

* EMBARGOED UNTIL 12:30 PM Pacific time and 3:30 PM Eastern time, or upon delivery *



*“Defining Financial Stability,
and Some Policy Implications
of Applying the Definition”*

Eric S. Rosengren
President & Chief Executive Officer
Federal Reserve Bank of Boston

Keynote Remarks at the Stanford Finance Forum
Graduate School of Business
Stanford University

June 3, 2011

It is a pleasure to be here with you today. I would especially like to thank Darrell Duffie for inviting me to Stanford to talk about financial stability. I am glad to be here to take part in this very constructive forum.

Of course, the views I express today are my own, not necessarily those of my colleagues on the Federal Reserve’s Board of Governors or the Federal Open Market Committee (the FOMC).

The topic of financial stability is receiving increased attention in both academic and non-academic settings, as we all try to incorporate lessons from the financial crisis. The challenge of incorporating the lessons of the crisis is made more difficult, in part, because there is no one clear definition of financial stability (and instability).

Interestingly, while the Dodd-Frank Act focuses on financial stability, the term is never actually defined in the legislation. Perhaps the absence of a definition in the legislation reflects the

reality that the concept is defined quite differently by different people. I should note that the new Financial Services Oversight Committee (FSOC) created by the Dodd-Frank legislation has been exploring defining the term.¹

The Dodd-Frank legislation seems primarily focused on addressing the failure of large financial institutions and payments systems, which was certainly a gap that warrants attention. However, a large interconnected failure is only one of several ways that a systemic problem can emerge. I believe the examples I will discuss today highlight the importance of focusing on systemic issues and not just the potential for large bank failures being disruptive.

Others – including some academics, politicians, and financial analysts – have argued that the pursuit of financial stability should address a variety of things such as volatility in financial markets, clustered failures of financial institutions, or asset bubbles (while at the early stages of their development). So it is important to clarify the definition.

The reason this is so important is that clarity of definition will help us frame the policy response – and identify what problems we will seek to solve and, equally importantly, what problems we will not. Knowing these parameters is in turn critical to identifying the needed supervisory and regulatory tools.

So, for the purposes of this talk I will provide my own definition of financial stability – one that I suspect can be helpful to the policy discussion – and then discuss how I would apply this definition, with some examples.

Financial stability reflects the ability of the financial system to consistently supply the credit intermediation and payment services that are needed in the real economy if it is to continue on its growth path.

Financial instability occurs when problems (or concerns about potential problems) within institutions, markets, payments systems, or the financial system in general significantly impair the supply of credit intermediation services – so as to substantially impact the expected path of real economic activity.

To summarize and perhaps simplify a bit further, my definition of financial instability has three key elements: problems in the financial system, impairment of intermediation (or the supply of it), and a substantial impact on the real economy.

Clearly the central theme is financial or credit intermediation services (and their supporting the real economy). So allow me to briefly define the critical role of financial institutions in such intermediation – a topic that has been central to much macroeconomic research over the course of the last 25 years, my own included.²

Financial intermediation's critical role in stability

Financial intermediaries like banks provide a critical function in the economy in that they essentially match borrowers and lenders – taking funds provided by depositors or investors, and lending those funds to individuals and firms that run businesses and employ people in the real economy, and thus have opportunities for higher potential returns.

Depositors generally need frequent access to their funds, while the individuals and firms who borrow often want to use the funds for significant periods of time. So there is a so-called “maturity transformation” at work, from short maturity for depositors to longer maturity for borrowers. Also, while depositors want a nearly risk-free repository for their funds, borrowers’ investment opportunities almost always entail credit risk. In this way financial intermediaries also perform a “risk transformation” – where firms with opportunities for higher potential returns obtain funds from investors and depositors looking for shorter-term, safer investments.

The financial intermediary must have expertise in identifying creditworthy investment opportunities, monitoring the investments, and obtaining the benefits of diversification. In normal

times, the financial intermediary can provide depositors or investors access to their funds with little or no notice, because the intermediary draws its funds from a diversified set of depositors (with varied financial needs) who are unlikely – again, in normal economic times – to all demand their funds at the same time.

So financial intermediation is a vital service for a well-functioning economy, allowing the funds from many depositors to be pooled and channeled to riskier and longer-term investment projects that support real economic activity.

The opposite is also true – disruption of intermediation can have significant macroeconomic consequences. In their widely read book *This Time Is Different: Eight Centuries of Financial Folly*, Carmen Reinhart and Ken Rogoff highlight that recoveries from crises in which financial intermediation has been badly disrupted can take much longer, and be more uneven, than recoveries from crises in which intermediation has not been impacted.

Implicit in the definitions I have suggested is the notion that if individual financial institutions – or even groups of institutions – fail, but intermediation services are not significantly impaired, then financial stability is *not* compromised. This could happen, for example, if intermediation services were highly substitutable so that borrowers could switch to alternate intermediaries at little cost.

Also important is what is *not* included in my definition. For instance, there is no mention of asset bubbles. While asset bubbles likely were involved in the recent crisis, we should recognize that not all asset bubbles result in a disruption of financial intermediation. Asset bubbles would only impact financial stability as I'm defining it if key intermediaries use significant leverage to purchase the asset that's experiencing a bubble, and as a result are seriously compromised if the bubble bursts.³ In such a situation they might face balance sheet constraints that could significantly impair the availability of intermediation services and thus the future path of the economy.

So, not all asset bubbles reflect financial instability, but some do – if they affect institutions involved in vital financial intermediation for the real economy. In this way the topic of asset bubbles helps to illustrate how the definition of financial instability is important as we seek to understand the problems we are trying to mitigate, and the tools that are most appropriate for doing so. And another way the definition matters is that holding regulators and supervisors accountable only makes sense if there is a clear understanding of their responsibilities.

The rest of my remarks today provide some examples of how my definition of financial stability (and of instability) could be applied – and the implications.

Some significant events may *not* yield financial instability

I would first like to share a few examples that would not meet my definition for affecting financial stability or creating financial instability.

My first example involves silver prices. As I'm sure you know, the recent movement of silver prices has been quite dramatic. **Figure 1** shows silver prices and is characterized by two dramatic movements. The first reflects an attempt to corner the silver market some years ago, when prices rose to nearly \$45 per troy ounce before the popping of the bubble – followed by a nearly 75 percent decline. The second dramatic move is the rapid increase in silver prices from \$17.65 per troy ounce in July of last year to \$44.90 in late April of this year. **Figure 2** focuses in on just this recent phase. Since hitting that peak, silver prices fell by just over 25 percent to \$33.42 on May 17. As of last week silver was trading up slightly, at \$36.14 an ounce.

While this dramatic movement in silver's price highlights the risk and volatility to investing in commodities, it does not meet my definition of financial instability. Price volatility is very different than financial instability. Silver is a relatively small market, and leveraged financial intermediaries do

not have an especially significant exposure to silver. So despite the dramatic price decline, there has been no trace of impairment in financial intermediation. So I would not view this as an instance of financial instability, as I define it, and would see no need to alter policy to respond to the price movements.

My second example involves the large numbers of failures of savings and loan institutions from the early 1980s to the early 1990s, as shown in **Figure 3**. A combination of poor supervision and poor management led savings and loans to be caught first in an adverse interest rate environment – they were borrowing short and lending long at a time of rapidly rising interest rates. As a result their capital became depleted, and many savings and loans increased their risk by taking on commercial real estate activities – resulting in widespread failures, and in some cases, quite dramatic losses. These losses were a significant problem for the deposit insurance fund.

But while this was a costly situation, did it constitute financial instability?

Using my definition, it did not. Savings and loan institutions were not the sole providers of credit to housing market participants. Many commercial banks were willing and able to lend to potential home buyers. In addition, securitization of mortgages had made it easier for borrowers to get financing regardless of the intermediary initiating the loan. I would point to **Figure 4**, which shows the spread between 10 year Treasury securities and 30 year mortgages with savings and loans failures in the background. There is no sharp break in credit pricing during that period, nor were there widespread complaints at the time of inability to obtain home mortgages. So, despite the large number of financial institutions that failed, there was not a severe disruption in the intermediation of mortgage credit, at least in the aggregate.

