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Lehman Died, Bagehot Lives: Why Did the Fed and Treasury Let a Major Wall Street Bank Fail?

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To avert panic, central banks should lend early and freely (i.e., without limit), to solvent firms, against good collateral, and at 'high rates.'

—Bagehot's dictum[1]

The firm [Lehman Brothers] could not post sufficient collateral to provide reasonable assurance that a loan from the Federal Reserve would be repaid.

—Ben Bernanke, 2008[2]

Five years after the Federal Reserve and the Treasury allowed the investment bank Lehman Brothers to fail, their actions (or inaction) remain a focus of debate. Some argue that it was an inconsistent policy to have let Lehman fail while making emergency loans to save other large financial institutions in the same time frame. In this Policy Brief we present evidence that the Fed and Treasury had a sound reason to have bailed out other institutions while letting Lehman fail. Simply put, Lehman was insolvent—probably deeply so—whereas the other institutions arguably were solvent. In addition, the other institutions had abundant collateral to pledge, whereas what little collateral Lehman had to pledge was of questionable quality and scattered across many affiliated entities. Thus, federal officials, at least in hindsight, appear to have followed the dictum of Walter Bagehot (cited above), which has guided central banks for almost 150 years.

The Fed and Treasury's adherence to the positive mandate of Bagehot's dictum—providing the lender-of-last-resort function—was extremely important in keeping the Great Recession from being far worse than it was. If Bear Stearns, Fannie Mae and Freddie Mac, and the American International Group (AIG) had all been forced into sudden bankruptcy, the financial crisis and Great Recession almost certainly would have been much more severe than they were. Not everyone recognizes this lesson, and the great public outcry against "bailing out the banks" raises some risk that the central bank may not carry out even this basic Bagehot responsibility in a future crisis. Indeed, the new constraints in the Dodd-Frank legislation curbing the previously nearly complete discretion of the Federal Reserve under the emergency powers that came out of the Great Depression[3] suggest that some risk exists in this regard.[4]

Federal officials, at least in hindsight, appear to have followed the dictum of Walter Bagehot.

1. As summarized by Paul Tucker, deputy governor of the Bank of England, in a 2009 speech, "The Repertoire of Official Sector Interventions in the Financial System—Last Resort Lending, Market-making, and Capital," Bank of Japan 2009 International Conference "Financial System and Monetary Policy: Implementation," Tokyo, May 27–28. For a more detailed presentation, see Bagehot (1873, chapter 7).

2. Ben Bernanke, "Stabilizing the Financial Markets and the Economy," speech at the Economic Club of New York, October 15, 2008.

3. Section 13.3 of the Federal Reserve Act.

4. Emergency loans henceforth must be part of programs with broad-based eligibility and not limited or targeted to individual institutions; they must be approved by the secretary of the Treasury; procedures must be in place to prevent lending to an insolvent institution; and leaders of Congress must be promptly briefed.

Lehman Brothers was so large that it was what has subsequently come to be called a systemically important financial institution (SIFI). The Fed and Treasury nonetheless allowed Lehman to collapse because they adhered to the corresponding negative mandate of Bagehot's dictum: avoid emergency lending to insolvent banks. The ensuing shock to financial markets sent the financial crisis into a new, more acute phase and may have contributed to the severity of the Great Recession. Therefore the lesson from Lehman is not only that Bagehot-type lender-of-last-resort action is as important as ever, if not more so considering the increasing concentration of the financial sector in a few mega-banks, but also that it is critical to ensure an orderly resolution for a SIFI going bankrupt. The Dodd-Frank legislation seeks precisely to provide a structure for such resolution, but we do not yet know whether it will be sufficient. Although in this Policy Brief we limit ourselves to documenting that Lehman was insolvent whereas the other key financial institutions that were rescued were solvent, such that the Bagehot principle was followed, we consider a "Beyond Bagehot" form of SIFI resolution to be crucial unfinished business.

The lesson from Lehman is not only that Bagehot-type lender-of-last-resort action is as important as ever…but also that it is critical to ensure an orderly resolution for a systemically important financial institution going bankrupt.

POLICY CONSISTENCY OR INCONSISTENCY IN THE FOG OF WAR?

In the epilogue to his popular book, *Too Big to Fail*, Andrew Sorkin (2009, 535) lays out the apparent inconsistency of official actions[5]:

> [I]t cannot be denied that federal officials—including [Treasury Secretary Henry] Paulson, [Federal Reserve Board Chairman Ben] Bernanke, and [President of the Federal Reserve Bank of New York Timothy] Geithner—contributed to the market turmoil through a series of inconsistent decisions. They offered a safety net to Bear Stearns and backstopped Fannie Mae and Freddie Mac but allowed Lehman to fall into Chapter 11, only to rescue AIG soon after. What was the pattern? What were the rules? There didn't appear to be any, and when investors grew confused…they not surprisingly began to panic.

In his influential book, *In Fed We Trust*, David Wessel (2009, chapter 1) presents what has become a widely accepted interpretation of the motivations behind this seemingly inconsistent behavior. He says that Fed and Treasury officials wanted to find a buyer to prevent Lehman's collapse but that they were not willing to provide the financial assistance needed to secure a deal. Bernanke and Paulson faced intense criticism of their actions to save Bear Stearns, Fannie Mae, and Freddie Mac, and they feared that there might be a strong political backlash to any further bailouts. According to Wessel, Paulson told Bernanke and Geithner, "I'm being called Mr. Bailout. I can't do it again." In addition,

> Paulson and Bernanke assured each other…that all the companies and traders that did business with Lehman had been given time to protect themselves from a possible Lehman bankruptcy. They comforted themselves that, since the Bear Stearns bailout, the Fed had found new ways to lend to other investment houses that might be hurt by a Lehman collapse. They were wrong. (Wessel 2009, 11)

According to this interpretation, the market turmoil and global condemnation that followed Lehman's demise was so great that Bernanke and Paulson had a change of heart and agreed to bail out AIG just one day later. In Wessel's words, "[i]t was becoming clear that Bernanke had adopted a new mantra: *whatever it takes* [italics in original]."

