

Ten Years after Bear

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"The holders of the cash reserve must be ready ... to advance it most freely for the liabilities of others. They must lend to merchants, to minor bankers, to 'this man and that man,' whenever the security is good." Walter Bagehot (II.41, 1873)

"In my preferred paraphrase of Bagehot's famous dictum, central banks should make clear that they stand ready to lend early and freely (i.e. without limit) to sound firms, against good collateral, and at rates higher than those prevailing in normal market conditions." Paul Tucker (2014).

Ten years ago in March, the run on Bear Stearns kicked off the second of three phases of the Great Financial Crisis (GFC) of 2007-2009. Last year, we argued that the crisis began in earnest on August 9, 2007, when BNP Paribas suspended redemptions from three mutual funds invested in US subprime mortgage debt (Cecchetti and Schoenholtz 2017b). In that first phase of the crisis, the financial strains reflected a scramble for liquidity combined with doubts about the capital adequacy of a widening circle of intermediaries.

In responding to the run on Bear, the Federal Reserve transformed itself into a modern version of Bagehot's lender of last resort (LOLR) in order to manage a *pure liquidity crisis* (Madigan 2009). Consequently, in the second phase of the GFC – in the period between Bear's 14 March rescue and the 15 September failure of Lehman – the persistence of financial strains was, in our view, primarily *an intensifying solvency crisis*.¹ In the third phase, following Lehman's collapse, the focus necessarily turned to recapitalisation of the financial system – far beyond the role (or authority) of any LOLR.

In this note, we trace the evolution of the Federal Reserve during the period between Paribas and Bear, as it became a Bagehot LOLR. This sets the stage for a future analysis of the solvency issues that threatened to convert the GFC into another Great Depression.

Before Paribas. Following the Panic of 1907, Congress created the Federal Reserve primarily as an institution to contain financial instability (Lowenstein 2015).

The idea was that, acting as LOLR, the Fed would make the supply of a gold-backed currency 'elastic' in response to surging liquidity demand. In line with the Bagehot dictum, the new American central bank would lend to solvent banks against good collateral, presumably at a penalty rate. Ironically, as Friedman and Schwartz famously documented in *A Monetary History of the United States 1867 to 1960*, in the 1930s, the Fed elected *not* to play this role. The result was waves of bank failures, a sequence of system-wide panics, and the Great Depression.²

Fast forward to the early years of the 21st century. Fed policymakers had learned a number of lessons from their disastrous performance some 70 years earlier.³ Nevertheless, they were unprepared to function as a true LOLR. The dire liquidity conditions following BNP Paribas's 2007 announcement (as well as events later in the crisis) compelled the Fed to innovate, enabling them to deliver liquidity to solvent intermediaries *where, when* and in the *volume* needed.

We start with the Fed's pre-GFC arrangements. First, between the end of the Great Depression and the GFC, the Fed had done remarkably little discount lending. The three most important episodes were when the Fed: (1) helped sustain Continental Illinois prior to its FDIC recapitalisation in 1984 (Haltom 2013); (2) prevented a software glitch at the Treasury-clearing Bank of New York (BoNY) from becoming a system-wide disruption in 1985 (Ennis and Price 2015); and (3) satisfied the surge in liquidity demand following the September 11, 2001 attacks (Neely 2002).

1 A cursory search for 'solvency' or 'solvent' in the transcripts of the eight FOMC meetings between the Paribas and Lehman events yields only a few instances, none of which anticipate large financial insolvencies. There is more frequent reference to 'counterparty' risk as a factor influencing interest rate spreads.

2 For a brief summary, see Bordo and Rockoff (2013).

3 See Ben Bernanke's (2002) speech at Milton Friedman's 90th birthday celebration.

Over more than seven decades through 2007, [monthly discount-window borrowings of depositories from the Federal Reserve](#)⁴ (based on a daily average) peaked at \$8 billion. For comparison, borrowings climbed 50 times higher following Lehman's collapse.

Second, the Fed bore little risk in its portfolio. With the exceptions of gold, foreign exchange reserves and discount loans, its assets were all backed by the full faith and credit of the federal government. And, while it held some long-term Treasuries, many assets were of very short tenor (such as repurchase agreements and Treasury bills). Finally, in virtually every instance, its lending was backed by a very narrow range of high-quality, liquid collateral.

