The Financial Panic[1]

This topic is an analysis of the financial panic of September 2008. “Panic” is an archaic term that describes what we now call recessions (and called depressions in between). It does seem, however, to accurately describe the events that follow and is still sometimes used when discussing dramatic downturns in financial markets. We are especially interested in how the crisis in housing spread (or propagated) to the rest of the economy.

These notes follow the following sources:

Gorton, Gary, and Andrew Metrick. 2012. “Getting Up to Speed on the Financial Crisis: A One-Weekend-Reader’s Guide.” *Journal of Economic Literature*, 50(1): 128-50.

Mizen, Paul. 2008. “The Credit Crunch of 2007-2008: A Discussion of the Background, Market Reaction, and Policy Responses.” *Federal Reserve Bank of St. Louis Review,* 90(5), 531-67.

“The Financial Crisis: A Timeline of Events and Policy Actions.” *Federal Reserve Bank of St. Louis*, Updated Frequently.

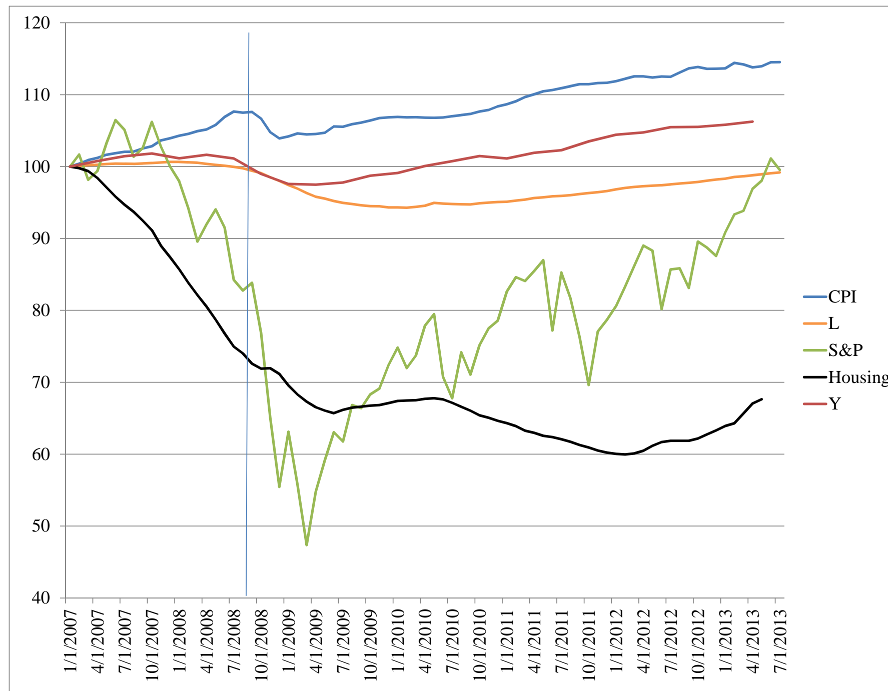
The focus of this topic is to chronicle the events surrounding the financial crisis of Fall 2008. Before looking at specific events, it is useful to examine the following macroeconomic time series:

The five variables are employment, the CPI for all urban consumers, real GDP, the Case Shiller 20 City Housing Index, and the SP 500. the latter two variables are adjusted for inflation using the CPI. All variables are normalized so that their January 2007 values equal 100. The vertical line represents September 2008.

Note that housing prices and stock prices were both falling prior to the financial panic. GDP and employment, however, were relatively stable prior to the panic. Only afterwards did they begin

[1]These are undergraduate lecture notes. They do not represent academic work. Expect typos, sloppy formatting, and occasional (possibly stupefying) errors.

Figure 1: Key Macroeconomic Variables (January 2007=100)



a steep decline. Also note that employment did not recover to its pre-panic levels until 2013. Were we to adjust for population growth, it would still be below its January 2007 level. Finally, note that deflation also followed the panic.