My third example involves the dramatic increase in “dot com” stock prices during the late 1990s, as shown in **Figure 5**. Stock prices rose rapidly for companies associated with the emerging commercialization of the internet. As you know, many of the companies had no clearly established

revenue stream, leading many analysts to become concerned about a bubble. And in fact, the stock prices of many of those companies did fall dramatically.

While the rapid decline of dot-com stock prices did result in a drop in wealth for those invested in the stocks, it did not have a significant impact on financial intermediation services – because generally speaking, banks and other key sources of intermediation were not directly exposed to dot-com stocks in a significant way. A shock to wealth can have a macroeconomic impact, but that can be addressed with traditional monetary policy. While there was a macroeconomic impact from the decline in the stock prices, the episode would not meet my definition of financial instability because it did not impair intermediation – in other words, it did not affect the ability of the financial system to provide credit.

Examples of financial instability (and possible causes)

I have been arguing here that there are examples of serious financial problems and dislocations that I would not consider examples of financial instability, as I define it. But there are, unfortunately, examples of financial instability that occurred recently, during the financial crisis and recession.

As I mentioned in my introduction, the Dodd-Frank legislation seems primarily focused on addressing the failure of large financial institutions and payments systems – which certainly warrants attention. But a large interconnected failure is only one of several ways that a systemic problem can emerge. The first example I would offer involves the experience of money market mutual funds (MMMFs) during the financial crisis, and it demonstrates that even a small financial intermediary can create financial instability.

As of August 2008 MMMFs had \$3.5 trillion of assets, and funds had been flowing into MMMFs, as a result of problems at a variety of banks and other factors. But **Figure 6** shows the daily

change in money market fund assets in prime funds in the latter portion of 2008, and notes some of the key events of that era.

In the wake of the failure of Lehman Brothers, a relatively small MMMF called the Reserve Primary Fund experienced very substantial outflows due to investor concerns about its credit exposure to Lehman. While money market funds are highly regulated by the SEC and are supposed to hold high-quality liquid assets, investors were concerned that losses from Lehman would cause the Reserve Fund to “break the buck” (that is, redeem shares for less than one dollar).

The problems at the Reserve Fund not only caused funds to flow out of that fund, but also triggered large withdrawals from other money market mutual funds as well, as shown in the figure. Over the course of the week, over \$300 billion was withdrawn from prime MMMFs, forcing the funds to try to quickly sell assets to meet redemption requests.

Note that there are three major types of money market funds, as shown in **Figure 7** – funds that invest in tax-exempt securities, funds that invest in government securities, and prime money market funds that purchase a wide variety of debt instruments. It was the prime money market funds that posed the most severe problem during the crisis – and which still pose a problem today (as I will discuss in a moment). While some of the assets in the prime funds, such as Treasury securities, could be readily sold, others such as asset-backed commercial paper (ABCP) were not easily sold given the prevailing harsh market conditions.

The rapid withdrawal of funds from prime money market funds not only represented a crisis of confidence, but also began seriously disrupting credit markets where MMMFs were the major buyers.⁴ Interest spreads on asset-backed commercial paper, shown in the top panel of **Figure 8**, rose dramatically. The bottom panel shows that asset-backed commercial paper could only be issued in very short maturities. The percent of issued paper maturing in one to four days leapt from roughly half to over 90 percent.

In response to these short-term credit disruptions, the U.S. Treasury announced a plan to insure MMMF shares,⁵ and the Federal Reserve System announced an asset-backed commercial paper MMMF liquidity facility. The facility, operated for the System by the Boston Fed, allowed money market funds to sell asset-backed commercial paper to banks – the MMMFs could use the sale proceeds to meet redemption requests – and the asset-backed commercial paper was pledged by the banks to the Fed as part of a loan from the Fed, which was ultimately paid back with interest. In addition, over time other facilities were created to address disruptions in short-term credit markets.

The money market problems that disrupted short-term credit markets highlighted that financial instability could be created by even a small money market fund if its problems created doubts about other funds' ability to redeem investors' funds at stable net asset value. In a situation like this, we should note, the weakest link in the financial stability chain might be *small*, rather than large, financial intermediaries. This problem with promising stable asset values despite some credit risk was what in this example impaired financial intermediaries (the MMMFs), seriously disrupted short-term credit markets, and had a large impact on the ability of firms to acquire short-term debt financing.

The Securities and Exchange Commission has tightened requirements on money market funds.⁶ While this represents an important step forward, I will digress for a moment on this issue as it relates to our topic today, financial stability. Despite the regulatory changes that have occurred, MMMFs still remain vulnerable to an unexpected credit shock that could cause investors to doubt the ability to redeem at a stable net asset value. I am certainly not predicting such an outcome, but I believe we all do well to recognize and address this vulnerability.

I do think it would be particularly prudent to address this issue now, as money market mutual funds have the potential to be impacted should there be unexpected international financial problems emanating from Europe. Consider that many (but not all) MMMF's have sizeable exposures to

European banks, by virtue of holding the banks' short-term debt. This means some MMMFs are potentially sensitive to a disruption in the European banking system, should one arise from the fiscal and sovereign-debt problems we are seeing in some European countries.

Conversely, I would note that European banks are reliant on the MMMFs – which are a major source of their dollar-funding needs. This latter point is worth noting as we carefully and responsibly examine this set of issues – because it means, for instance, that a regulatory change that reduced the debt holdings of European banks by prime money market funds could (as an unintended consequence) necessitate corresponding changes in European dollar-funding strategies.

While there have been various proposals to address this issue – for instance allowing the asset values of the funds to float, or requiring capital be set aside in the event of a credit shock, or requiring a source of strength from a parent company or an insurance contract – no one solution has been settled on that would cure the type of problem that occurred with the Reserve Primary Fund in the last financial crisis.

So in my view, any solution needs to address the potential impact of unexpected credit losses, the risk that investors might rapidly withdraw their funds to avoid any loss, and the operational convenience that MMMFs provide as a transactions account vehicle.⁷ Despite these challenges, the set of issues surrounding MMMFs is in sum a vulnerability that needs to be addressed. Forums like this one serve an important role in allowing us to underline issues like this that need focused and constructive attention.

Financial instability may occur without the *failure* of a financial intermediary

Returning to my examples I would say that another vulnerability is the risk that common, widely-held exposures could cause intermediation services to be cut simultaneously, even without a

failure of any large intermediary. For example, if banks experience a common shock to collateral values or experience similar credit losses, banks that are capital-constrained may shrink their lending in an effort to satisfy binding capital-to-assets ratios. (As a reminder, loans are assets on a bank's balance sheet).

This type of problem is illustrated by the difference in the lending behavior during the recent crisis and downturn of banks with strong supervisory ratings, and those with weak supervisory ratings. **Figure 9** shows that commercial and savings banks with weak supervisory ratings shrank lending during the first year of the recession. Banks experiencing large losses are often reluctant to raise additional capital – either because it could signal financial problems or be perceived as an attempt to avoid diluting existing shareholders. Instead, firms that choose not to raise additional capital often satisfy capital-to-assets requirements by shrinking their assets, and more importantly for the real economy, reducing their willingness to lend.

If this behavior is widespread, it can significantly reduce credit intermediation. Earlier in my career I studied this dynamic with my colleague Joe Peek, and our research found such behavior during the credit crunch period in the United States during the 1990 recession⁸ and during the Japanese banking crisis.⁹ This dynamic forms one explanation for why recessions that are accompanied by problems at financial intermediaries tend to be deeper recessions, followed by slower recoveries (again, the point that Reinhart and Rogoff discuss).

Indeed, a look at the last three recessions suggests significant tightening of credit and slow recoveries. While I mentioned earlier that the mortgages issued by savings and loan institutions were easily substitutable, the same cannot be said of commercial lending. **Figure 10** shows the declines in commercial loans in relation to the last three recessions. The headwinds in monetary policy that became a concern in the 1990s primarily reflected reduced business lending, as commercial banks became capital constrained as a result of large commercial real estate losses. **Figure 11** shows the

rise in the net percent of loan officers reporting tighter lending standards in relation to the recessions, as well.

All this leads to something of a conundrum. Higher capital requirements (higher ratios of capital to assets) can reduce the probability of an institution's failure – but a lower risk of banks' insolvency does not necessarily prevent a credit crunch.