Wessel notes that, after a few weeks, Bernanke and Paulson began to publically emphasize the legal restrictions on their ability to save Lehman because of its lack of collateral. For example, the opening quote of this Policy Brief about Lehman's lack of collateral is from a speech Bernanke made on October 15, 2008. Geithner also stressed the Fed's lack of authority to lend to Lehman during his Senate confirmation hearings in January 2009. Why did these officials change the way they described their thinking? In an interview with Wessel in January 2009, Paulson said "You're unable to say: 'We let it go down because we were powerless to do anything about it.' You don't want to say 'the emperor has no clothes.'" Wessel presents Paulson's explanation without comment, but

5. The apparent inconsistency of official actions also was a key theme of the written statement of former Lehman CEO Richard Fuld before the Financial Crisis Inquiry Commission, September 1, 2010, and a book by a former Lehman staffer under the pseudonym Joseph Tibman (2009).

the implication seems to be that the emphasis on legal restrictions was a decision taken in hindsight to avoid having to admit a mistake. It is impossible to know what factors were foremost in another person's mind at a point in time, but we find it plausible that in the midst of a financial panic, public officials might not want to admit their impotence. The passage of the Emergency Economic Stabilization Act on October 3, 2008 granted the Treasury the authority to invest in and lend to financial institutions as well as to purchase troubled assets from them via the Troubled Asset Relief Program (TARP). Perhaps only after that point did officials feel free to acknowledge the restrictions on their powers just a few weeks earlier.

Wessel is surely right that officials had other considerations on their minds in addition to the legal restrictions on their powers. There was political pressure against bailouts, and perhaps Bernanke and Paulson were unduly complacent about the market reaction to a Lehman bankruptcy. Arguably, the Fed could have lent enough funds to Lehman to prevent a sudden bankruptcy and claimed to have received satisfactory collateral. But our results, based on data that were not available at the time Sorkin and Wessel wrote their books, suggest that saving Lehman would have required an outright deception on the part of the Fed that was not required for the other emergency loans. Lehman simply was unable to post collateral quickly that would have been worth close to the amount of loan needed. Although Bernanke and Paulson did not stress this point at first, it may have been a decisive factor nonetheless.

A stricture against central bank lending without adequate collateral is an important element of Bagehot's dictum—that in a financial panic a central bank should lend freely but only to solvent institutions with good collateral. Based on our examination of financial statements of all five of the most troubled major financial institutions, Lehman was unique in being deeply insolvent and having relatively few unencumbered assets to pledge as collateral. This finding supports the explanation provided by Chairman Bernanke (see opening quote) and helps to explain why a buyer could not be found for Lehman as had been done for Bear Stearns.

According to the Federal Reserve Act, Fed loans must be "secured to the satisfaction of the Federal Reserve Bank" that makes them. The definition of the word "satisfaction" may be open to question, but one interpretation of this clause is that the Fed cannot lend without collateral that can be plausibly valued at least as highly as the loan. The Treasury's ability to extend credit without congressional approval was even more restricted than the Fed's at the time of these crises, as evidenced by the fact that the Fed—not the Treasury—made the initial loans to Bear and AIG. In contrast, in July 2008, shortly before the rescue of Fannie and Freddie, Congress had granted Treasury expanded authority to lend to these two government-sponsored enterprises with the passage of the Housing and Economic Recovery Act, likely reflecting their political popularity, importance to the key sector of housing, and the past implicit government guarantee of their obligations.

ANALYSIS OF SOLVENCY

We ask whether each of the following institutions was solvent at the time of its emergency loan, conservatorship, or bankruptcy: Bear Stearns, Fannie Mae, Freddie Mac, Lehman Brothers, and AIG.[6] The Fed made an emergency loan to assist with the takeover of Bear by JPMorgan on March 14, 2008. The Treasury put Fannie and Freddie into conservatorship on September 7, 2008. Lehman filed for bankruptcy on September 15, 2008. The Fed gave AIG an emergency loan on September 16, 2008.

If solvency is defined as having a positive net worth in a hypothetical liquidation at current market prices, then all of these institutions and many more were insolvent in late 2008. The essence of banking is the transformation of illiquid assets into liquid deposits and securities. In a panic, investors dump illiquid assets for liquid ones. The central bank's role is to provide liquidity without unduly jeopardizing the taxpayer. This is not to deny that flaws in financial regulation and supervision allowed a panic to develop, but that is a different topic.

We believe a more reasonable definition of solvency for the lender of last resort is whether an institution is expected to have substantially positive net income over the medium term, assuming that it can roll over its short-term liabilities at a normal market rate of return. Under this definition, an insolvent institution is one whose assets and operations are not generating enough revenue to service its liabilities and cover its operating expenses. In other words, future cash flows from assets should be discounted at a rate that is closer to historic norms than what may be implied by market prices of assets during a panic. Correspondingly, an institution is solvent if its assets exceed its liabilities when evaluated at medium-term values, rather than at fire-sale prices in the midst of the crisis.

6. Later in 2008, special assistance packages were designed for Bank of America and Citigroup. Both of these packages were fully repaid with interest above the government's cost of funds by the end of 2010. But in the case of Citigroup, shareholders were largely wiped out. The share price fell from $20 at the end of September 2008 to $1.50 by end-February 2009, reflecting massive dilution under the terms of government support, which led to expansion of the shareholder base from 5.5 billion shares in early 2009 to 28.3 billion by the end of 2009 (Bloomberg).

Our definition of solvency requires a forecast of future revenues and expenses, which in turn depend on many factors, including the state of the economy. To get around this problem, we use actual revenues and expenses between 2008 and 2013 in place of expected revenues and expenses as of five years ago. We believe this approach is conservative because economic growth has been considerably lower than was projected by most forecasters in late 2008, although not as low as implied by some tail-risk scenarios.[7]

An alternative way of measuring solvency under our definition is whether the firm is able to repay the emergency loans in a reasonable period and at a rate of return that is higher than the government's cost of funds.

Our analysis largely omits the intangible value of a firm as a "going concern," which includes the expertise of its staff, its relationships with clients, and its reputation as a brand. Adjusting for the intangible value would strengthen our conclusion that Bear and AIG were solvent, but our evidence presented below shows that the intangible value of Lehman as a going concern was small relative to the size of the hole in its balance sheet and therefore would not have made a difference to its (in)solvent status.