The Great Moderation and the Global Savings Glut

Mizen provides some background on the massive expansion of credit, including in the subprime mortgage market, that triggered the financial crisis. Notably, he is skeptical of the idea that loose monetary policy (keeping interest rates too low for too long) was a major factor. He cites the experience of Europe where interest rates were not as low as in the United States yet where a credit bubble occurred anyway. Mizen provides two contributing factors for the credit bubble that this course has not previously discussed.

First, Mizen discusses the *Great Moderation*. This event refers to a general stabilization of the U.S. economy that begin after the Volker Recession in the early eighties. The Great Moderation featured reduced inflation and inflation volatility, as well as more stable GDP growth rates and

unemployment. The Great Moderation reduced aggregate uncertainty in the economy which in turn reduced the risk that individual agents faced. This may have incentivized creditors to extend additional credit. Several causes of the Great Moderation have been proposed:[2]

i) Better monetary policy. Since 1979, there is empirical and anecdotal evidence that the Federal Reserve has more aggressively targeted measures of inflation (i.e. what inflation threatens, the Fed raises interest rates).

ii) Luck may also have played a part. The economy may have simply been hit by fewer and smaller exogenous macroeconomic shocks.

iii) As the economy stabilized, firms may have had less incentive to pay the costs associated with either changing their prices or surveying market conditions. This resulted in more stable prices, providing positive feedback that accelerated the Great Moderation.

The second new cause is the *Global Savings Glut*. In 1997, several emerging Asian economies suffered a severe currency crisis where depreciating currencies caused a credit crunch similar to those discussed in our model of credit shocks. [As currencies depreciated, foreign denominated debt increased in value, increasing default which tightened access to additional credit. This caused further depreciation...] To prevent another currency crisis, these economies began to hold larger reserves of U.S. Treasury Bonds and Bills. This additional demand for Treasury Bonds reduced long term interest rates which further increased access to credit in the United States.

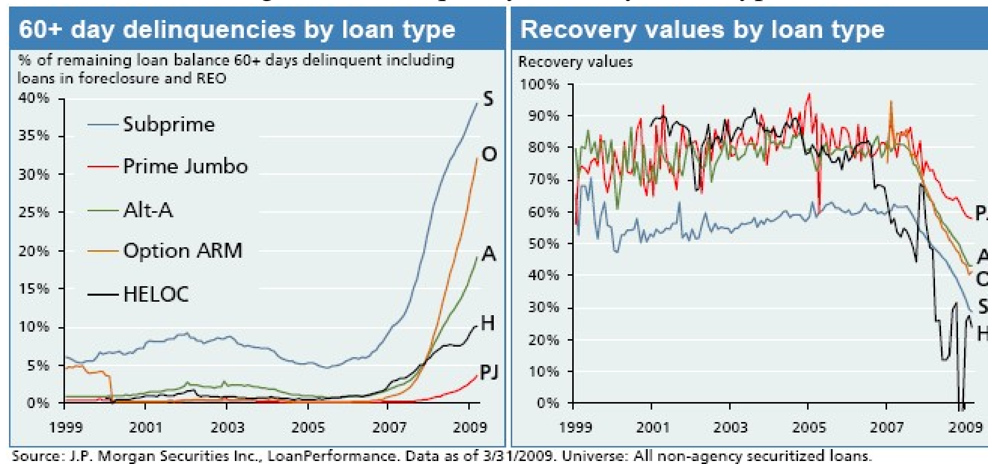
The Global Savings Glut represents emerging countries lending to developed nations. The U.S. current account deficit increased dramatically. Lower interest rates decreased U.S. savings rates from 6% to less than 1% from 1993 to 2006 (see Figure 1 in Mizen).

The First Major Signs of Trouble: Subprime Defaults

The first signs of trouble were increases in delinquencies in the subprime mortgage market beginning in early 2007. Subprime delinquencies of at least 60 days start increasing from their range of 5-10% to almost 40% by 2009.

[2] We will leave open the question of whether or not the Great Moderation is ongoing, or if it ended with in 2007-08.