A potential solution, being advocated in Basel III proposals, could be requiring banks to hold a buffer above the minimum capital requirements, which can be drawn down during times of credit crunches – but with the expectation that the capital would not be rebuilt by shrinking the institution's loan portfolio. However, for credit crunches to be avoided this source of capital needs to be set apart as something of a “shock absorber,” and not be viewed as just a higher capital ratio that incents reduced financial intermediation when the buffer is breached.

Financial instability when a large, interconnected intermediary fails

My third example of instability involves the failure of Lehman Brothers, which in my view highlighted the importance of understanding the interconnection of financial firms.

Interconnectedness occurs in a variety of ways:

- The most direct way involves those who have an immediate credit exposure to the firm.

As an example, the failure of a large financial firm could create a credit loss that could generate runs on money market funds broadly – a linkage that was probably not sufficiently appreciated prior to the financial crisis.

- A second form of interconnectedness involves the opaqueness of financial firms, which makes it difficult to determine counterparty exposure or whether similar exposures exist at

other financial firms. During the crisis, investors started retreating from financial firms *generally*, as shown in the substantial widening of the LIBOR/OIS spread (**Figure 12**) as banks became suspicious of counterparty exposure to even some of the largest global financial intermediaries.

- A third manifestation of interconnectedness involves the criticality of firms that are significant market makers, because when they experience troubles broader intermediation services can be impacted.
- A fourth form of interconnectedness involves the increasing global nature of large financial intermediaries, which greatly complicates resolutions of such firms should they fail. The incentive for host countries to “ring fence” liquidity and capital, and the legal uncertainty surrounding global failures, together provide incentives that might not be compatible with orderly resolutions.

While the role of interconnectedness is much better appreciated now than prior to the crisis, it is still very difficult to get good “measures” of it. Academics and regulators need to spend more time understanding what data might be useful, and how it can be readily ascertained and updated.

Assuming interconnectedness can be measured, it is important to understand how that information will be used. For example, should highly interconnected firms have higher capital requirements, to reduce the probability that they become insolvent? Should banks be required to disclose measures of interconnectedness to bank supervisors – or in public statements? And what role can stress tests play in understanding how a failure of a large firm impacts other firms?

Concluding observations

In conclusion I would just emphasize that financial stability was not clearly identified as the responsibility of any particular regulatory authority prior to the financial crisis. Under the Dodd-Frank legislation a group of regulators, the Financial Stability Oversight Council, is now tasked with providing financial stability oversight. However, as I noted at the outset, financial stability was never defined in the legislation. This leaves some ambiguity on how broadly or narrowly financial stability should be defined.

In this talk I have tried to provide a relatively simple definition of financial stability and instability, and have provided some examples of how the definition could be used in various circumstances. The examples of potential financial instability emanating from money market mutual funds and commercial banks highlight, in my view, that much work remains to be done if we want to significantly reduce the likelihood of impairment of critical financial intermediation services – the sort of impairment that could substantially impact economic activity.

I know we all want to work to make progress in this area, and I hope my remarks today help advance the cause.

Thank you.

¹ Through an Advance Notice of Proposed Rulemaking, FSOC asked the public whether it should define the term “financial stability” as well as “material financial distress.” In a Notice of Proposed Rulemaking the FSOC indicated that there was a broad consensus from the comments received that the FSOC *should* define those two terms. The FSOC is in the process related to regulation writing on the “Authority to Require Supervision and Regulation of Certain Nonbank Financial Companies” pursuant to Section 113 of DFA. (The Notice of Proposed Rulemaking actually explains that their proposed rule “describes the criteria that will inform, and the processes and procedures established under the DFA for, the Council’s designation of nonbank financial companies under the DFA.”)

² See for example “The Impact of Financial Institutions and Financial Markets on the Real Economy: Implications of a ‘Liquidity Lock’” – my talk at the University of Wisconsin – Madison in October 2008 (available at <http://www.bostonfed.org/news/speeches/rosengren/2008/100908.htm>).

³ Financial institutions can use leverage to purchase assets (e.g. residential mortgage backed securities) or can provide leverage to borrowers wishing to purchase the asset. Either way a bubble bursting impacts the financial intermediary's balance sheet.

⁴ Since a major theme in my talk is that financial stability is not compromised if intermediation services are sustainable through alternative intermediaries, I would note that here there are no similar substitutes. Even product substitutes (like unregistered funds) have investors that behave in the same fashion.

⁵ The U.S. Treasury Department on September 19, 2008 announced "the establishment of a temporary guaranty program for the U.S. money market mutual fund industry. For the next year, the U.S. Treasury will insure the holdings of any publicly offered eligible money market mutual fund – both retail and institutional – that pays a fee to participate in the program." Information on the program can be found in announcements posted by the Treasury in late September and early November, archived at <http://www.treas.gov/press/releases/archives/200809.html>

⁶ As Chairman Bernanke said on May 5, "the stability of money market mutual funds – which suffered dramatic runs that worsened funding conditions at the height of the crisis – is clearly a systemic issue, not just an industry issue. The SEC, which has already issued rules to increase the stability of money market mutual funds, is appropriately taking the lead in investigating whether further steps are necessary. Under the aegis of the council, however, the SEC has consulted with other agencies, including the Federal Reserve, which have provided their own analyses and perspectives. In particular, interagency consultation has helped clarify the potential systemic implications of instability in the money market mutual fund industry. The Federal Reserve will be among the agencies participating in a roundtable on money fund regulation sponsored by the SEC later this month."

⁷ That is, in eliminating the need for extensive tracking of capital gains and losses.

⁸ For a description of credit crunch problems in the early 1990s see Peek and Rosengren, "The Capital Crunch: Neither a Borrower nor a Lender Be," *Journal of Money, Credit and Banking*, vol. 27, no. 3 (August 1995): 625-638. Also see the article I wrote with Joe Peek, "Bank Regulation and the Credit Crunch," in the *Journal of Banking & Finance*, Volume 19, Issues 3-4, June 1995, pages 679-692.

⁹ See for example the following articles I wrote with Joe Peek: "The International Transmission of Financial Shocks: The Case of Japan" in the *American Economic Review* vol. 87, no. 4 (September 1997), pages 495-505; "Collateral Damage: Effects of the Japanese Bank Crisis on Real Activity in the United States" in the *American Economic Review*, vol. 90, no. 1 (March 2000), pages 30-45; and "Unnatural Selection: Perverse Incentives and the Misallocation of Credit in Japan" in the *American Economic Review*, vol. 95(4), September 2005, pages 1144-1166.

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Eric S. Rosengren
President & CEO
Federal Reserve Bank of Boston