Third, it had only modest arrangements to provide dollar liquidity outside the United States (Bordo *et al.* 2014). This may not have mattered much before the 21st century. But the Eurodollar market – the provision of dollar intermediation outside the United States – began to expand greatly after the British Banking Association launched LIBOR in 1986. By the time of the GFC, the 'Global Dollar system' outside the United States probably was comparable to or larger than the aggregate liabilities of banks operating inside the country (Cecchetti and Schoenholtz 2014c). A collapse of this system would inevitably disrupt domestic US finance as well.

Fourth, and arguably most important, while the Fed *traded* with non-bank [primary dealers](#)⁵ to implement monetary policy, only *chartered banks* could borrow. That is, the Fed did not offer LOLR credit to non-bank intermediaries. This means that the system relied on banks being able to borrow and pass on emergency liquidity to non-banks. Again, until the mid-1980s, since banks dominated the US financial landscape, this constraint probably was unimportant. However, between 1985 and 2007, banks' share of US intermediation halved, from 70% to 34% (Adrian and Ashcraft 2012). Consequently, when the banks themselves became impaired in the GFC, the narrow conception of the LOLR where the Fed lent only to banks could not contain the strains in the system.

Bank-only LOLR. While the Fed may have been tempted, after the 1930s, to go beyond this bank-only lending practice, it did *not* do so until the GFC. Two pre-GFC events serve to make the point. First, following the 19 October 1987 stock market crash, uncertainty prevailed about the resilience of both the large securities firms (that carried substantial equity inventories) and the Chicago Mercantile Exchange (CME), where stock futures traded.

Rather than provide credit directly to the class of brokers, the Federal Reserve Bank of New York President E. Gerald Corrigan cajoled the large banks into making the loans (Cecchetti and Schoenholtz 2017c). And, when the CME needed funding to open on 20 October, the Exchange obtained a \$100-million loan from Continental Illinois (Melamed 1997), which was still majority-owned by the FDIC (Wyden 1988).

The second event – the September 1998 collapse of the hedge fund, Long-Term Capital Management (LTCM) – was in many ways a dry run for the GFC. Russia's August 1998 default triggered an upsurge of volatility and of liquidity demand much like that following the August 2007 BNP Paribas announcement (Cecchetti and Schoenholtz 2017b). The resulting jump in the correlation of returns across a range of seemingly unrelated, but increasingly illiquid, assets led to large losses that depleted LTCM's slim capital. Moreover, the largest US intermediaries faced a common exposure to LTCM through loans, credit lines and over-the-counter derivatives, as well as through a prospective fire sale of its assets.

Once again, however, the Fed avoided lending directly to LTCM or to the non-bank securities firms that provided much of its funding. Instead, much as J. Pierpont Morgan summoned New York bankers to his library to coordinate a response to the Panic of 1907,⁶ the Federal Reserve Bank of New York acted as *convener-of-last-resort*. FRBNY President William McDonough gathered the largest intermediaries' CEOs at the Reserve Bank's headquarters, getting them to provide private credit for an orderly workout.⁷

From Paribas to Bear. In the period between Paribas and Bear, both liquidity and counterparty risk rose, increasing stress in the system. Until the Fed developed tools to operationalise Bagehot's dictum for the 21st century – and until it demonstrated a commitment to doing so – there were legitimate doubts about its effectiveness as an LOLR.

To understand the evolution of the crisis, we can look at a leading 'thermometer' – the spread between the LIBOR rate and the equivalent-maturity overnight index swap (OIS) rate. The former incorporates both the expected risk-free rate as well as bank risk premia for funding liquidity and for counterparty risk, while the latter serves as a proxy for the expected risk-free rate. As a result, the LIBOR-OIS spread reflects the sum of liquidity and solvency premia that are difficult to separate.

