



E-coli, Repo Madness, and the Financial Crisis

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All bond prices plummeted (spreads rose) during the financial crisis, not just the prices of subprime-related bonds. These price declines were because of a banking panic in which institutional investors and firms refused to renew sale and repurchase agreements (repos)—short-term, collateralized, agreements that the U.S. Federal Reserve rightly used to count as money. Collateral for repos was, to a large extent, securitized bonds. Firms were forced to sell assets as a result of the banking panic, reducing all bond prices and creating losses. There is nothing mysterious or irrational about the panic. There were genuine fears about the locations of subprime risk concentrations among counterparties. This banking system (the “shadow” or “parallel” banking system)—repos based on securitization—is a genuine banking system, as large as the traditional, regulated banking system. It is of critical importance to the economy because it is the funding basis for the traditional banking system. Without it, traditional banks will not lend and credit will not be created.

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Unfortunately the subject [of the Panic of 1837] has been connected with the party

politics of the day. Nothing can be more unfavorable to the development of truth, on questions in political economy, than such a connection. A good deal which is false, with some admixture of truth, has been put forward by political partisans on either side. As it is the wish of the writer that the subject should be discussed on its own merits and free from such contaminating connection, he has avoided as much as possible all reference to the political parties of the day. (Appleton [1857], May 1841)

The current explanations [of the Panic of 1907] can be divided into two categories. Of these the first includes what might be called the superficial theories. Thus it is commonly stated that the outbreak of a crisis is due to a lack of confidence—as if the lack of confidence was not itself the very thing which needs to be explained. Of still slighter value is the attempt to associate a crisis with some particular governmental policy, or with some action of a country’s executive. Such puerile interpretations have commonly been confined to countries like the United States where the political passions of a democracy had the fullest sway Opposed to these popular, but wholly unfounded, interpretations is the second class of explanations, which seek to burrow beneath the surface and to discover the more ... fundamental causes of the periodicity of crises. (Seligman [1908] p. xi)

This paper is an edited version of a paper prepared as the basis of my testimony to the U.S. Financial Crisis Inquiry Commission, and originally entitled “Questions and Answers about the Financial Crisis.” It was the basis of remarks presented at the NABE Annual Meeting on October 11, 2009.

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The subject [of the Panic of 1907] is technical. Opinions formed without a grasp of the fundamental principles and conditions are without value. The verdict of the uninformed majority gives no promise of being correct If to secure proper banking legislation now it is necessary for a ... campaign of public education, it is time it were begun. (Vanderlip, 1908, p. 18)

Don't bother me with facts, son. I've already made up my mind.—Foghorn Leghorn

Yes, we have been through this before, tragically, many times.

U.S. financial history is replete with banking crises and the predictable political responses. Most people are unaware of this history, which we have repeated. A basic point of this note is that there is a fundamental, structural, feature of banking, which—if not guarded against—leads to such crises. Banks create money, which allows the holder to withdraw cash on demand. We need this type of bank product; but, as the world grows and changes, this money feature of banking reappears in different forms. The current crisis, far from being unique, is another manifestation of this problem, this time with a form of money called sale and repurchase agreements (“repos”). Subprime mortgages play a role in the crisis (I will liken them to e-coli later—a small amount can lead to big problems). But the problem is structural.

In this note, I pose and try to answer what I think are the most relevant questions about the crisis. I focus on the systemic crisis, not other attendant issues. I do not have all the answers by any means. But, I know enough to see that the level of public discourse is politically motivated and based on a lack of understanding, as it has been in the past, as the opening quotations indicate. The goal of this note is to help raise the level of discourse.

1. What Happened?

This question, though the most basic and fundamental of all, seems very difficult for most people to answer. They can point to the effects of the crisis, namely the failures of some large firms and the rescues of others. People can point to the amounts of money invested by the government in keeping some firms running. But they can't explain what actually happened, what caused these firms to get into trouble. Where and how were losses actually realized? What actually happened? The remainder of this short note will address these questions. I start with an overview.

There was a banking panic, starting on August 9, 2007. In a banking panic, depositors rush en masse to their banks and demand their money back. The banking system cannot possibly honor these demands because they have lent the money out or they are holding long-term bonds. To honor the demands of depositors, banks must sell assets. But only the U.S. Federal Reserve is large enough to be a significant buyer of assets.¹

Banking *means* creating short-term trading or transaction securities backed by longer term assets. Demand deposits are the leading example of such securities. The fundamental business of banking creates a vulnerability to panic because the banks' trading securities are short term and need not be renewed; depositors can withdraw their money, while assets (primarily loans) are longer term. However, panic can be prevented with intelligent policies. What happened in August 2007 involved a different form of bank liability, one unfamiliar to regulators and academics, who were not aware of the size or vulnerability of the new bank liabilities.