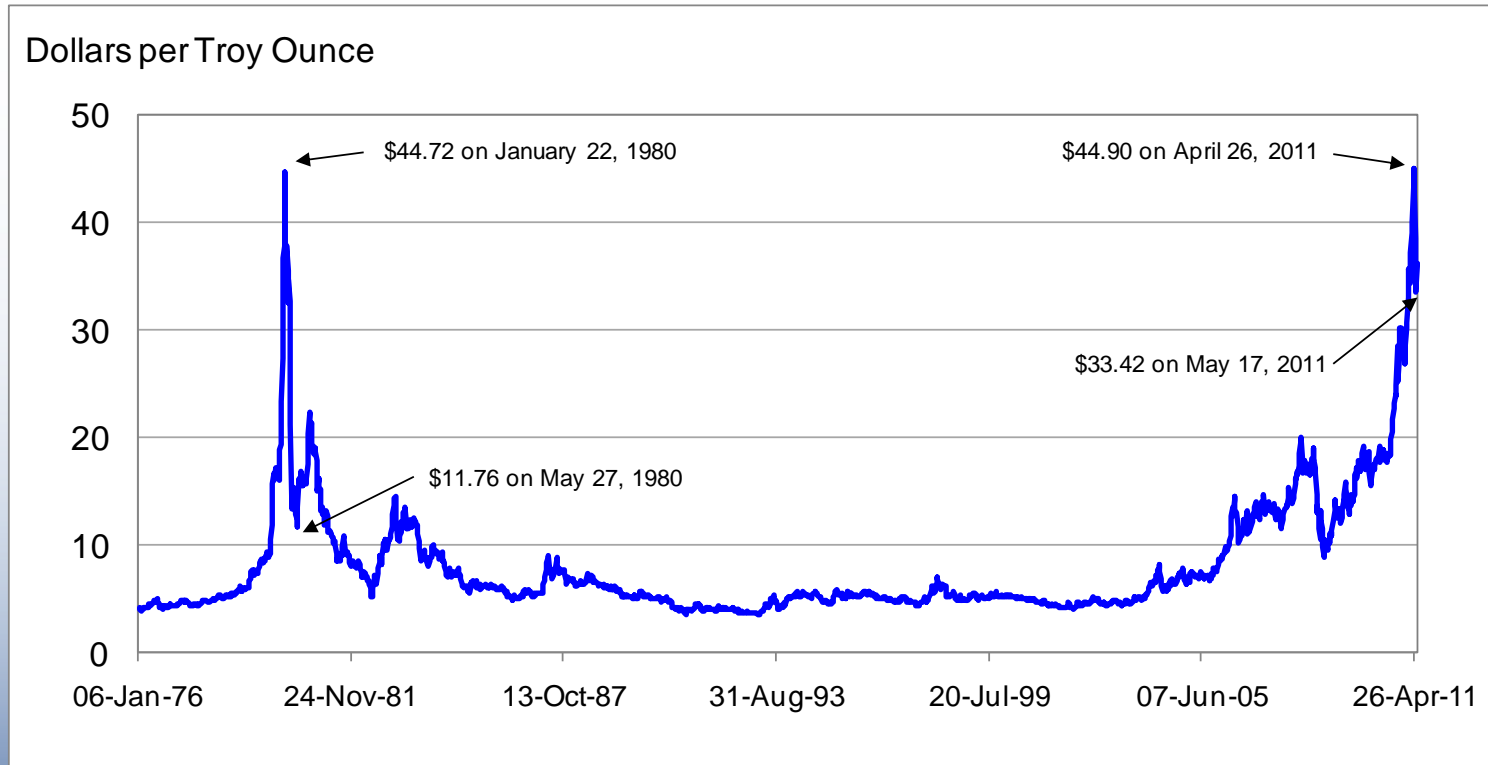
Stanford Financial Forum
Stanford, CA

June 3, 2011

Figure 1

Silver: Handy & Harman Base Price

Weekly, January 6, 1976 - May 24, 2011

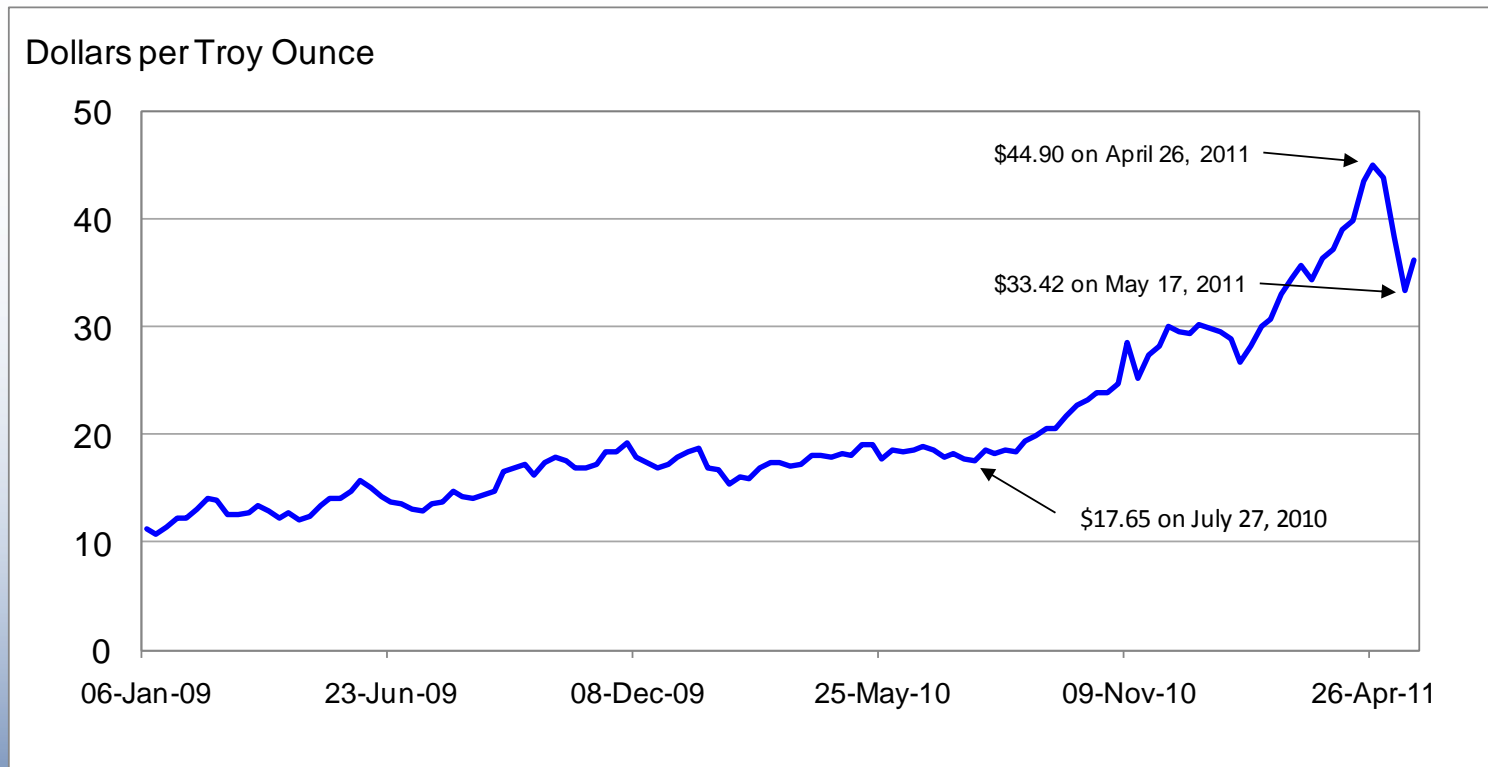


Source: WSJ / Haver Analytics

Figure 2

Silver: Handy & Harman Base Price

Weekly, January 6, 2009 - May 24, 2011

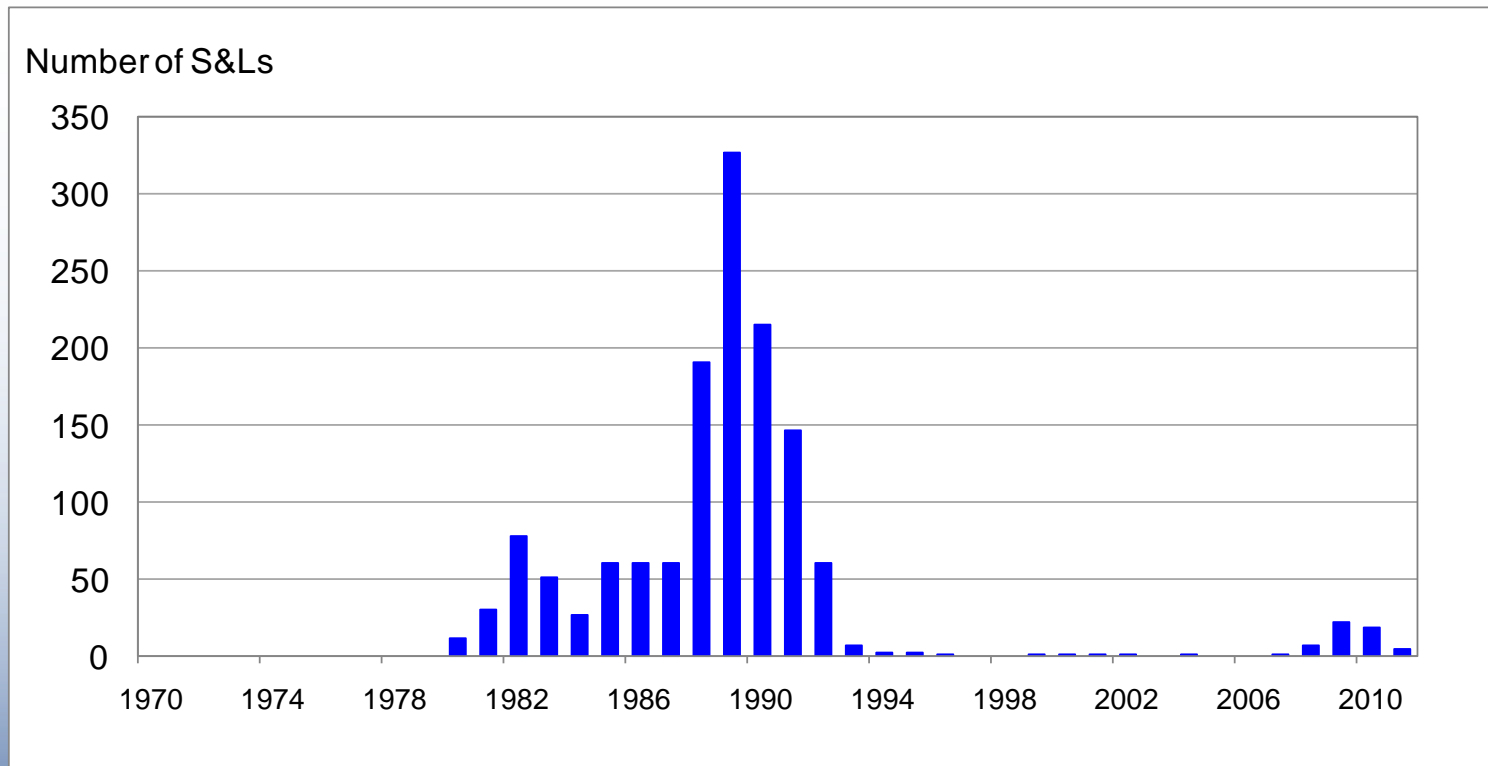