4 <https://fred.stlouisfed.org/graph/?g=iXNL>

5 <https://www.newyorkfed.org/markets/primarydealers>

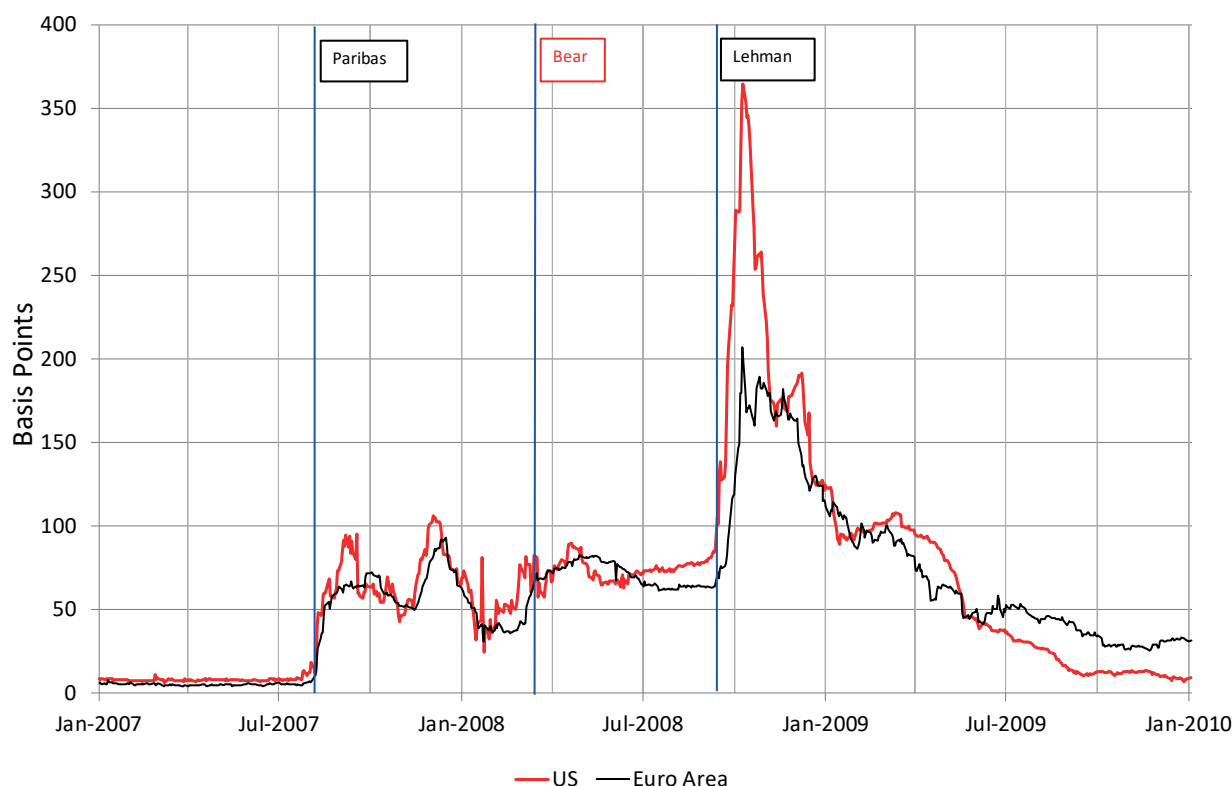
6 See Morgan Library & Museum <https://www.themorgan.org/>.

7 See the testimony of Fed Chair Greenspan (1998) and of FRBNY President McDonough (1998).

The following chart highlights the upsurge in the spread on 9 August both in the United States (the red line) and the euro area (the black line). Note that the heightened spread persisted *after* the March 2008 run on Bear, peaking in October 2008 following the Lehman failure. The spread narrowed only after

Congress provided the means to recapitalise the banks (by enacting the Troubled Asset Relief Program, or TARP, on 3 October 2008) and the Fed's May 2009 stress test results convinced investors to provide a wave of new equity funding for the largest banks.

Figure I Three-month LIBOR-OIS interest rate spreads (basis points), 2007-2009



Note: The three vertical lines denote the BNP Paribas (9 August, 2007), Bear Stearns (14 March 2008) and Lehman (15 September 2008) events, respectively.
Source: Bloomberg.

At the start of the crisis, the Fed relied initially on traditional discount lending to banks, but with little impact. In September 2007, the Fed narrowed the spread of the discount rate over the federal funds target from 100 basis points to 50 basis points (before lowering it further to 25 basis points after Bear). However, the stigma of borrowing from the Fed overwhelmed this modest cost reduction (Carlson and Rose 2017).

Acknowledging the problems with discount lending, in December 2007 the Fed introduced the **Term Auction Facility**⁸ (TAF). Like discount lending, TAF provided credit only to depositories against similar collateral, but for a longer period (initially 28-day loans). Within the banking system, the TAF probably helped deliver liquidity where it was most needed at a time when banks with abundant funds had become reluctant to make uncollateralised interbank loans (McAndrews *et al.* 2011).

The Fed's most important LOLR innovation prior to Bear was the December 2007 authorisation of **dollar swap lines with foreign central banks**⁹. By providing other central banks with dollars (collateralised by foreign currency) that they could lend to private intermediaries in their jurisdictions, the Fed became the effective LOLR to the Global Dollar system. At the same time, it avoided direct exposure to the ultimate (foreign) recipients of these funds. While initially small in scope and scale, the Fed eventually provided swap lines to 14 central banks, including *unlimited* facilities to the Bank of England, the Bank of Japan, the European Central Bank, and the Swiss National Bank.