In fact, the bank liabilities that we will focus on are actually very old, but have not been quantitatively important historically. The liabilities of interest are sale and repurchase agreements, or “repos.” Before the crisis, trillions of dollars were traded in the repo market. The market was very liquid, like the market where goods are exchanged for checks (demand deposits). Repos and demand deposits are both forms of money. There have always been difficulties creating private money (like demand deposits), and this time around was no different.

The panic in 2007 was not observed by anyone other than those trading or otherwise involved in the capital markets because it was not like the previous panics in American history (like the Panic of 1907, or those of 1837, 1857, 1873 and so on) in that it was not a mass run on banks by individual depositors. Rather, it was a run by firms and institutional investors on financial firms. The fact that the run was not observed by regulators, politicians, the media, or ordinary Americans has made the events particularly hard to understand. It has opened the door to spurious, superficial, and politically expedient “explanations” and demagoguery.

¹Editor's note: See the article by Sack in this issue about the U.S. Federal Reserve's approach to unwinding the asset position that it took in response to the crisis.

As the economy transforms with growth, banking also changes. But, at a deep level, the basic form of bank liability has the same structure, whether it is private bank notes (issued before the Civil War), demand deposits, or sale and repurchase agreements. Bank liabilities are designed to be safe; they are short term, redeemable, and backed by collateral. However, they have always been vulnerable to mass withdrawals, or panics. This time the panic was in the repo market. But, before we come to that, we need to think about how banking has changed.

Americans frequently experienced banking panics from colonial days until legislation establishing deposit insurance was passed in 1933, effective in 1934. Government deposit insurance finally ended the panics that were because of runs on demand deposits, which allow you to keep money safely at a bank and redeem it for currency any time you want. The idea that you can redeem your deposits anytime you want is one of the essential features of making bank debt safe. Also, bank debt is backed by sufficient collateral in the form of bank assets.

Before the Civil War, the dominant form of money was privately issued bank notes; there was no government currency issued. That is, individual banks issued their own currencies. During the Free Banking Era, 1837–63, these currencies had to be backed by state bonds deposited with the authorities of whatever state the bank was chartered in. Bank notes were also redeemable on demand, and there were banking panics because sometimes the collateral (the state bonds) was of questionable value. This problem of collateral will reappear in 2007.

During the Free Banking Era, banking slowly changed, first in the cities and then nationally over the decades after the Civil War. The change was that demand deposits came to be a very important form of bank money. During the Civil War, the government took over the money business in that national bank notes (“greenbacks”) were backed by U.S. Treasury bonds, and there were no longer private bank notes. But banking panics continued because demand deposits were vulnerable to panics. Economists and regulators did not figure this out for decades. In fact, when panics because of runs on demand deposits were ended it was not owing to the insight of economists, politicians, or regulators. Deposit insurance was not proposed by President Roosevelt; in fact, he opposed it. Bankers opposed it. Economists decried

the moral hazard that would result from such a policy. Instead, deposit insurance was a populist demand to have the dominant medium of exchange protected. It is not an exaggeration to say that the quiet period in banking from 1934 to 2007, because of deposit insurance, was basically an accident of history.

Times change. Now, banking has changed again. In the last 25 years or so, there has been another significant change: a change in the form and quantity of bank liabilities that has resulted in a panic. This change involves the combination of securitization and the repo market. At root, this change has to do with the traditional banking system becoming unprofitable in the 1980s. During that decade, traditional banks lost market share to money market mutual funds (which replaced demand deposits) and junk bonds (which took market share from lending), to name the two most important changes. Keeping passive cash flows on the balance sheet from loans, when the credit decision was already made, became unprofitable. This led to securitization, which is the process by which such cash flows are sold. I discuss securitization below.

2. What has to be Explained to Explain the Crisis?

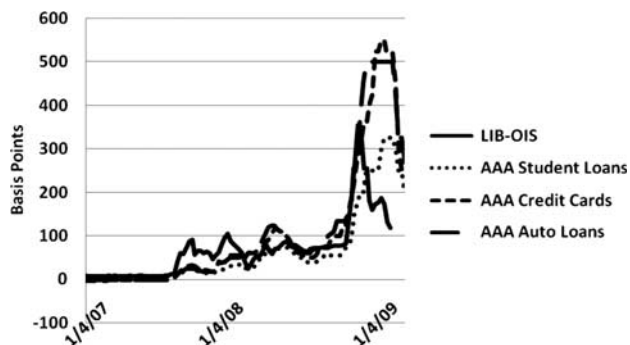
It is very important to set standards for the discussion. I think we should insist on three criteria.