Source: WSJ / Haver Analytics

Figure 3

S&L Failures and Assisted Resolutions

1970 - 2011 Year-to-Date

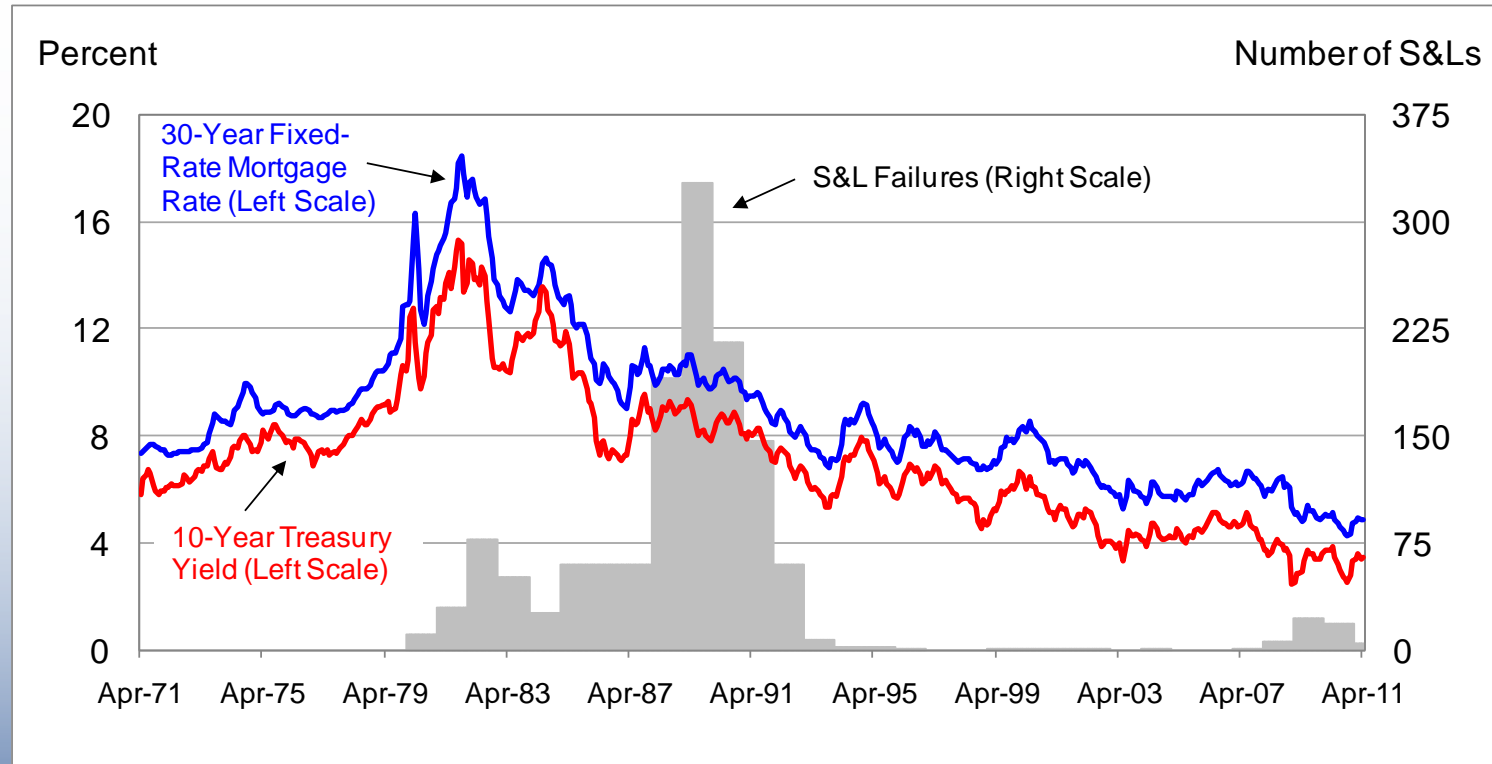


Source: FDIC

Figure 4

Mortgage Rates, Treasury Yields and S&L Failures

April 1971 - April 2011



Source: FDIC, Federal Reserve Board, Federal Home Loan Mortgage Corporation / Haver Analytics