One summary test of our conclusion that Fannie, Freddie, and AIG turned out to be solvent is simply that although their shareholders were nearly wiped out, their shares retained modest positive value. The value of shares of an insolvent firm should be zero. Instead, by mid-December 2010, when the S&P500 index had recovered all of its losses subsequent to early September 2008, the shares of Fannie Mae were worth 4.3 percent of their prior value; those of Freddie Mac, 5.9 percent; and those of AIG, 11.7 percent.[8] (The same test is not available for Bear Stearns because it was taken over by JP Morgan.)

Bear Stearns

Table 1 displays consolidated balance sheets for all entities controlled by Bear Stearns Companies, Inc. the month before the emergency loan (February 2008) and immediately prior to consummation of the merger with JPMorgan Chase & Company (May 2008). After May 2008 it is not possible to track the performance of assets originally held by Bear Stearns.

Bear's assets shrank $110 billion during these three months; its liabilities shrank $99 billion and its net worth shrank $11 billion. Most of the decline in assets reflects a collapse in collateralized borrowing, in which assets and liabilities fell by equal amounts. The decline in net worth almost certainly reflects a markdown of assets closer to market values. As part of the emergency purchase by JPMorgan, Bear sold $30 billion of financial instruments at market values as of March 14, 2008, to Maiden Lane LLC, a company that the Federal Reserve Bank of New York formed in March 2008 to facilitate JPMorgan's merger with Bear Stearns. These assets included $10 billion of agency mortgage-backed securities (MBS), $10 billion of real estate whole loans, $5 billion of private MBS, and $5 billion of derivatives and other structured assets.

Overall, it appears that Bear Stearns was solvent at the time of its emergency loan, but its capital had been eroded by more than 90 percent and its shareholders took a large loss.

Maiden Lane was funded by a $29 billion senior loan from the Federal Reserve Bank of New York and a $1 billion junior loan from JPMorgan. The Fed loan was at the variable primary credit rate of the Fed's discount window, which does not reflect any significant premium for the risk incurred. The JPMorgan loan was at the primary credit rate plus 450 basis points. Both loans were repaid in full, and the Fed retains a moderate residual profit of almost $1.5 billion as of June 2013. Factoring in the profit over the life of the loan, the Fed received about 100 basis points per year above the primary credit rate (and 150 basis points above its cost of funds) on its loan, still not a large premium but not insignificant.

JPMorgan acquired Bear for $1 billion, almost exactly what it reported as Bear's book value immediately prior to the merger. Because Bear was integrated into several of JPMorgan's business lines, it is impossible to calculate a separate profit stream for Bear after the merger. But most observers have assumed that the Bear assets sold to Maiden Lane were among the most troubled of Bear's portfolio.[9] Given that these assets generated cash flows

7. As of 2012, (annual average) US real GDP was more than 7 percent below the mean projection of private-sector forecasters on October 13, 2008, according to Consensus Economics' *Consensus Forecasts*. Consumer prices were about 3 percent lower than projected over the same period, suggesting that nominal GDP was about 10 percent lower than projected. Nominal GDP may be the best indicator of an economy's aggregate ability to service its debts.

8. The S&P500 stood at 1242 on September 5, 2008 and returned to 1242 on December 16, 2010. The stock price comparisons are for the same two dates. Data are from Bloomberg.

9. See, for example, Sorkin (2009, chapter 1); Serena Ng and Carrick Mollenkamp, "Fed Opens the Books on Bear, AIG Toxic Assets," *Wall Street Journal*, April 1, 2010, B1; and Jacob Goldstein, "Meet the Fed's Toxic Assets," Planet Money blog, www.npr.org, April 1, 2010.

Table 1 Consolidated balance sheets of entities controlled by Bear Stearns Companies, Inc. and of Maiden Lane LLC (billions of dollars)

Item	February 29, 2008	March 14, 2008	May 30, 2008	December 31, 2008	December 31, 2009	December 31, 2010	December 31, 2011	December 31, 2012
Bear Stearns								
Assets								
Securities borrowed	129		76					
Financial instruments	171		137					
Other	99		76					
Total	399		289					
Liabilities								
Secured debt and repo	178		55					
Other borrowing	107		107					
Other	102		126					
Total	387		288					
Equity								
Net worth	12		1					
Maiden Lane LLC								
Assets (fair value)		30		26	27	*28*	*8*	1
Liabilities								
Federal Reserve[a]		29		29	29	*26*	*6*	0
JPMorgan[a]		1		1	1	*1*	*1*	0
Other		0		0	0	*1*	*1*	0
Total		30		30	30	*28*	*8*	0
Equity								
Net worth		0		–4	–3	*0*	*0*	1

a. We report the liabilities to Fed and JPMorgan at face value rather than fair value.

Note: Numbers in italics are approximations because of unreported differences between fair value and face value.

Sources: Bear Stearns Form 10-Q filing with the Securities and Exchange Commission; JPMorgan Annual Report 2008 (p. 139); Federal Reserve Bank of New York, www.newyorkfed.org.

sufficient to repay $30 billion in loans at interest rates that were at least slightly above what low-risk borrowers paid, a case can be made that they were worth $30 billion in 2008. And if the worst part of Bear's balance sheet was solvent, it naturally follows that the remainder was solvent.[10]

Overall, it appears that Bear was solvent at the time of its emergency loan, but its capital had been eroded by more than 90 percent and its shareholders took a large loss.

10. At a press conference at the Council on Foreign Relations on October 10, 2012, JPMorgan CEO Jamie Dimon said that there may have been losses of $5 billion to $10 billion from the acquisition of Bear Stearns, noting in particular the lawsuits filed against Bear's subprime mortgage-related activities. We have found no published accounting treatment of the net impact of the Bear acquisition on JPMorgan and it is not clear whether Dimon's estimates net out any offsetting gains from other aspects of Bear's operations, including its value as a going concern.

Fannie Mae and Freddie Mac

The US government's treatment of Fannie and Freddie went beyond Bagehot's dictum. In effect, it nationalized the two entities, rather than simply providing classic lender-of-last resort liquidity. Shareholders were largely wiped out and management was replaced. The willingness of the government to act forcefully in this manner reflected the high stakes associated with the pivotal role the firms played in the US housing market, as well as the past implicit government guarantee for obligations of the two "agencies" held by many foreign governments as part of official foreign exchange reserves.