First, a coherent answer to the question of what happened must explain why the spreads on asset classes completely unrelated to subprime mortgages rose dramatically. (Or, to say it another way, the prices of bonds completely unrelated to subprime mortgages fell dramatically.) Figure 1 shows the LIBOR-OIS spread, a measure of interbank counterparty risk, together with the spreads on AAA tranches of bonds backed by student loans, credit card receivables, and auto loans.² The units on the y-axis are basis points above or below LIBOR. The three types of bonds normally trade at spreads near or below LIBOR. Yet, in the crisis, they spiked dramatically upward, and they moved with the measure of bank counterparty risk. Why?

The outstanding amount of subprime mortgage-backed bonds was not large enough to cause a systemic financial crisis by itself. It does not explain Figure 1, nor does any other popular theory

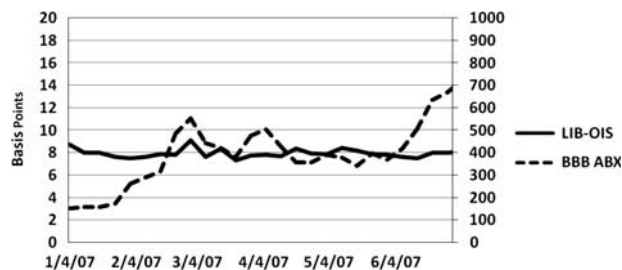
²OIS refers to the overnight indexed swap rate, which is considered to be less risky than LIBOR.

Figure 1. Spreads on Non-subprime AAA Bonds vs. Counterparty Risk



Source: Gorton and Metrick [2009].

Figure 2. Subprime Fundamentals (BBB ABX) vs. Counterparty Risk (LIB-OIS)



Source: Gorton and Metrick [2009]. LIBOIS is the LIBOR minus Overnight Indexed Swap spread. ABX refers to the spread on the BBB tranche of the ABX index. ABX spread on the right axis. Subprime will play an important role in the story later. But by itself, it does not explain the crisis.

(academic or otherwise). Let me repeat that another way. Common “explanations” are too vague and general to be of any value. They do not explain what actually happened. The issue is why *all* bond prices plummeted. What caused that?

This question does not imply that there are not other important issues that should be explored, as a matter of public policy. It does, however, mean that these other issues—whatever they are—are irrelevant to understanding the main event of the crisis.

Second, an explanation should be able to show exactly how losses occurred. This is a different question than the first question. Prices may go down, but how did that result in trillions of dollars of losses for financial firms?

Finally, a convincing answer to the question of what happened must include some evidence and not just be a series of broad, vague, assertions.

In what follows, I will try to adhere to these criteria.

3. Wasn't the Panic Owing to Subprime Mortgages Going Bad Because of House Prices Falling?

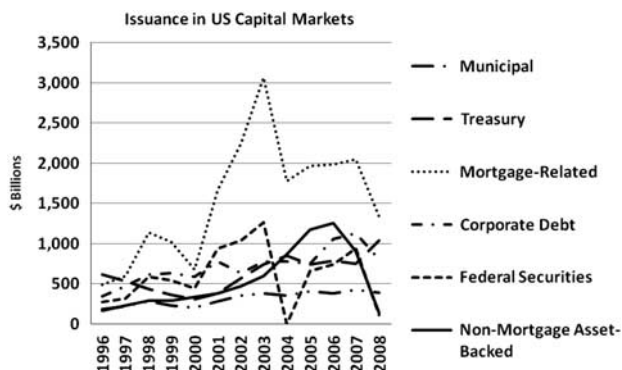
No. This cannot be the whole story. Outstanding subprime securitization was not large enough by itself to have caused the losses that were experienced. Further, the timing is wrong. Subprime mortgages started to deteriorate in January 2007, eight months before the panic in August. The dashed line in Figure 2 is the BBB tranche of the ABX index, a measure of subprime fundamentals. It is in the form of a spread, so when it rises it means that the fundamentals are deteriorating. The two axes are measured in basis points; the axis

on the right side is for the ABX. The other line, the one that is essentially flat, is the LIBOR minus OIS spread—a measure of counterparty risk in the banking system. It is measured on the left-hand axis. The point is this: Subprime started significantly deteriorating well before the panic, which is not shown here. Moreover, subprime was never large enough to be an issue for the global banking system. In 2007, subprime mortgage debt stood at about \$1.2 trillion outstanding, of which roughly 82 percent was rated AAA and to date has very small amounts of realized losses. Yes, \$1.2 trillion is a large number, but for comparison, the total size of the traditional and parallel banking systems is about \$20 trillion.