Figure 5

Dow Jones Internet Composite Stock Price Index

July 1997 - April 2011

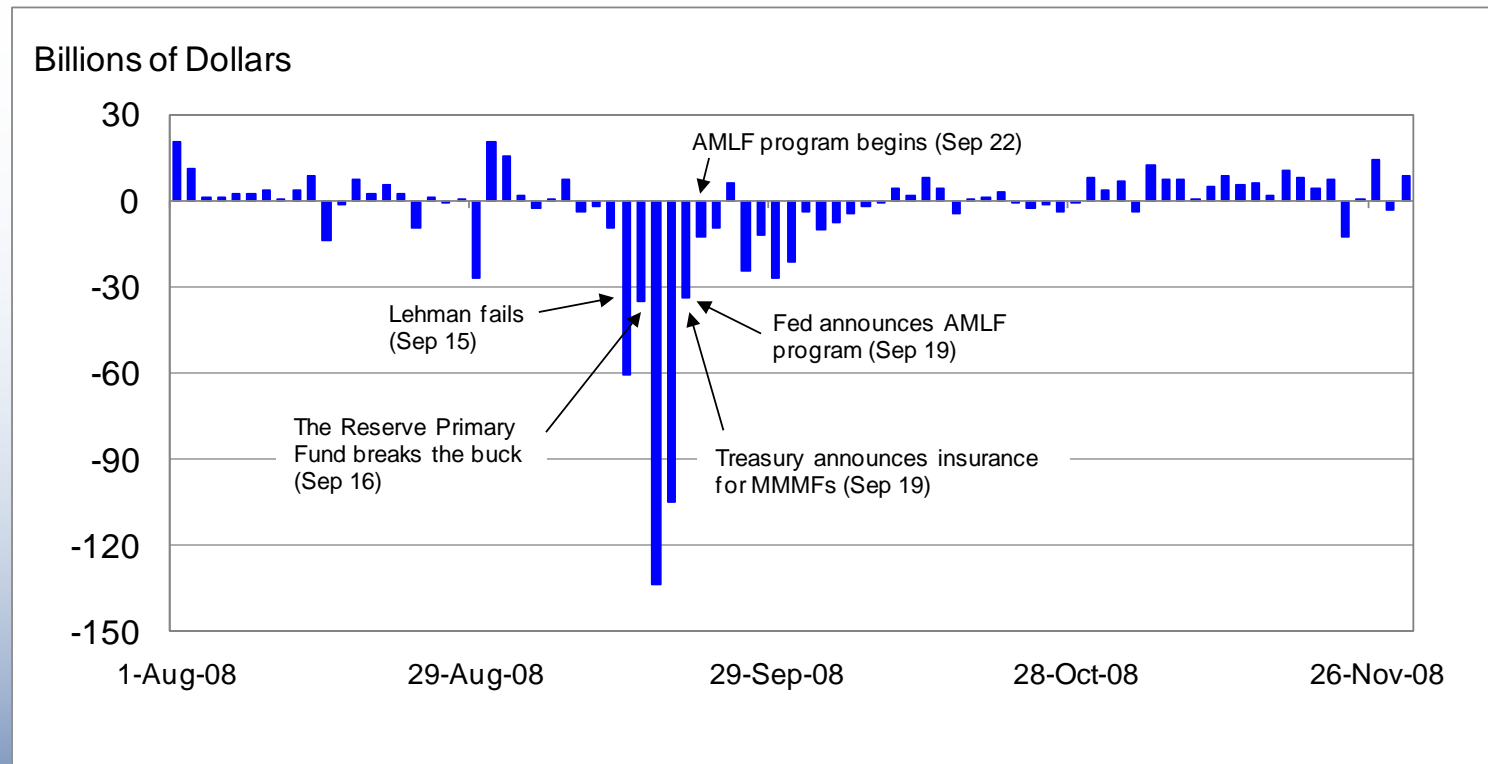


Source: Dow Jones, WSJ / Haver Analytics

Figure 6

Daily Change in Money Market Mutual Fund Assets in Prime Funds

August 1, 2008 - December 1, 2008

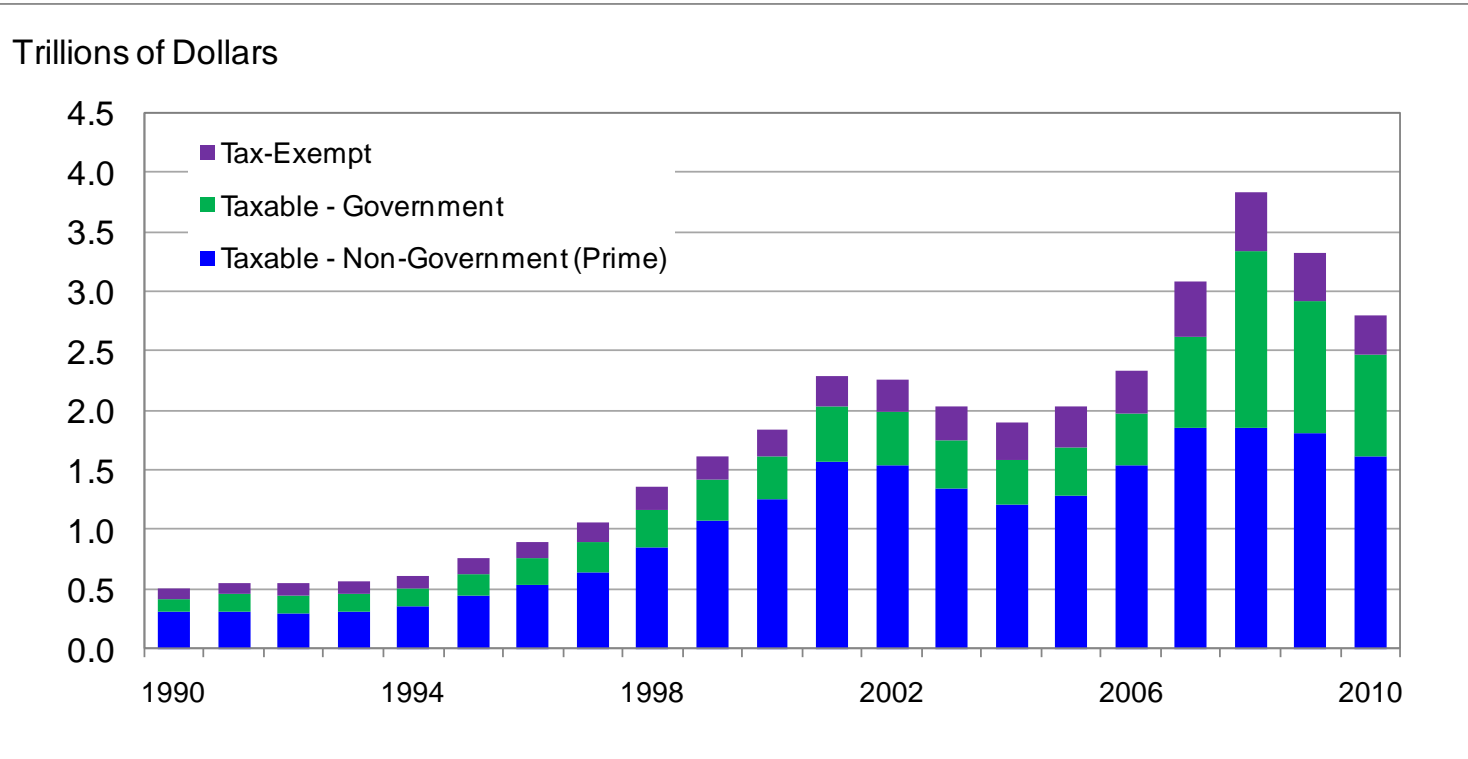


Source: iMoneyNet

Figure 7

Assets of Money Market Mutual Funds

1990 - 2010, Year-End

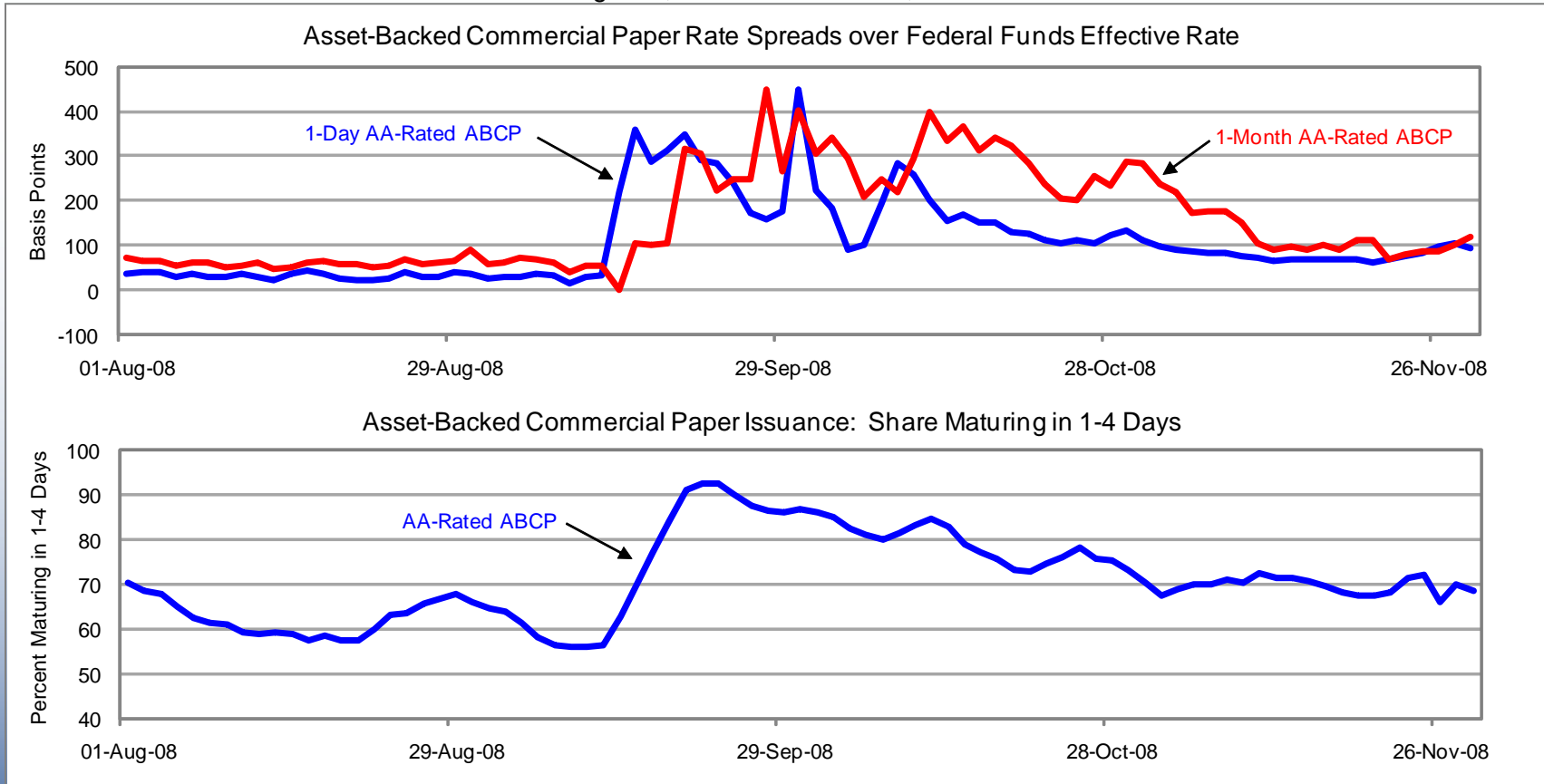


Source: 2011 Investment Company Fact Book

Figure 8