Balance sheets for the federal housing agencies, Fannie Mae and Freddie Mac, continue to show that these institutions would be insolvent without the capital invested by the Treasury. In part this may reflect excessive provisions for loan losses, as the income statements now show loan losses as a posi-

Table 2 Income, Treasury funding, and repayments by Fannie Mae and Freddie Mac, 2008–20 (billions of dollars)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2018	2020
Fannie Mae											
Pre-tax income	–45	–73	–14	–17	17	25	25	25	25	25	25
Treasury draw	1	60	28	24	5	0	0	0	0	0	0
Repayment	–17	4	8	10	12	25	25	25	25	25	25
Treasury principal at 5 percent	18	76	99	118	117	98	78	57	35	–13	–66
Treasury principal at 10 percent	18	76	104	129	135	123	110	96	81	45	2
Freddie Mac											
Pre-tax income	–45	–22	15	–6	9	13	13	13	13	13	13
Treasury draw	15	37	13	8	0	0	0	0	0	0	0
Repayment	3	3	5	6	6	13	13	13	13	13	13
Treasury principal at 5 percent	12	46	56	60	58	48	37	26	14	–11	–39
Treasury principal at 10 percent	12	46	59	66	67	61	54	47	38	19	–4

Note: Treasury principal in each year equals the principal in the previous year plus interest at 5 or 10 percent plus the current year's Treasury draw minus the current year's repayment.

Sources: Consolidated statements of Fannie Mae and Freddie Mac and authors' calculations.

tive contribution to net income because they are running lower than had been provisioned for. But loss provisions are not large enough to explain all of the hole in the balance sheet. Moreover, a supplemental balance sheet provided by Fannie shows that the negative equity position even exceeds the value of Treasury's capital if both assets and liabilities are recorded at fair value. Yet both Fannie and Freddie are currently profitable and likely to remain so in the near term. This suggests that the balance sheets are missing the intangible value of their effective government support, which lowers their cost of funds, and their duopoly as providers of mortgage guarantees.

Many people criticized the implicit government support for Fannie and Freddie before the financial crisis, and we are inclined to agree. Without that support and their privileged market positions, the housing agencies probably would have been insolvent prior to the crisis. But we believe that the issue of restructuring the housing agencies should not be confused with the question of whether they were solvent in 2008 under their existing structure.

Because these entities continue to operate as going concerns under the same structure as before, we believe a more useful approach to the solvency question is to look at their income statements. Table 2 shows past and projected future pre-tax income for Fannie and Freddie.[11] We project income for 2013–20 at the average rate of the 18 months from January 2012 through June 2013. This was a period of stability in the housing sector and relatively small adjustments to income from special factors and fair value adjustments. Although it may seem optimistic to assume that income will remain steady for the foreseeable future, an alternative case may be made that it is conservative to assume that there is no further upside to income given how far the economic recovery has to go to reach full employment and how much pent-up demand there may be for housing.

Fannie returned to profitability in 2012 after large losses in the previous four years. Fannie made large draws on Treasury financial support in 2009 through 2011, although it began to service this liability as early as 2009 with a repayment of $4 billion.[12] Beginning in 2013, we assume that all of Fannie's net income is paid to the Treasury, both to service the Treasury's claims in the form of preferred stock and because Treasury has a warrant to acquire common stock for essentially no cost up to an 80 percent ownership position, so that 80 percent of any

11. We use pre-tax income to remove the effect of a large tax benefit booked by Fannie that reflects the carrying forward of past losses on future tax filings. This enabled Fannie to make a large payment to Treasury in 2013 that will presumably be offset by lower tax payments in the future. From Treasury's perspective, pre-tax income is the more relevant concept. For Freddie, the results are essentially identical using either pre-tax or post-tax income as Freddie has paid little in taxes and has not booked any large tax benefit.

12. The negative repayment of $17 billion in 2008 reflects a tax credit for losses, which we include as a net cost to Treasury.

income that does not service Treasury's preferred shares will also go to Treasury. If we assume that Treasury requires a return of 5 percent on its net capital contributions, Fannie is projected to be able to pay back Treasury's capital by 2018, as shown by the negative entry in the line labeled "Treasury principal at 5 percent" in that year. If we assume that Treasury requires a return of 10 percent, the next line shows that the principal will be nearly paid off in 2020. These projections support the proposition that Fannie was and is solvent, even if its capital base was small relative to the fluctuation in its profits.

The bottom half of the table presents similar data for Freddie Mac. Prior to conservatorship, Freddie reported total assets almost identical in size to those of Fannie. However, in 2010, both agencies were required to report all guaranteed mortgages on their balance sheets. Because Fannie had guaranteed a higher volume of mortgages, its balance sheet is now considerably larger than Freddie's. Because of its smaller guarantee pool, total losses at Freddie and the associated capital draw on Treasury were smaller than those of Fannie.

Our overall judgment is that Fannie and Freddie were solvent at the time they were placed under conservatorship, but only with the benefit of their government guarantees.

But Freddie also has less guarantee fee income, and thus the projected payoff dates for Treasury principal are comparable to those for Fannie under both the 5 and 10 percent assumed rates of return.

An alternative method for assessing solvency is to impute a net worth based on sustainable net income and to see if that net worth exceeds the cumulative principal of Treasury's capital contributions. We assume a benchmark pre-tax rate of return on capital of 10 percent per year. Thus, the $25 billion projected annual income at Fannie would imply a net worth of $250 billion, and the $13 billion projected annual income at Freddie would imply a net worth of $130 billion. In each case, the implied net worth is about double the Treasury principal as of December 2012 (also based on a 10 percent rate of return). These calculations support the view that Fannie and Freddie were solvent at the time they were taken into conservatorship, especially in light of the fact that economic outcomes over the past five years have been weaker than most forecasters projected in the fall of 2008.

According to table 2, it will take roughly a decade to repay the capital Treasury has invested in Fannie and Freddie. If the administration and Congress agreed to maintain the current business model of the housing agencies, in which the previously implicit government guarantee is now explicit, Treasury would be able to exercise its warrant to acquire common shares and then sell both its preferred and common shares to the public over a much shorter span of time. Our calculations suggest that Treasury could realize a large profit. The main reason such a sale has not already happened is that the administration and Congress have not decided whether and how to restructure Fannie and Freddie. There is strong opposition to retaining the current government guarantee of the two agencies' obligations, which greatly reduces their cost of funding.