4. Isn't Securitization Bad Because IT Allows Banks to Sell Loans?

Holding loans on the balance sheets of banks is not profitable. This is a fundamental point. This is why the parallel or shadow banking system developed. If an industry is not profitable, the owners exit the industry by not investing; they invest elsewhere. Regulators can make banks do things, like hold more capital, but they cannot prevent exit if banking is not profitable. “Exit” means that the regulated banking sector shrinks, as bank equity holders refuse to invest more equity. Bank regulation determines the size of the regulated banking sector, and that is all. One form of exit is for banks to not hold loans but to sell the loans, and securitization is the selling of portfolios of loans. Selling loans—while news to some people—has been going on now for about 30 years without problems.

Figure 3. Issuance of Fixed Income Instruments in U.S. Capital Markets



Sources: U.S. Department of Treasury, Federal Agencies, Thomson Financial, Inside MBS & ABS, Bloomberg.

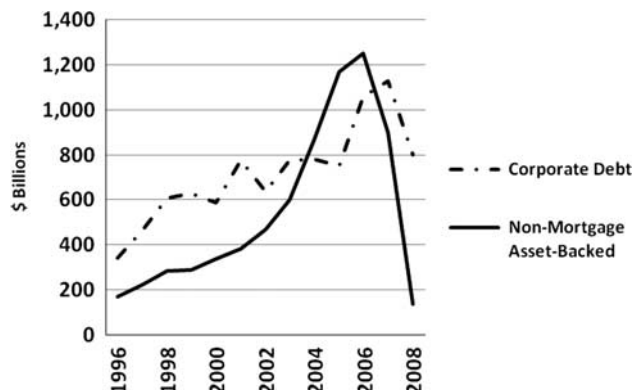
In securitization, the bank is still at risk because the bank keeps the residual or equity portion of the securitized loans and earns fees for servicing these loans. Moreover, banks support their securitizations when there are problems. No one has produced evidence of any problems with securitization generally; though there have been many such assertions. The motivation for banks to sell loans is profitability. In a capitalist economy, firms (including banks) make decisions to maximize profits. Over the last 25 years securitization was one such outcome. As mentioned, regulators cannot make firms do unprofitable things because private investors do not have to invest in banks. Banks will simply shrink. This is exactly what happened. The traditional banking sector shrank, and a whole new banking sector developed—the outcome of millions of individual decisions over a quarter of a century.

5. What is this New “Parallel Banking System” or “Shadow Banking System” or “Securitized Banking System”?

A major part of it is securitization. Never mind the details for our present purposes (see Gorton [2010] for details); the main point is that this market is very large. Figure 3 shows the issuance amounts of various levels of fixed-income instruments in the capital markets. The dotted line shows mortgage-related instruments, including securitization. It is the largest market.

Of greater interest perhaps is the comparison of the nonmortgage securitization (labeled

Figure 4. Non-mortgage ABS Issuance vs. Corporate Debt



Sources: U.S. Department of Treasury, Federal Agencies, Thomson Financial, Inside MBS & ABS, Bloomberg.

“Nonmortgage Asset-Backed” in the above figure) issuance amounts with the amount of all of U.S. corporate debt issuance. This is portrayed in Figure 4.