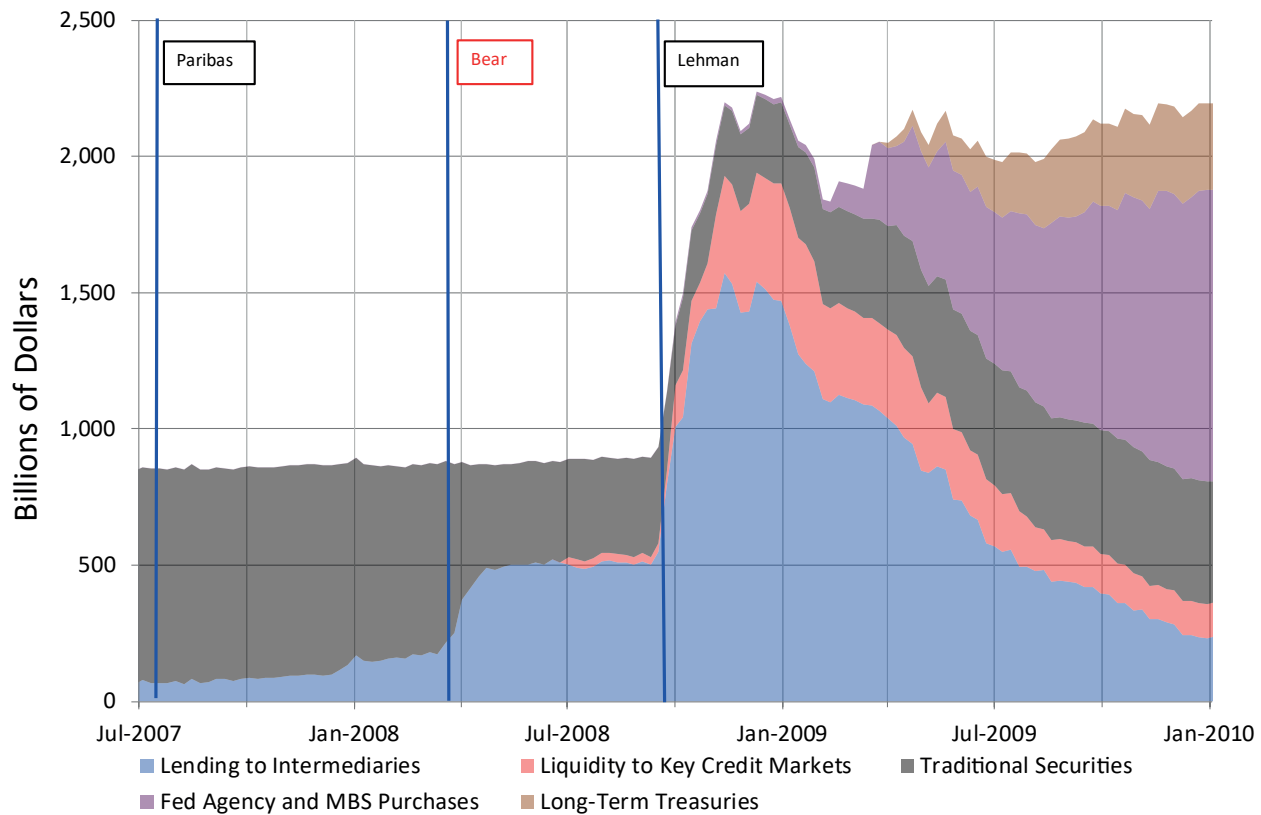
Crossing the Rubicon with Bear. Prior to the run on Bear, various LOLR actions had modestly altered the composition of the Fed's balance sheet, but left its size unchanged (see Figure 2). The Fed *sterilised* the additions of TAF credit and of dollar swaps (included in the blue-shaded 'lending to intermediaries' in

8 <https://www.federalreserve.gov/regreform/reform-taf.htm>
9 https://www.federalreserve.gov/monetarypolicy/bst_liquidityswaps.htm

Figure 2), reducing its Treasury holdings in equal measure (shaded in grey). They did this first by simply failing to replace maturing securities, and

then, beginning on 7 March, by selling Treasuries – something they had not done for nearly two decades.¹⁰

Figure 2 Federal Reserve Assets by Type (Weekly, Billions of Dollars), 2007-2009



Notes: Lending to intermediaries includes the dollar swap lines, the PDCF and the TAF. The three vertical lines denote the BNP Paribas (9 August 2007), Bear Stearns (14 March 2008) and Lehman (15 September 2008) events, respectively. Source: Federal Reserve Bank of Cleveland¹¹.