Our overall judgment is that Fannie and Freddie were solvent at the time they were placed under conservatorship, but only with the benefit of their government guarantees.

Lehman Brothers

Among the other firms examined in this Policy Brief, Lehman most closely resembled Bear Stearns. Both were investment banks, which tended to be much more highly leveraged than normal banks (with asset-to-capital ratios of 20 to 30 rather than 10; Cline 2010, 288). Financial market participants anticipated that Lehman could be the next institution to get into trouble after the takeover of Bear Stearns by JPMorgan. In March 2008, Lehman had already sought to establish a "bad bank" subsidiary for $32 billion in troubled commercial real estate assets (named ironically "SpinCo"). The financial environment at the time of the Lehman crisis in early September 2008 was far worse than in early March when the Bear Stearns takeover took place, so presumably less favorable valuations would have been placed on similar assets.

Table 3 displays consolidated balance sheets for all entities controlled by Lehman Brothers Holdings, Inc. On the eve of its bankruptcy filing, Lehman had assets valued at $626 billion and liabilities of $560 billion, leaving a putative net worth of $66 billion. Just three months later, its balance sheet had contracted by half and it had a negative net worth of $29 billion. Much of this decline seems likely to have been associated with the transfer of collateral to collateralized creditors in payment of debt, including the Federal Reserve (which by one account held $63 billion in claims on Lehman through its expanded lending facilities to securities dealers), accompanied by corresponding reduction in outstanding debt.[13] Collateral was also seized by counterparties to derivatives contracts. Asset value declined by more than liability value for five reasons:

13. Jeffrey McCracken, "Lehman's Chaotic Bankruptcy Filing Destroyed Billions in Value." *Wall Street Journal*, December 29, 2008.

Table 3 Consolidated balance sheets of entities controlled by Lehman Brothers Holdings, Inc. (billions of dollars)

Item	September 14, 2008	December 31, 2008	December 31, 2009	December 31, 2010	September 30, 2011	December 31, 2011	December 31, 2012	March 31, 2013
Assets								
Claims on affiliates	455	218	205	191	163	85	66	49
Other	171	78	53	60	60	68	50	50
Total	626	296	258	251	223	153	116	99
Liabilities								
Claims by affiliates	388	189	192	185	180	29	24	22
Other	172	136	124	126	141	369	330	322
Total	560	325	316	311	321	398	354	344
Equity								
Net worth	66	–29	–58	–60	–98	–244	–237	–245

Sources: Balance sheets and operating reports filed by Lehman Brothers in US Bankruptcy Court for the Southern District of New York.

(1) At least some assets were marked down closer to market values; (2) some assets may have been sold at less than book value; (3) market values generally declined over this period; (4) market values of Lehman's assets may have declined more than general market values because of impairments related to default; and (5) collateral seized may have been worth more than the associated liabilities.

It seems likely that few, if any, assets were sold between September 14 and December 31, 2008. Total cash receipts over this period were less than $8 billion, most or all of which probably reflects debt service flows on the assets held. Lehman's CEO in bankruptcy, Bryan Marsal, estimated at the end of December 2008 that value destruction caused by the sudden bankruptcy filing was between $50 billion and $75 billion, mainly arising from termination of derivatives contracts and impairments of asset values due to default.[14] If true, more than half of the decline in Lehman's net worth between September and December 2008 could have been prevented by a more orderly resolution. However, declines in market values of assets and markdowns of assets closer to market values were also likely to have been important.

Net worth declined further in 2009 through 2011, reaching almost –$100 billion in September 2011, as assets declined and liabilities were stable. Most of these declines appear to reflect marking down of assets closer to market values. No record is made of any sales in the first half of 2009. From July 2009 through September 2011, only $20 billion of assets were sold, so sales at depressed prices are not likely to be a major factor in the reported decline in Lehman's net worth.

December 2011 represents a critical date in the resolution of Lehman, as it marks the approval by creditors of the final bankruptcy plan. At this time, a large number of postbankruptcy claims were accepted as liabilities. In addition, many claims and liabilities between affiliates were reduced further in offsetting agreements. On balance, Lehman's net worth took a large step down to nearly –$250 billion. A large part of this decline reflects claims of financial guarantees by Lehman that were not carried on its books, including by investors who purchased asset-backed securities from Lehman before its bankruptcy.[15] Some of it also may reflect claims for damages suffered when Lehman failed to fulfill its obligations beyond the intrinsic value of those obligations. It seems likely that many of the latter claims would not have occurred if Lehman had been able to continue as a going concern. Since December 2011, Lehman's reported net worth has been roughly stable.

How much of the nearly –$250 billion net worth reflects costs and impairments that are unique to a disorderly bankruptcy? As mentioned above, an early estimate of the losses from disorderly bankruptcy was between $50 billion and $75 billion. It is not clear whether this estimate includes loss of value as a going concern and legal fees. But any going concern value would have been an intangible asset that was not included on Lehman's reported assets and thus its loss would not affect reported net worth.[16] And professional fees related

14. McCracken, "Lehman's Chaotic Bankruptcy Filing."

15. Many financial firms have faced a wave of lawsuits from disgruntled investors in structured financial products backed by real estate. JPMorgan noted in its *2012 Annual Report* (p. 321) that there are $170 billion of such claims filed against it with respect to securities sold by JPMorgan, Bear Stearns, and Washington Mutual during the real estate bubble.

16. Lehman's broker-dealer and wealth management operations were sold to Barclays and Nomura for little more than the value of their associated real estate. Since it acquired Lehman's New York office and staff, Barclays' investment banking group has stepped up its net income by just over $1 billion per year. Assuming a rate of return on capital of 10 percent, the operations of Lehman's New York office as a going concern had a property and intangible

to bankruptcy have totaled less than $2 billion over the past five years. At least some of the $150 billion decline in reported net worth in December 2011 reflects lawsuits that would not have been filed if Lehman had not defaulted. On the other hand, the expected low recoveries in the Lehman bankruptcy may have deterred some lawsuits that would have been filed had Lehman remained a going concern. Overall, it appears unlikely that more than half of the negative net worth of $245 billion represents costs that were created by bankruptcy per se.