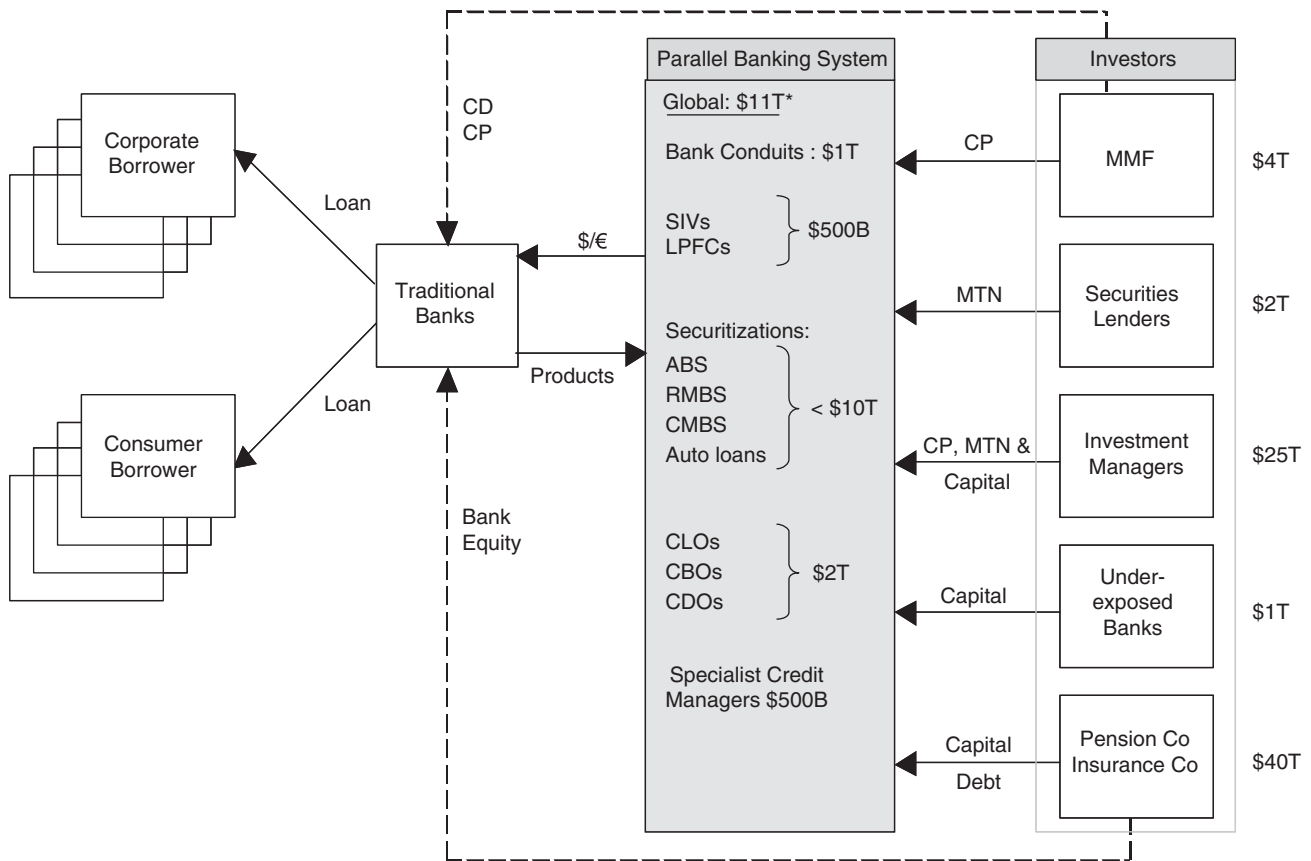
Figure 4 shows two very important points. First, measured by issuance, nonmortgage securitization exceeded the issuance of all U.S. corporate debt starting in 2004. Secondly, the figure shows the effects of the crisis on issuance: this market is essentially dead.

6. What is the Connection between the Parallel or Shadow Banking System and the Traditional Banking System?

The parallel or shadow banking system is essentially how the traditional, regulated, banking system is funded. The two banking systems are intimately connected. Recognizing this is very important because it means that without the securitization markets the traditional banking system is not going to function. Figure 5 shows how the two banking systems are related.

The figure shows how the traditional banking system funded its activities just prior to the crisis. The loans made to consumers and corporations, on the left side of the figure, correspond to the credit creation that the traditional banks are involved in. Where do they get the money to lend to corporations and consumers? The most straightforward way is through deposits and equity. Also, however, portfolios of traditional bank loans are sold as bonds to the various securitization vehicles in the parallel banking system (the shaded box in the middle). These vehicles are securitization, conduits,

Figure 5. Traditional Banking Funding via the Parallel Banking System (pre-Crisis numbers)



Source: Gordian knot

structured investment vehicles, limited purpose finance corporations, collateralized loan obligations, collateralized bond obligations, collateralized debt obligations, and specialist credit managers. Like the traditional banks, these vehicles are intermediaries. They in turn are financed by the investors on the right side of the figure through capital, debt, medium-term notes, and commercial paper.

7. But Weren't These Securitizations Supposed to be Distributed to Investors? Why Did Banks Keep So Much of This on Their Balance Sheets?