Asset-Backed Commercial Paper Rate Spreads and Issuance

August 1, 2008 - December 1, 2008

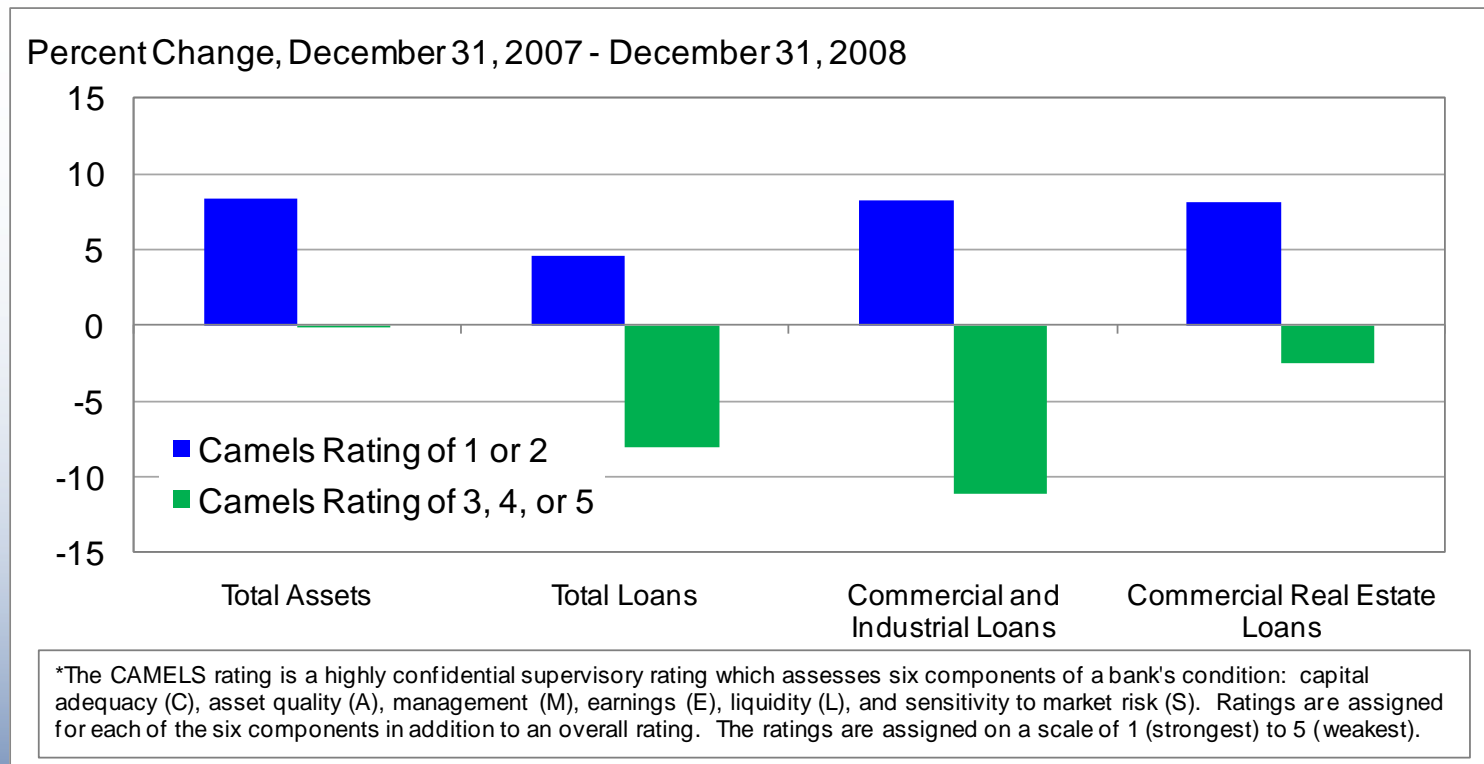


Source: Federal Reserve Board / Haver Analytics

Figure 9

Asset Growth at Commercial and Savings Banks by CAMELS Rating*

December 31, 2007 - December 31, 2008

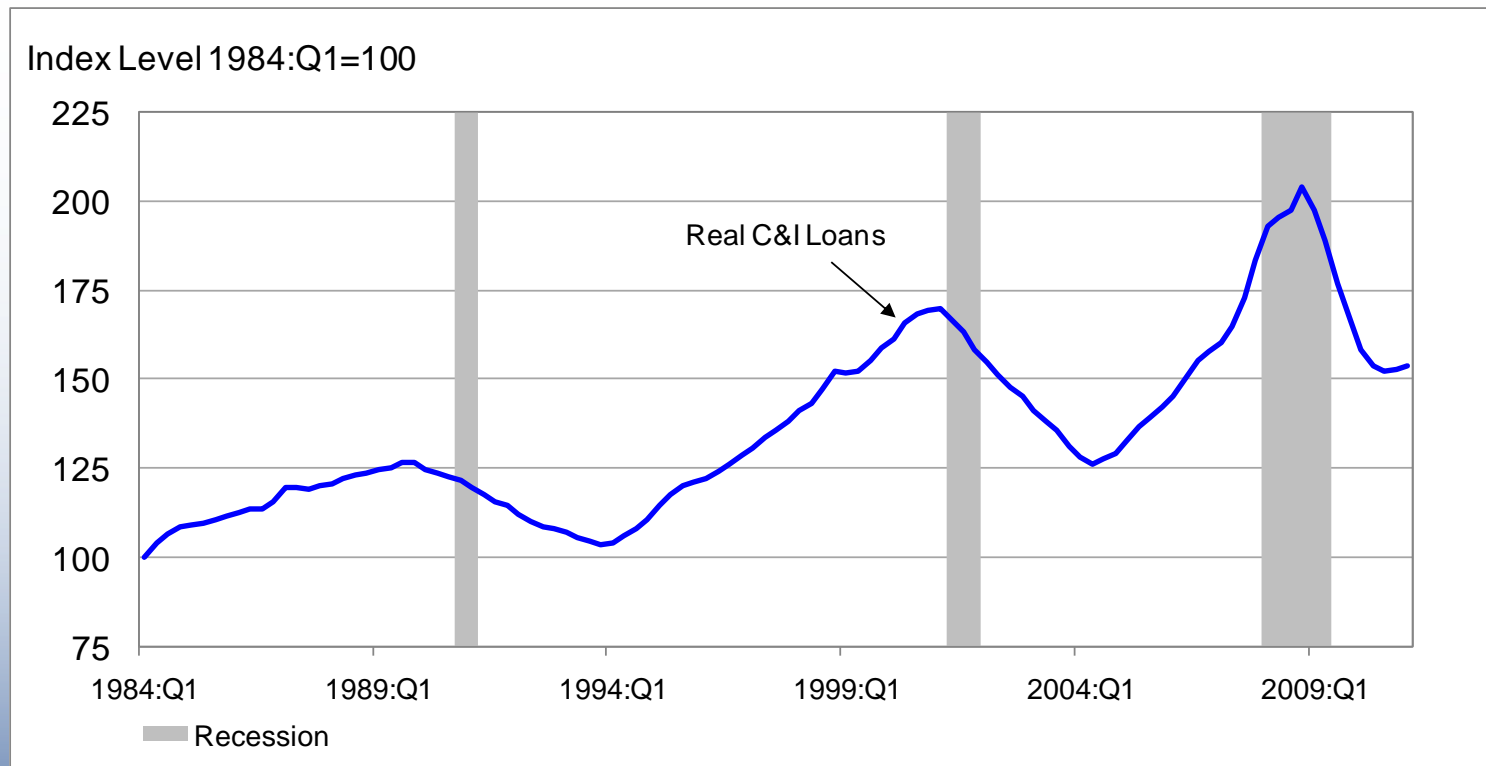


Note: CAMELS ratings are as of December 31, 2008. Banks included are merger-adjusted. De novos are excluded
Source: Commercial and savings bank call reports, supervisory reports and author's calculations