The negative net worth of $245 billion as of March 31, 2013, represents a 44 percent loss on the initial stock of liabilities of $560 billion. However, the initial liabilities may have been understated in light of the increase in accepted liabilities in December 2011, implying a smaller overall loss than 44 percent. In any event, different classes of creditors are receiving very different payouts. Secured claimholders and some derivatives claimholders received 100 cents on the dollar. Other customers and investors are expected to receive anywhere from 0 cents on the dollar (on subordinated debt) to as much as 100 cents on each dollar of senior claims at affiliates that were fully capitalized. The largest single category is holders of senior unsecured debt of the holding company, with claims of $84 billion at face value. At the time of the final bankruptcy plan, these claimants were expected to receive 21 cents on the dollar. However, estimates of net cash receipts from the resolution rose to $84 billion in the July 2013 report filed with the bankruptcy court, up from $59 billion in the bankruptcy plan. Much of the additional recovery should accrue to the senior unsecured bondholders, since the secured creditors have already been paid off and the junior creditors will still receive essentially nothing. Indeed, senior debt of Lehman Brothers Holdings is currently trading at around 24 cents on the dollar after having already received distributions of 15 cents, implying a final expected payout of 39 cents on the dollar.

An important part of the run-up to bankruptcy was the search for a buyer for Lehman, as had been done with Bear Stearns. The two main targets were Bank of America and Barclays, a large British bank. After examining Lehman's books, Bank of America concluded that the asset quality was too low and it pursued Merrill Lynch instead. Barclays was definitely interested, on the condition that it would not purchase $52 billion in overvalued assets (FDIC 2011, 3). Before any terms could be agreed with the Fed and Treasury, however, the deal was killed by the refusal of the UK Financial Services Authority to waive the requirement of a shareholder vote before Barclays could guarantee Lehman's liabilities. Such a guarantee was essential to allow Lehman to avoid filing for bankruptcy and there was no time to arrange a shareholder vote.

It may be no surprise that a deeply insolvent institution had difficulty in finding a buyer. However, the search for a buyer was also made harder by the heightened market stresses at the time. Despite these stresses, at least one candidate did express an interest before being reined in by its supervisor. We do not take that as significant evidence that Lehman was solvent.[17] Rather, we think that Barclays might have changed its mind if it had had more time to examine Lehman's assets and, to some extent, Barclays' status as too big to fail in the United Kingdom may have created a moral hazard incentive to gamble on expansion. The UK supervisor probably understood these adverse incentives well when it denied Barclays' request.

Overall, our guess of Lehman's true net worth at the time it filed for bankruptcy is somewhere between –$100 billion and –$200 billion. ...In the end, it is this negative net worth and the Fed's unwillingness to lend more than the collateral it received that made it impossible to find a buyer for Lehman.

JPMorgan's takeover of Bear Stearns was facilitated by a loan from the Fed. As we showed above, this loan was secured by assets that in the end proved to be worth more than the loan. The difficulty for Lehman was that any loan from the Fed that was secured by adequate collateral would not have solved the fundamental problem of its deeply negative net worth. In the end, it is this negative net worth and the Fed's unwillingness to lend more than the collateral it received that made it impossible to find a buyer for Lehman.

So what was Lehman's true net worth when it filed for bankruptcy? Overall, our guess of Lehman's true net worth at the time it filed for bankruptcy is somewhere between –$100 billion and –$200 billion. In contrast, an important study by the FDIC conveys the impression that the hole was as small as only $5 billion (FDIC 2011, 18). A close examination of that study, however, shows that the $5 billion does not count $15 billion in subordinated debt that would have to have been

asset value of $12 billion, for which Barclays paid about $2 billion. The Asian and European offices of Lehman (acquired by Nomura) were much smaller and presumably had smaller intangible values.

17. If the $52 billion in assets that Barclays wanted to exclude from the deal were worthless, Lehman would still have had a positive net worth according to the September 14 balance sheet in table 3.

Table 4 Summary of Fed and Treasury assistance to AIG (billions of dollars)

Assistance	Maximum committed	Maximum disbursed (including funding cost)	Date of repayment	Gain or loss (above funding cost)
Fed credit facility	123	90	January 2011	26
Maiden Lane II and III	53	44	June 2012	10
Fed CPFF	21	16	April 2010	0
TARP preferred shares	70	68	December 2012	–13
Total	**198**	**185**		**23**

CPFF = Commercial Paper Funding Facility; TARP = Troubled Asset Relief Program

Source: Baird Webel, *Government Assistance for AIG: Summary and Cost*, Congressional Research Service, August 2013.

wiped out to address losses of $40 billion with a cushion of only $20 billion equity. Moreover, the loss estimate of $40 billion pertained solely to the holding company, whose assets comprised only one-third of consolidated assets including those of subsidiaries (FDIC 2011, 14, 18). If we take –$20 billion as the meaningful net worth for the holding company implied by the FDIC study, and gross up proportionately from the holding company to the consolidated firm, the total net worth would have been –$60 billion. This estimate is not far from the more favorable bound of our range of –$100 billion and –$200 billion. Moreover, the FDIC study was based on the pre-bankruptcy informal estimates of impaired assets by Bank of America and Barclays and did not take into consideration the subsequent large markdowns in asset values by the bankruptcy administrators or the lawsuits that subsequently hit all firms that sold structured financial products backed by real estate during the housing bubble.

To recapitulate, *our overall judgment on Lehman is that it was deeply insolvent at the time of its bankruptcy*. This conclusion applies even if the Fed and Treasury's judgment anticipated none of the subsequent markdowns and lawsuits and was based solely on the range of troubled asset estimates at the time, as summarized in the FDIC study.

American International Group (AIG)

Federal assistance for AIG was more complicated than for the other institutions considered in this Policy Brief (table 4). It consisted of (1) a special Fed credit facility with an initial limit of $85 billion; (2) eligibility for the general Fed backstop for commercial paper known as the Commercial Paper Funding Facility (CPFF); (3) Fed loans to special purpose vehicles (Maiden Lanes II and III) for the purchase of troubled assets from AIG; and (4) Treasury purchases of preferred equity in AIG under the TARP. These programs were restructured on several occasions from late 2008 until September 2010.[18] The last of these programs was terminated in December 2012.