Above, we discussed the supply of securitized products. What about the demand? There is a story that is popular called "originate-to-distribute," which claims that securitizations should not end up on bank balance sheets. There is no basis for this idea. In fact, there is an important reason for why banks did hold some of these bonds: these bonds were needed as collateral for a form of depository banking. The other part of the new banking sector

involves the new "depositors." This part of the story is not shown in the figure above.

Institutional investors and large nonfinancial firms have demands for checking accounts; but, unlike most household depositors, there is no safe banking account because there is no checking account insured by the FDIC if you want to deposit \$100 million. So, where does an institutional investor or nonfinancial firm who wants to earn interest, have immediate access to the money, and be assured that the deposit is safe go to deposit money?

The answer is that the institutional investor goes to the repo market. For concreteness, let us use some names (though the example is completely fictitious). Suppose the institutional investor is Fidelity, and Fidelity has \$500 million in cash that will be used to buy securities, but not right now. Right now, Fidelity wants a safe place to earn interest but be liquid in case the opportunity for buying securities arises. Fidelity goes to Bear Stearns and "deposits" the \$500 million *overnight* for interest. What makes this deposit safe? The

safety comes from the collateral that Bear Stearns provides. Bear Stearns holds some asset-backed securities that are earning LIBOR plus 6 percent. They have a market value of \$500 million. These bonds are provided to Fidelity as collateral. Fidelity takes physical possession of these bonds. As the transaction is overnight, Fidelity can get its money back the next morning, or it can agree to “roll” the trade. Fidelity earns, say, 3 percent.

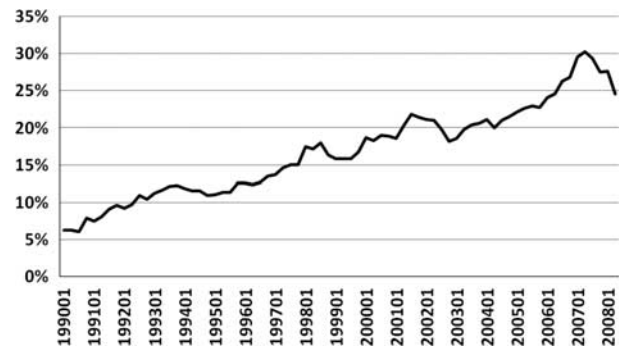
Just like banking throughout history, Bear has, in this example, borrowed at 3 percent and “lent” at 6 percent. In order to conduct this banking business, Bear needs collateral (that earns 6 percent in the example)—just like in the Free Banking Era, when banks needed state bonds as collateral. In the last 25 years or so, money under management in pension funds and institutional investors—and money in corporate treasuries—has grown enormously, creating a demand for this kind of depository banking.

How big was the repo market? No one knows. The U.S. Federal Reserve only measures repos done by the 19 primary dealer banks that it is willing to trade with. So, the overall size of the market is not known. I roughly guess that it is at least \$12 trillion; the size of the total assets in the regulated banking sector is \$10 trillion. The fact is, however, that the repo market was never properly measured, so we will likely never know for sure how big it was. There is indirect evidence, however, that we can bring to bear on this question.

One thing we can look at is how big the broker-dealer banks were compared with the traditional banks. Broker-dealer banks to a large extent were the new depository institutions. As repos require collateral, the banks would need to grow their balance sheets to hold the collateral needed for repos. Broker-dealers are essentially the old investment banks. Although this division is not strictly correct, it gives some idea. Figure 6 shows the ratio of the total assets of broker-dealers to total assets of the regulated depository banks.

You can see in the figure that the ratio of total assets of broker-dealer banks to traditional banks was about 6 percent in 1990, and had grown to about 30 percent just before the crisis onset. In the meantime, as we saw above, securitization was growing enormously over the same period. Why would dealer banks be growing their balance sheets if there was not some profitable reason for this? My answer is that the new depository business using repos was also growing.

Figure 6. Ratio of broker-dealers' Total Assets to Banks' Total Assets



Source: Flow of Funds data; Gorton and Metrick [2009a].

Now, of course there is the alternative hypothesis, that the broker-dealer banks were just irresponsible risk-takers. They held all these long-term assets financing them with short-term repos just to take on risk. (Of course there are much easier ways to take on (much more) risk.) As a theory of the crisis this “theory” is hard to understand. It is a lazy “explanation” in the form of Monday morning quarterbacking. Further, this view, of course, ignores the fact that someone must be on the other side of the repo. Who were the depositors? What was their incentive to engage in this if it was just reckless bankers?

