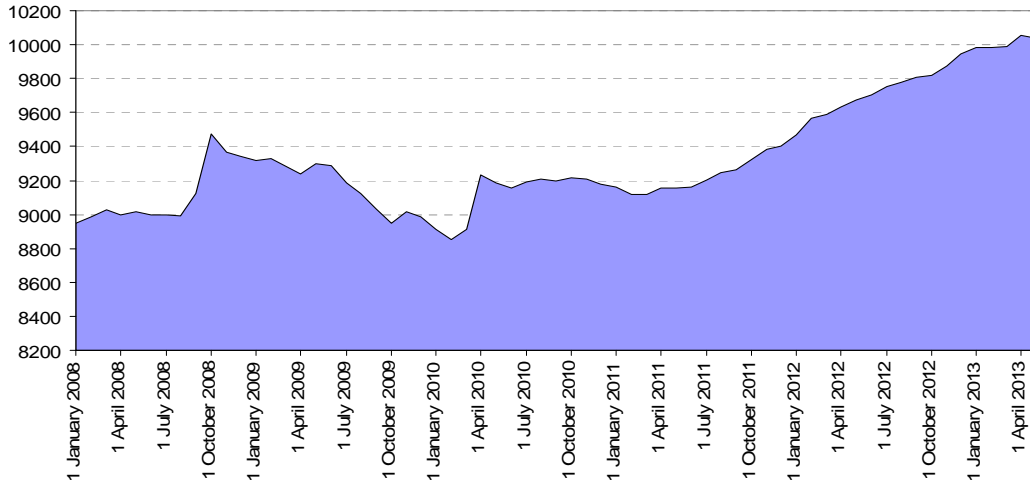


Source: Cukierman A., "Monetary policy and institution before, during and after the global financial crisis, *Journal of financial stability*, 9(3), September 2013, 373-384.

¹ This is a summary of ideas presented by the author at the June 18 2013 Farewell Conference Honoring Governor Stanley Fischer.

² Between June 2011 and May 2013 the average yearly rate of credit expansion rose to 4.58%.

**Figure 2: Total US commercial banks' credit (Billions of \$):
January 2008- May 2013**



Source: same as in figure 1.

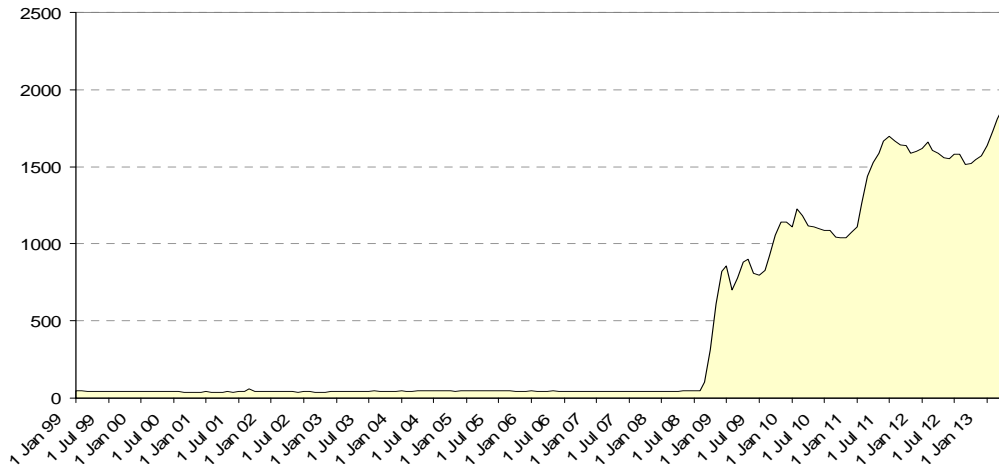
Table 1: Average growth of US commercial banks' credit by subperiods at annual rates

Time period	Yearly growth of US commercial banks' credit
January 1947- August 2008	7.15%
August 2008 - June 2011	0.65%
June 2011 - May 2013	4.58%

Source: Author's calculations based on Bloomberg – Ticker: ALCBBKCR Index.

An even more dramatic break – before and after September 2008 – can be observed in the behavior of total US bank reserves. Their annual long-term normal rate of increase between January 1999 and August 2008 is about half a percent. After the Lehman event and up to April 2011, this annual rate accelerated to 100%. Figure 3 shows the rush to reserves of US banks after September 2008. At the end of August 2008, total banking reserves stood at about \$ 46 billion. A year later they were eighteen times larger!!! They did decline moderately during the second half of 2010 and then increased again by about sixty percent till the end of April 2012.