Figure 2: Delinquency Rates by Loan Type



Other risky types of mortgages also see dramatically higher default rates. Alt-A loans, those made to borrowers with good credit but questionable income, rise to nearly 20%. Option-ARMS, loans that often offered low initial "teaser rates" increase to more than 30%.[3]

Given the volume and nature of subprime lending, it is not surprising that delinquencies eventually rose. What is less obvious is why the steep increase began early in 2007. There are several factors:

i) To entice borrowers, many subprime loans (such as Option-ARMS) offered interest rates that were initially at very low rates. These introductory (teaser) rates began to expire in large amounts.

ii) The Fed had begun to raise its interest rate target which partially was passed onto long-term mortgage rates.

iii) As interest rates rose, ARM loans re-set at higher rates.

iv) Many borrowers exhausted their asset holdings.

v) Declining/flat home price prevented further equity cash outs.

[3]Lenders offered sub-market initial rates in order to attract borrowers. These loans typically rest to much higher rates after an initial introductory period. Sometimes, they included significant prepayment penalties.

Initially, increased delinquency rates did not seem to have significant effects on the broader economy. Using the S&P 500 as a (very) rough approximation of the private sector's perception of the macroeconomy, the index would still be near record levels as late as October 2007. Likewise, real GDP would not peak until Q42007.

As delinquencies rose, agents exposed to mortgage risk obviously began to suffer substantial losses. At the same time, the decline in housing prices was accelerating, reducing the ability of mortgage debt holders to recover some of their losses through foreclosure. The second panel of Figure 1 shows that falling home prices dramatically reduced the recovery values. For subprime loans, only about 30% of the loan value was, on average, recoverable by 2009.

In February 2007, concerned about their risk exposure, Freddie Mac announced that they were tightening their standards for which loans they would buy in the secondary mortgage market.

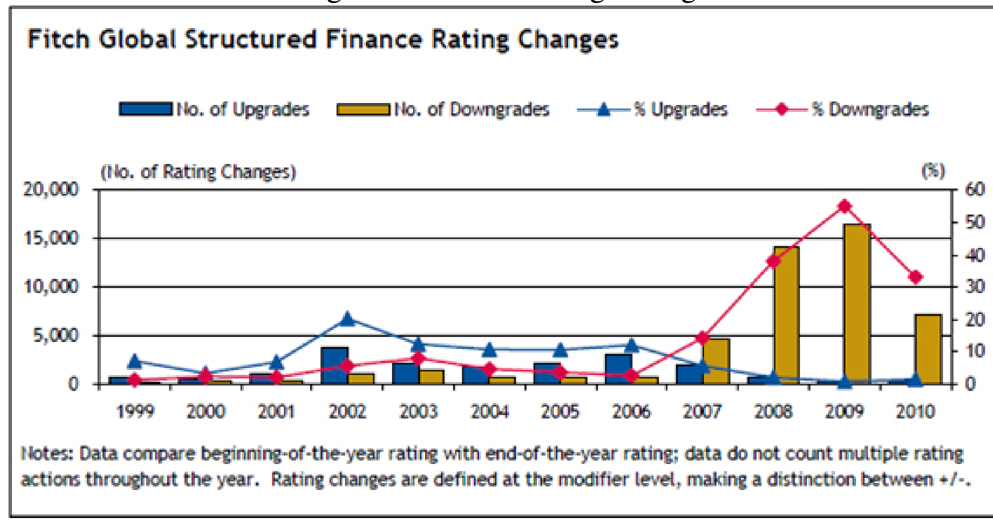
In April 2007, New Century Financial, a major subprime mortgage specialist filed for bankruptcy. By May 2007, markets began to appreciate the crisis in subprime lending. Ratings agencies began to downgrade the credit worthiness of assets backed by subprime mortgages.