8. Why Doesn't the Repo Market Just Use Treasury Bonds for Collateral?

A problem with the new banking system is that it depends on collateral to guarantee the safety of the deposits, but there are many demands for such collateral. Foreign governments and investors have significant demands for U.S. Treasury bonds, U.S. agency bonds, and corporate bonds (about 40 percent is held by foreigners). Treasury and agency bonds are also needed to collateralize derivatives positions. Further, they are needed to use as collateral for clearing and settlement of financial transactions. There are few AAA corporate bonds. Roughly speaking (which is the best that can be done, given the data available), the total amount of possible collateral in U.S. bond markets, minus the amount held by foreigners is about \$16 trillion. The amount used to collateralize derivatives positions (according to ISDA) is about \$4 trillion. It is not known how much is needed for clearing and settlement. Repos need, say, \$12 trillion.

The demand for collateral has been largely met by securitization, a 30-year old innovation that allows for efficient financing of loans. Repos are to a significant degree based on securitized bonds as collateral, a combination called “securitized banking.” The shortage of collateral for repos, derivatives, and clearing/settlement is reminiscent of the shortages of money in early America, which is what led to demand deposit banking.

9. How Do We Know There Was a “Panic,” and What Does This Have to Do with Repo?

Here is where we come to the question of “what happened.”

There is another aspect to repo that is important: “haircuts.” In the repo example I gave above, Fidelity deposited \$500 million of cash with Bear Stearns and received as collateral \$500 million of bonds, valued at market value. Fidelity does not care if Bear Stearns becomes insolvent because Fidelity in that event can unilaterally terminate the transaction and sell the bonds to get the \$500 million: repos are not subject to Chapter 11 bankruptcy.

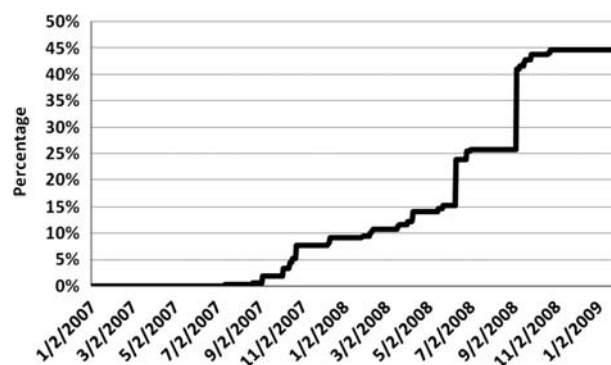
Imagine, however, that Fidelity, getting a little nervous about the future value of the bonds, said to Bear: “I will deposit only \$400 million and I want \$500 million (market value) of bonds as collateral.” This would be a 20 percent haircut. In this case, Fidelity is protected against a \$100 million decline in the value of the bonds, should Bear become insolvent and Fidelity want to sell the bonds.

Note that a haircut requires the bank (Bear) to raise money. In the above example, suppose the haircut was zero to start with, but then it becomes positive, say that it rises to 20 percent. This is essentially a withdrawal from the bank of \$100 million. Bear turns over \$500 million of bonds to Fidelity, but only receives \$400 million. This is a withdrawal of \$100 million from the bank. How does Bear Stearns finance the other \$100 million? Where does the money come from? We will come to this shortly.

Figure 7 shows that prior to the panic, haircuts on all assets were zero for dealer banks.

For now, keep in mind that an increase in the haircuts is a withdrawal from the bank. Massive withdrawals are a banking panic. That is what happened. Similar to the pre-Federal Reserve panics, there was a shock that by itself was not large: house prices fell. But, the distribution of the risks (where the subprime bonds were, in which

Figure 7. Average Repo Haircut on Structured Debt



Source: Gorton and Metrick [2009a].

firms, and how much) was not known. Here is where subprime debt plays its role. Elsewhere, I have likened subprime to e-coli (see Gorton [2009 and 2010]). Millions of pounds of beef might be recalled because the location of a small amount of e-coli is not known for sure. If the government did not know which ground beef contained the e-coli, there would be a panic: people would stop eating ground beef, and McDonald’s, Burger King, Wendy’s and so on would go bankrupt. That is an accurate analogy to what happened in the financial crisis.

The evidence is in Figure 7, which shows the increase in haircuts for securitized bonds (and other structured bonds) starting in August 2007.