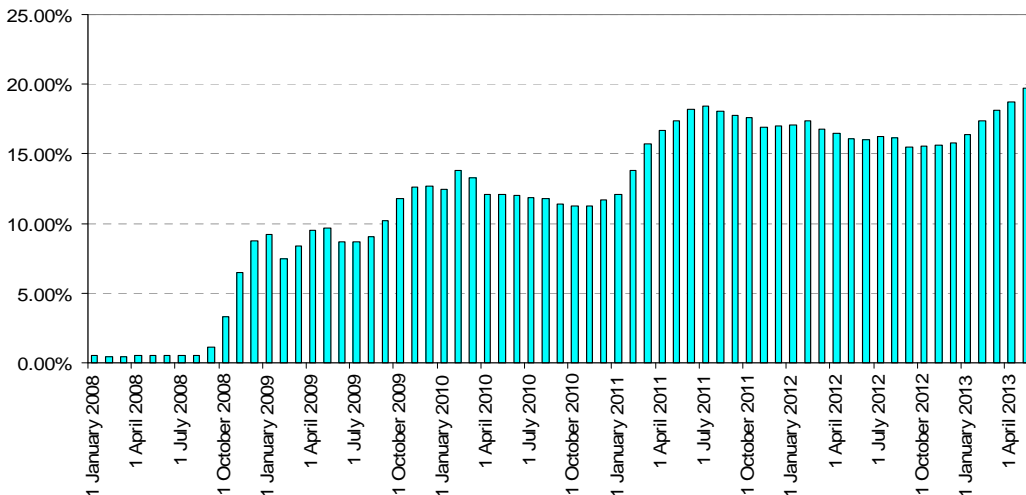
**Figure 3: Total Reserves of US Depository Institutions
(Billions of \$)**



Source: same as in figure 1.

Another way to appreciate the magnitude of the change in the behavior of US banks prior to and after the Lehman event is to compare the ratio between their total reserves and their total credit before and after this event. Just one month prior to Lehman’s downfall, on August 31 2008, this reserve ratio was slightly more than half a percent. As can be seen from figure 4, it shot up dramatically immediately after Lehman’s demise reaching 12.62 percent on November 30, 2009 (a twenty four fold increase in the reserve ratio) and climbing further to almost 20 percent in May 2013.

Figure 4: Evolution of average reserve ratio of US banking system: January 2008- May 2013



Source: Author’s calculations based on raw data from Bloomberg – Ticker: ALCBBKCR Index, and from Federal Reserve Board Website.

II. Higher bailout uncertainty as an explanation for the post Lehman behavior of US banks

The previous evidence suggest that Lehman's downfall marks a watershed in the behavior of US banks raising a fundamental conceptual question about the reasons for this shift. I argue here that this change in behavior is due to a change in bailout uncertainty induced by Lehman's downfall.

In view of the Fed's actions and the general political climate prior to the collapse it is not hard to support the argument that the decision not to bailout Lehman was a surprise that increased bailout uncertainty in the immediate aftermath of the collapse. In conjunction with aversion to bailout uncertainty on the part of banks this argument can explain the rush of US banks into safe assets during the initial post Lehman period.

In particular suppose that bailout **risk** is captured by a single binomial distribution with a parameter, P , that designates the probability of bailout in the minds of financial market participants. Bailout **uncertainty** in the Knightian sense means that individuals are not certain about the parameter P . Following Gilboa and Schmeidler this uncertainty can be modeled by postulating that individuals possess multiple priors about P .³ To illustrate, suppose that, prior to Lehman's collapse, individuals in financial markets entertained the view that all the probabilities of bailout in the range between 0.4 and 0.6 were possible. Following the decision not to bailout Lehman they became more uncertain about the likelihood of bailout implying that their set of multiple priors expanded to **also** include lower probabilities of bailout. For concreteness suppose that their multiple priors set expanded to include all binomial probability distributions with P between 0.1 and 0.6.

Using a set of axioms similar to the von Neuman-Morgensten axioms on which the expected utility criterion is based Gilboa and Schmeidler (Op. Cit.) show that, in the presence of ambiguity individuals should behave as if they are maximizing expected utility with respect to the worst probability distribution.⁴ In the context of binomial multiple priors concerning the probability of bailout the worst distribution from the point of view of investors in financial markets is the one with the lowest P . Continuing the numerical example above this implies that, prior to Lehman's collapse, investors in bonds maximized expected utility under the presumption that $P=0.4$ and after it under the assumption that it is lower ($P = 0.1$). Cukierman and Izhakian trace out theoretically the general equilibrium implications of this change in perceptions for banks and investors in

³See: 1. Knight F. M., **Risk, Uncertainty and Profit**. Houghton Mifflin, Boston, 1921

2. Gilboa I. and D. Schmeidler. "Maxmin expected utility with non-unique prior. **Journal of Mathematical Economics**, 18(2):141–153, April 1989.

⁴Ambiguity is the term used in modern decision theory for Knightian uncertainty.

the bond market.⁵ They find that such an increase in bailout uncertainty induces a flight to safety by both banks and investors in the bond market, to a reduction in credit and, depending on parameters, even to a total arrest of financial intermediation. The upshot is that the decrease in the growth of banking credit, and the associated dramatic increase in the demand for reserves following Lehman's downfall can be understood in terms of an increase in bailout uncertainty in the aftermath of this event.

⁵Cukierman A. and Y. Izhakian, "Bailout Uncertainty in a Microfounded General Equilibrium Model of the Financial System", April 2013, Manuscript Interdisciplinary Center and Tel-Aviv University.