But with the run on Bear, everything changed. For the first time since the Great Depression, the Fed provided support to a supposedly solvent, but illiquid *non-bank*.¹² Doing so required that the Federal Reserve Board invoke its emergency authority under Section 13(3) of the Federal Reserve Act that (until the 2010 Dodd-Frank eliminated it) allowed collateralised lending "in unusual and exigent circumstances" to "any individual, partnership or corporation" (Fettig 2008). We suspect that Bagehot would have wondered why it took so long.

The Fed never looked back. On Monday, 17 March – the first business day following the government-supported purchase of Bear by JPMorgan – the central bank introduced the **Primary Dealer Credit Facility**¹³ (PDCF), permitting it to provide non-bank primary dealers with overnight funds.

Then, on 27 March, the Fed conducted the first auction under the **Term Securities Lending Facility**,¹⁴ allowing primary dealers to use **less-liquid, investment-grade instruments**¹⁵ as collateral for borrowing Treasuries. These (and other) LOLR facilities grew rapidly, leading the Fed to sell sizeable quantities of their Treasury holdings. (Sterilisation of various lending operations halted following Lehman’s failure, when it was no longer feasible to meet surging liquidity demand without a massive balance sheet expansion.)

Implications of a Bagehot LOLR. With the use of its emergency lending authority following Bear, the Federal Reserve largely completed its transformation into a modern Bagehot LOLR – standing ready to provide dollar credit against good collateral to sound domestic firms (with and without a bank charter) and to foreign central banks.

10 See footnote 12 on page 13 of Federal Reserve Bank of New York (2009).
 11 <https://www.clevelandfed.org/~media/files/charting/crediteasingbalancesheet.xls>
 12 See Cox (2008). In this case, the Fed created the “Maiden Lane” (<https://www.newyorkfed.org/markets/maidenlane.html>) entity and then lent against the entity’s pool of risky collateral acquired from Bear; see Bernanke (2009).
 13 <https://www.federalreserve.gov/monetarypolicy/pdcf.htm>
 14 <https://www.federalreserve.gov/monetarypolicy/tslf.htm>
 15 https://www.newyorkfed.org/markets/tslf_terms.html

So, why did the spread between LIBOR and OIS persist (see Figure 1)? Shouldn't the *liquidity risk* premium have faded? In our view, the lingering LIBOR-OIS gap after Bear implies that the shortfall of capital in the financial system – initially caused by the plunge in the value of mortgage-backed securities (MBS) and other structured credit – created pervasive adverse selection. Unable to discern the extent of losses at individual institutions, creditors required a persistently high *counterparty risk* premium. While some portion of the Paribas-to-Bear LIBOR-OIS spread was surely due to counterparty risk, it was difficult to distinguish from liquidity risk until the Fed's post-Bear LOLR activism quashed the latter.

Looking ahead. In the epilogue to his landmark history of the Fed, Meltzer (2014) complained:

"The Board had never developed or enunciated a lender-of-last resort policy. Markets had to observe its actions and interpret the statements as always in the past. Instead of reducing uncertainty by offering and following an explicit lending policy rule, it continued to prevent some failures while permitting others."

It is surely true that, compared to the elaborate rules-oriented inflation-targeting framework that developed over decades for monetary policy, the Fed's LOLR policy emerged during the crisis as a series of *ad hoc* responses to severe financial disturbances. Even today, LOLR strategy in the United States and elsewhere remains far more a discretionary art, than a rule-based science. This creates moral hazard beyond that which is unavoidable, say, due to problems with time consistency (Cecchetti and Schoenholtz 2018).

Beyond that, we have two concerns. First, we know from painful experience that the evolution of the financial system can limit the effectiveness of previously-deployed LOLR tools. And second, because of changes in the law, the Fed no longer has the authority, even in extremis, to do a range of things that it did starting in 2008: this includes lending to individual non-banks (Labonte 2016).

In a future crisis, we hope that the Fed will be better prepared to operationalise Bagehot's dictum expeditiously, and will have few qualms about the legal distinction between banks and non-banks that perform nearly equivalent economic functions.

At the same time, the authorities need to make abundantly clear that they will never knowingly lend to insolvent entities (Cecchetti and Schoenholtz 2014a). The credibility of this commitment will depend not only on the Fed, but on the broader prudential framework, including the Fed's access to high-quality information about the well-being of

potential non-bank credit recipients and, above all, about the resolution regime for financial behemoths (Cecchetti and Schoenholtz 2017a).

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