Table 5 shows that between June 2008 and December 2008, AIG's equity (excluding the Treasury purchase of preferred shares) declined by more than $50 billion and its total assets declined by almost $200 billion. This contraction reflected three factors: (1) a reduction in secured liabilities and the associated collateral; (2) sales of assets to Maiden Lanes II and III, which were used to pay down debt; and (3) the markdown of asset values in a falling market. AIG's net worth ticked up a bit in 2009 as federal assistance reached its peak. AIG slimmed down considerably in 2010 and 2011 by selling off subsidiaries. Fed and Treasury equity holdings were converted to common shares in early 2011, at which point Treasury owned 92 percent of outstanding shares. Treasury began to sell its shares in 2011, but most sales were conducted in 2012. By December 2012 Treasury had sold all of its shares of AIG stock.

We find that AIG remained consistently solvent, even though it was on the verge of insolvency in late 2008 and 2009.

On these data, AIG appears to have been solvent throughout the past five years, though it was on the verge of insolvency in late 2008 and 2009, if the value of Fed claims on AIG equity is excluded. Table 4 shows that AIG was able to repay its loans and capital assistance for $23 billion more than the cost of Fed and Treasury funds. Applying this return to the maximum disbursed

18. The initial terms of the Fed assistance were severe. The Fed received an 80 percent claim on AIG common stock that it could keep regardless of whether the loans were repaid. The interest rate on the credit facility was 8.5 percent over the London interbank offered rate (Libor). The interest rate was reduced and other terms were relaxed in subsequent restructurings.

Table 5 Consolidated balance sheets of entities controlled by AIG (billions of dollars)

Item	June 30, 2008	December 31, 2008	December 31, 2009	December 31, 2011	December 31, 2012
Assets					
Fixed income investments	424	404	397	288	295
Equity investments	42	21	18	4	4
Other investments	370	212	187	118	77
Other assets	214	224	246	142	173
Total	1,050	860	848	552	549
Liabilities					
Future policy claims and reserves	265	257	223	149	151
Policyholder funds and deposits	279	240	233	134	129
Long-term debt	164	137	113	75	49
Other (except Fed loans)	264	245	152	83	121
Fed CPFF	0	15	5	0	0
Fed credit facility	0	40	23	0	0
Total	972	798	749	441	450
Equity					
Fed shares	0	0	23	0	0
Treasury shares	0	40	47	87[b]	0
Net worth (excluding Fed and Treasury)	78	21[a]	29[a]	24	99

CPFF = Commercial Paper Funding Facility

a. The Fed credit facility included a warrant to purchase 80 percent of AIG equity, implying that most of the net worth was subject to claim by the Fed.
b. Treasury equity is based on nonvoting shares of $9 billion plus 77 percent ownership of common equity.

Source: AIG Form 10-Q filings with the Securities and Exchange Commission.

amount of $185 billion and assuming the funds were disbursed for the entire five-year period (a conservative assumption) yields a premium for the government of three percentage points above the cost of funds. Some might argue that this is not a large premium given the risks involved, but neither is it inconsequential. As with Bear, AIG's original shareholders lost roughly 90 percent of the value of their equity claims.

In sum, *we find that AIG remained consistently solvent, even though it was on the verge of insolvency in late 2008 and 2009*.

AVAILABLE COLLATERAL

A solvent institution generally has more collateral to post than an insolvent one. But even an insolvent institution may have available collateral provided that its net worth is not too negative and its liabilities are unsecured and have long maturities. Of course, if an insolvent entity posts collateral, its doing so subordinates existing unsecured creditors. At one level, availability of such collateral becomes irrelevant for eligibility for lender-of-last-resort support if the entity is insolvent, because the solvency test is a joint rather than alternative condition for Bagehot's dictum. Nonetheless, because of the difficulty of measuring solvency under stressed market conditions, it is useful to consider the second of the two conditions, sufficient collateral for the loan from the central bank. Did Lehman have sufficient collateral?

First we need to know how large a loan might have been needed. We assume that claims by affiliates and long-term debt are not going to be an immediate source of demand for cash. We focus on the balance sheet of December 2008, immediately after secured claims and associated collateral were run off. According to table 3, liabilities excluding claims by affiliates were $136 billion. Of this, long-term debt was reported to be $82 billion as of September 2008. (No maturity breakdown is available for later dates.) That leaves $54 billion in short-term, nonaffiliate claims on Lehman, a good indicator of the size of emergency loan that might have been needed.

On the asset side, claims on affiliates were $218 billion, but these are not likely to be usable as collateral because liabilities to affiliates were nearly as big as the claims and thus the unencumbered value of these claims is small and uncertain. Other assets are listed with a value of $78 billion, but accuracy

of this valuation is open to doubt, especially given the sharp drop in reported value of this class in the following year.

After allowing for the decline in market valuations and a reasonable haircut for the fraction of market value allowed as collateral, Lehman had barely sufficient collateral to cover short-term nonaffiliated claims, let alone the entirety of obligations. Further complicating factors are that the collateral was mainly held at Lehman's numerous subsidiaries and it spanned a wide range of asset types. The holding company (unconsolidated) listed nonaffiliate claims in December 2008 of only $23 billion, considerably less than was needed for a loan, especially given concerns about asset valuations. It may not have been technically possible to post and value the collateral from a large number of affiliates fast enough to avoid default even if it might have proved sufficient in hindsight.

In the cases of Bear Stearns and AIG, collateral was readily available that proved sufficient to pay off the emergency loans with modest premiums on the cost of funds of the Fed and Treasury. The case of AIG merits further comment. The consolidated balance sheet of AIG shows a huge volume of apparently unencumbered assets that could have been posted as collateral. However, most of these assets were held by insurance subsidiaries whose supervisors would not have allowed them to transfer collateral to the holding company. Effectively the assets and liabilities of these insurance subsidiaries were ring-fenced. Instead, AIG's collateral was the equity value of the subsidiaries themselves. Unlike Lehman's holding company, AIG's holding company did not have large liabilities to its subsidiaries, so its equity claim on those subsidiaries was free and clear to post as collateral for its loan. As of December 2007, the holding company of AIG reported total assets of $136 billion with short-term, secured, and interaffiliate liabilities of only $4 billion. That left $132 billion of assets free and clear to post as collateral, considerably more than the initial $85 billion credit line from the Fed. In addition, its subsidiaries were free to sell their own assets or post them as collateral in order to service or secure their own liabilities, which explains how AIG ultimately was able to draw even more than $132 billion in capital assistance from the Fed and Treasury.

HOW DAMAGING WAS THE LEHMAN COLLAPSE?