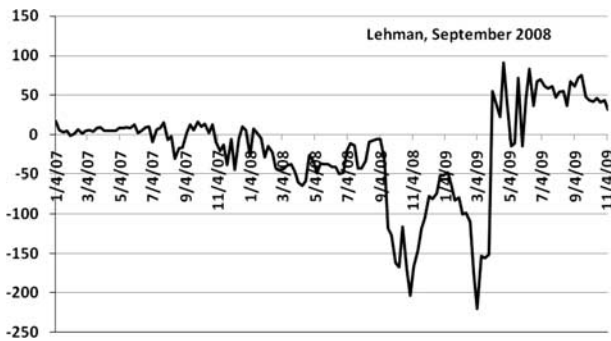
The figure is a picture of the banking panic. We don’t know how much was withdrawn because we don’t know the actual size of the repo market. But, to get a sense of the magnitudes, suppose the repo market was \$10 trillion and that repo haircuts rose from zero to an average of 20 percent. Then the banking system would need to come up with \$2 trillion, an impossible task.

10. Where Did the Losses Come from?

Faced with the task of raising money to meet the withdrawals, firms had to sell assets. There were no investors willing to make sufficiently large new investments, on the order of \$2 trillion. In order to minimize losses, firms chose to sell bonds that they thought would not drop in price a great deal, bonds that were not securitized bonds, and bonds that were highly rated. For example, they sold AAA-rated corporate bonds.

These kinds of forced sales are called “fire sales”—sales that must be made to raise money. Even if the sale causes price to fall because so much

Figure 8. 5 year AA-AAA Industrials: Spread Difference (bps)



Source: Gorton and Metrick [2009].

is offered for sale, the seller has no choice but to take the low price. The low price reflects distressed, forced, sales, not the underlying fundamentals. Here is one example of the evidence for this phenomenon. Normally, AAA-rated corporate bonds would trade at higher prices (lower spreads) than, say, AA-rated bonds. In other words, these bonds would fetch the most money when sold. However, when all firms reason this way, it doesn't turn out so nicely.

Figure 8 shows the interest rate spread between AA-rated corporate bonds and AAA-rated corporate bonds, both with five-year maturities. This spread should always be positive, unless so many AAA-rated corporate bonds are sold that the spread must rise to attract buyers. That is exactly what happened!

The figure is a snapshot of the fire sales of assets that occurred because of the panic. To be concrete, suppose the bond was purchased for \$100, and then was sold, hoping to fetch \$100 (its market value just before the crisis onset). Instead, when all firms are selling the AAA-rated bonds, the price may be, say, \$90—a loss of \$10. This is how actual losses can occur due to fire sales caused by the panic.

The development of the parallel banking system did not happen overnight. It has been developing for three decades, and it especially grew in the 1990s; but bank regulators and academics were not aware of these developments. Regulators did not measure or understand the parallel banking system or the repo market. Few academics were aware of these markets, much less studied them. The incentives of regulators and academics did not lead them to look hard and ask questions. There was a failure of curiosity.

11. Summary

The important points are:

- As traditional banking became unprofitable in the 1980s—because of competition from, most importantly, money market mutual funds and junk bonds—securitization developed. Also, Regulation Q, which limited the interest rate on bank deposits, was lifted. Bank funding became much more expensive. Banks could no longer afford to hold passive cash flows on their balance sheets. Securitization is an efficient, cheaper, way to fund the traditional banking system. Securitization became sizable.
- The amount of money under management by institutional investors has grown enormously. Also, nonfinancial firms hold substantial amounts of cash. These investors have a need for a short-term, safe, interest-earning, transaction account that resembles demand deposits: repos. The repo market also grew enormously and came to use securitization as an important source of collateral.
- Repos are money. They were counted in M3 by the Federal Reserve System, until M3 was discontinued in 2006. But, like other privately created bank money, it is vulnerable to a shock, which may cause depositors to rationally withdraw en masse—an event that the banking system (in this case the shadow banking system) cannot withstand alone. Forced by the withdrawals to sell assets, bond prices plummeted and firms failed or were bailed out with government money.
- In a bank panic, banks are forced to sell assets, which causes prices to go down, reflecting the large amounts being dumped on the market. Fire sales cause losses. The fundamentals of the subprime mortgage market were not bad enough by themselves to have created trillions in losses globally. The mechanism of the panic—like that created by detection of small amounts of e-coli—triggered the fire sales. As a matter of policy, such firm failures should not be caused by fire sales.
- The crisis was not a one-time, unique, event. The problem is structural. The explanation for the crisis lies in the structure of private transaction securities that are created by banks. This structure, while very important for the economy, is subject to periodic panics if there are shocks that cause concerns about

counterparty default. There have been banking panics throughout U.S. history, with private bank notes, with demand deposits, and now with repos. The economy needs repo markets and the parallel banking system, but policy must recognize that the resultant liabilities are vulnerable.

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