Figure 10

Real Commercial and Industrial Loans Outstanding at Commercial Banks

1984:Q1 - 2011:Q1



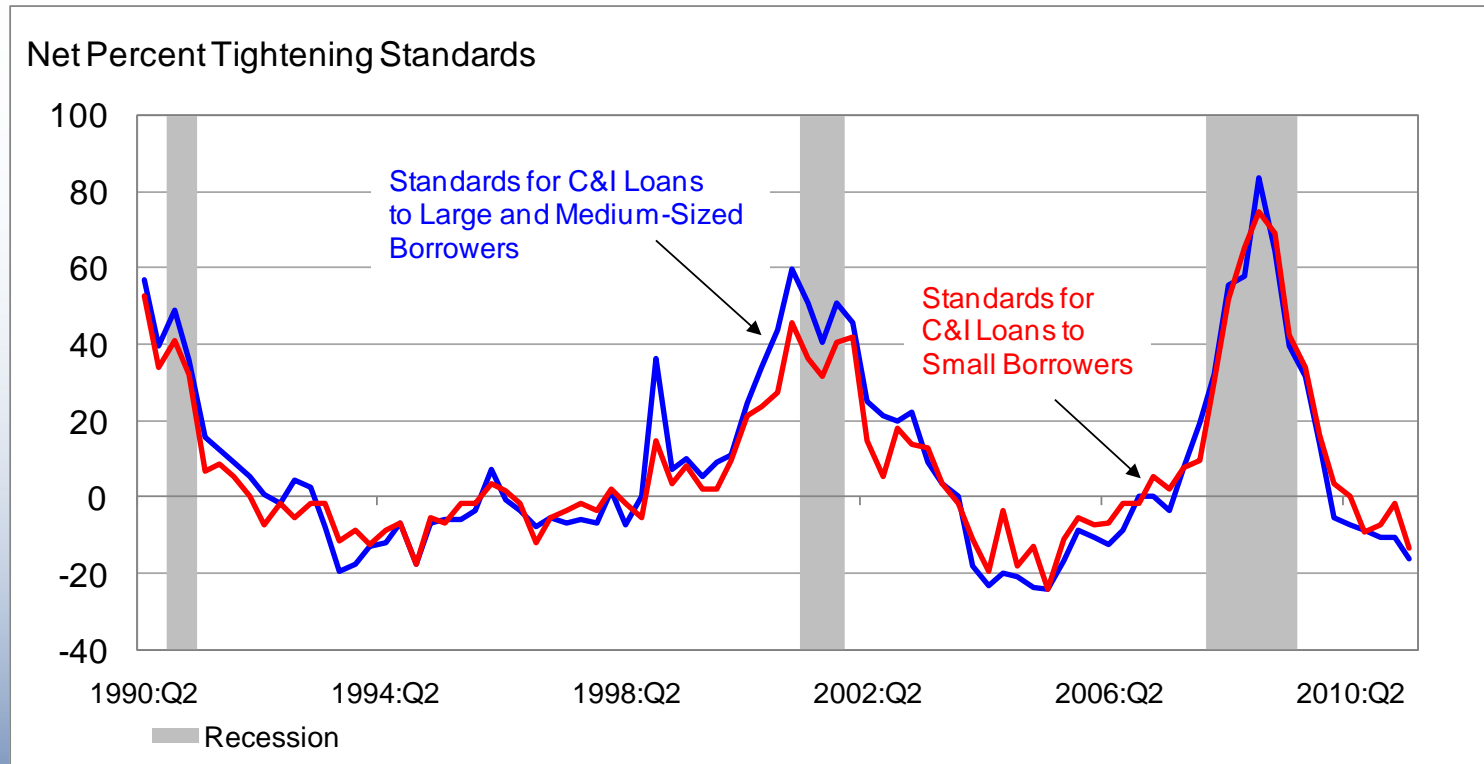
Note: C&I Loans were adjusted for inflation using the GDP deflator

Source: Federal Reserve Board, BEA, NBER / Haver Analytics

Figure 11

Bank Lending Standards for Commercial and Industrial Loans

1990:Q2 - 2011:Q2

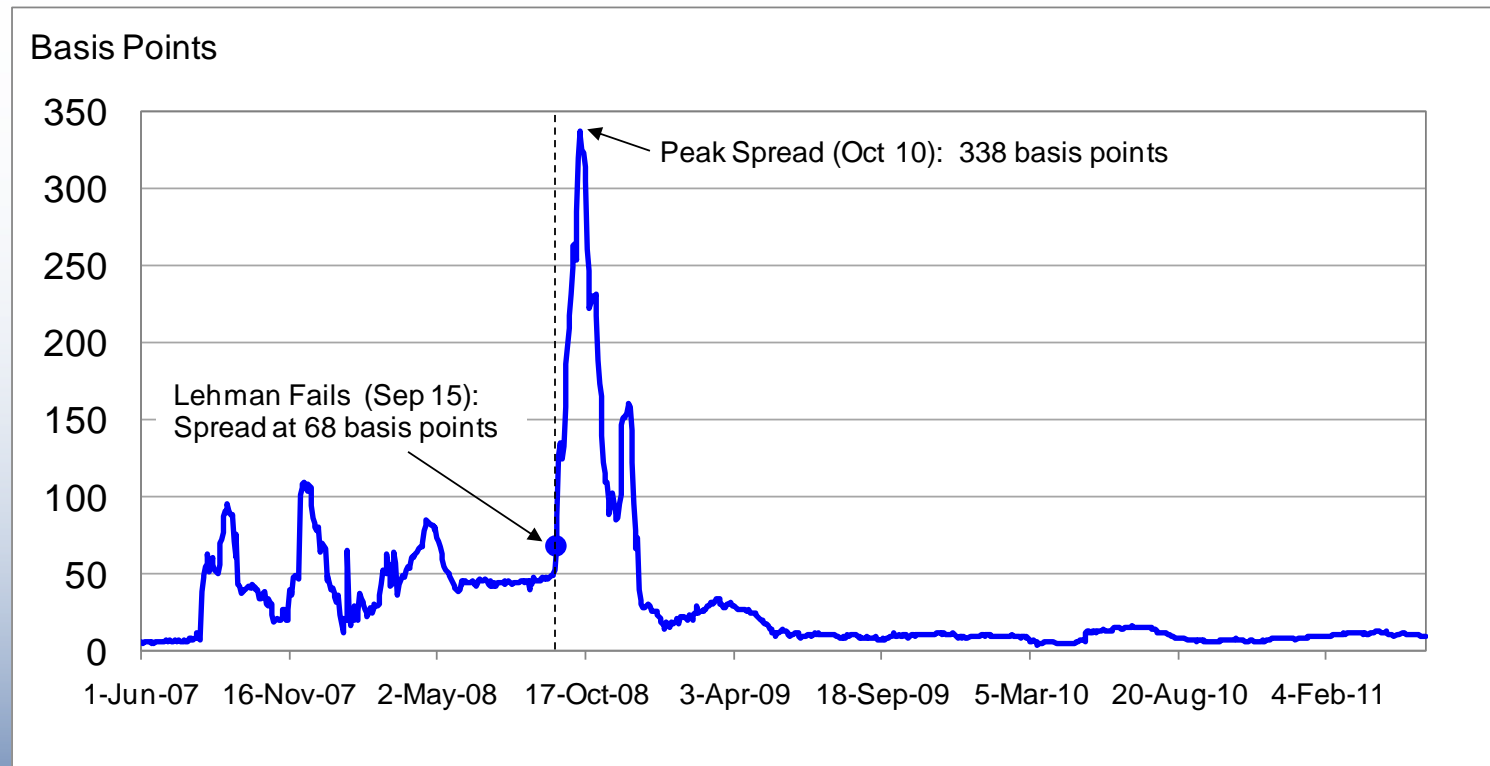


Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices, NBER / Haver Analytics

Figure 12

Spread: One-Month London Interbank Offered Rate (LIBOR) to Overnight Index Swap (OIS) Rate

June 1, 2007 - May 27, 2011



Source: Financial Times, Bloomberg / Haver Analytics