A stylized fact, or a relatively widely accepted analytical and empirical view, of the Great Recession is that it has been so severe and protracted because it was caused by a banking and financial crisis rather than by plain vanilla overheating of the economy cured by a harsh but reversible dose of monetary restraint. A companion stylized fact is that the signal event of the financial crisis was the collapse of Lehman and that this event plunged the US and international economies into much deeper financial turmoil.

It is not difficult to find indicators that support the importance of the Lehman event. One standard measure of financial stress is the spread between the London interbank offered rate (Libor) and the corresponding risk-free overnight interest swap for US treasury obligations (OIS). This Libor-OIS spread soared from 50 basis points on September 2, 2008, to a peak of 350 basis points by October 9, 2008 (Cline 2010, 241). For its part, the US stock market, as gauged by the S&P500 index, fell by 10 percent from the end of August to September 17, two days after the announcement of the Lehman bankruptcy. Perhaps the clearest "smoking gun" on Lehman's impact was the announcement by the large money market fund Reserve Primary that it had "broken the buck" because of losses on Lehman's commercial paper, an event that triggered withdrawals of 15 percent of total assets of US money market funds and forced the US Treasury to issue a temporary guarantee of the money market funds (FDIC 2011, 3). Examples of the lasting image of Lehman as the hallmark of the banking crisis can be found in such recent references as the International Monetary Fund's use of "a catastrophic event like the collapse of Lehman Brothers" to calibrate an adverse scenario for the impact of an exit from the euro by Greece (IMF 2013, 78). One of us judges that the stylized fact is broadly right and that it would have been a socially profitable public investment to spend a few billion dollars of public money to avoid the chaotic collapse of Lehman. Doing so in the right way, however, would have required fast-track application of SIFI-type resolution, with the Fed (or FDIC) informing different classes of creditors what ranges of recovery they could likely expect and announcing a timetable for recovery payments. It was not good for the system for Lehman to collapse chaotically, but it would have been even worse for the US government simply to assume all of Lehman's obligations (analogously to what happened in Ireland soon thereafter), and the appropriate alternative of orderly resolution was extremely difficult at a point in time that preceded not only Dodd-Frank but also the TARP.

It was not good for the system for Lehman to collapse chaotically…[but] the appropriate alternative of orderly resolution was extremely difficult at a point in time that preceded not only Dodd-Frank but also the TARP.

The other author notes that there is little agreement as to how much better the economy would have performed if Lehman had been saved, especially if the cost of saving Lehman meant that the subsequent fiscal stimulus would have been proportionally smaller. Lehman's failure caused measures of financial market stress to spike, but the subsequent actions and statements of officials that no other SIFI would be allowed to fail caused these stress indicators to return to near normal levels by January 2009.[19] There is no way to tell how much lasting damage the temporary panic caused. The collapse of the housing bubble meant that households would have been forced to spend less and banks would have been forced to tighten credit to repair their balance sheets regardless of whether or not Lehman was saved. On the other hand, the all-out actions to prevent another disruptive failure after Lehman probably nullified any benefit from the Lehman bankruptcy on moral hazard at financial institutions.

Whether or not the Lehman collapse was a major or minor factor in worsening the Great Recession, we agree that there is a need for an orderly workout alternative to sudden bankruptcy for SIFIs.

CONCLUSIONS

Four of the five major US financial institutions we examined—Bear Stearns, Fannie Mae, Freddie Mac, and AIG—were arguably solvent and received emergency loans and capital that they have already paid off, or are on track to pay off, fully and with a premium over the government's cost of funds. Lehman Brothers, on the other hand, was deeply insolvent and did not receive emergency funding. In retrospect, the decision to let Lehman fail and to bail out the others appears to be consistent with Bagehot's dictum.

What little collateral Lehman had was marginally sufficient at best, and it had very limited time to organize and value the collateral for posting from all the subsidiaries that held it. Again, on this dimension, the other four institutions were fundamentally different from Lehman in that they had lots of available collateral.

Although Bagehot clearly supported aggressive actions to calm financial panics, he drew the line at actions that would likely cost taxpayers' money. Is that the correct place to draw the line? A thorough answer is beyond the scope of this Policy Brief, and we doubt it is possible to answer it even in hindsight. The benefit of a bailout is less disruption of economic activity and the costs are possible taxpayer losses and adverse incentives (moral hazard) for financial institutions and their customers, who may expect to be bailed out in the future.

One point is incontrovertible: The case for adherence to the negative mandate of Bagehot's dictum—lend only to solvent firms and in the presence of collateral—would be greatly enhanced if it were possible to resolve a failing large and complex financial institution in a rapid and nondisruptive manner. This is the objective of the "living will" provision of the Dodd-Frank Act. The efficacy of these living wills has yet to be tested, and no agreement has been reached among regulators of different countries concerning the living wills of internationally active financial institutions. In summary, in modern financial markets the Bagehot principle of providing lender-of-last-resort support remains necessary but is no longer sufficient. Some Beyond Bagehot form of orderly resolution is essential to deal with insolvent SIFIs.

19. See the Plan of Action of G-7 finance ministers and central bank governors on October 10, 2008, www.treasury.gov/press-center/press-releases/Pages/hp1195.aspx. Stress measures are Libor-OIS spreads and bank credit default swap (CDS) spreads.

REFERENCES

Bagehot, Walter. 1873. *Lombard Street: A Description of the Money Market.* Available at www.gutenberg.org.

Cline, William R. 2010. *Financial Globalization, Economic Growth, and the Crisis of 2007-09*. Washington: Peterson Institute for International Economics.

FDIC (Federal Deposit Insurance Corporation). 2011. The Orderly Liquidation of Lehman Brothers Holdings Inc. under the Dodd-Frank Act. *FDIC Quarterly* 5, no. 2: 31–49.

IMF (International Monetary Fund). 2013. *Greece: First and Second Reviews Under the Extended Arrangement Under the Extended Fund Facility.* IMF Country Report no. 13/20 (January). Washington.

Sorkin, Andrew. 2009. *Too Big to Fail*. New York: Viking Penguin.

Tibman, Joseph. 2009. *The Murder of Lehman Brothers: An Insider's Look at the Global Meltdown*. New York: Brick Tower Press.

Wessel, David. 2009. *In Fed We Trust*. New York: Crown Business.