In the Summer of 2007, rating agencies began downgrading both the ratings on subprime mortgage backed securities and on subprime lenders themselves. This was an early sign that financial markets were reevaluating risk, a trend that would soon accelerate with dire consequences for the macroeconomy.The following chart shows Fitch's rating changes for all securities. Over half are downgraded in 2009. Most of these were MBSs.[4]

In January 2008, Bank of America purchased the troubled subprime lender Countrywide. Countrywide had been among the largest subprime lenders and had experienced a bank run on August 17, 2007. Its downfall was a combination of incompetence and alleged corruption (*i.e.* misleading shareholders). Its former CEO, Angelo Mozilo, was the subject of a long criminal investigation but ultimately avoided prosecution.

[4]Source: Capital Markets Report. May 27, 2011. *National Association of Insurance Commisioners*

Figure 3: Fitch's Rating Changes



Source: Fitch Ratings Global Structured Finance 2010 Transition and Default Study, March 24, 2011.

Propagation Into the Broader Financial Sector

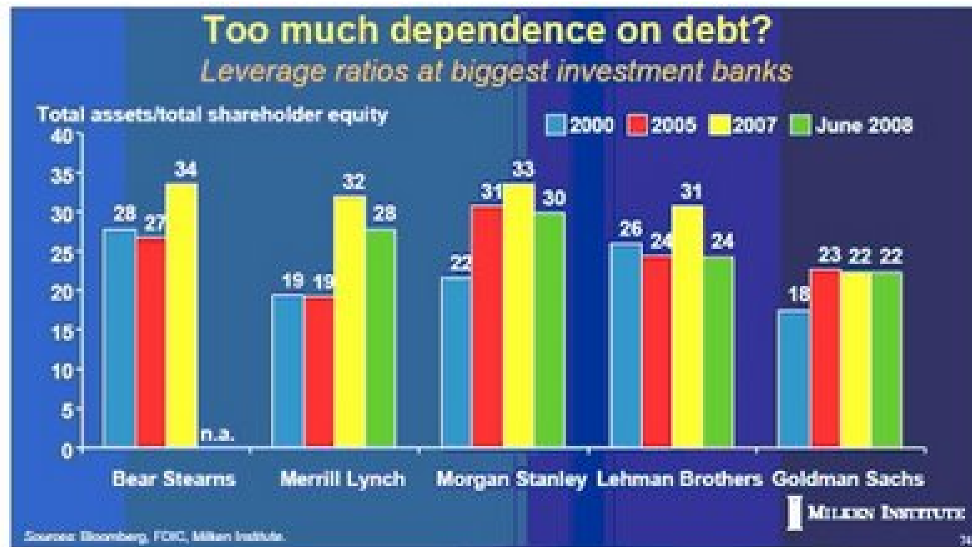
Through 2007, the firms that failed due to the growing subprime mortgage crisis were generally directly tied to the mortgage market. During the housing boom, however, many other firms purchased MBSs, and were thus exposed to mortgage risk. These included investment banks which help facilitate large scale lending in the general economy.

Many financial institutions were buying MBSs on leverage, allowing the value of their MBS risk to far exceed their assets A fairly small decline in MBS value could thus push these firms into bankruptcy. In order to leverage themselves, these firms typically issue *Asset Backed Commercial Paper* (ABCP), which is corporate debt. In this case, the MBSs acted as collateral. The following chart illustrates the leverage ratios at the five then independent U.S. investment banks:[5]

ABCP is typically short-term debt that is repeatedly rolled over whether new debt is issued to pay off maturing debt. The equivalent of a bank run occurs if the financial institution is unable to find additional buyers in order to roll over its ABCP debt. It is also similar to sovereign debt crises where governments find themselves suddenly unable to find buyers for their new debt. If this occurs, there are two possible outcomes:

[5]Taken from the blog *Cause for Depression*, "Leverage Unbound at the Investment Banks,"*10/15/08*.

Figure 4: Delinquency Rates by Loan Type



i) The firm must use its asset holdings to pay off its debt.

ii) If i) is not possible, then the financial institution will fail. In this case, financial markets are likely to adjust their perceptions of riskiness upwards and restrict access to credit. Negative credit effects (higher credit spreads) are likely to occur.

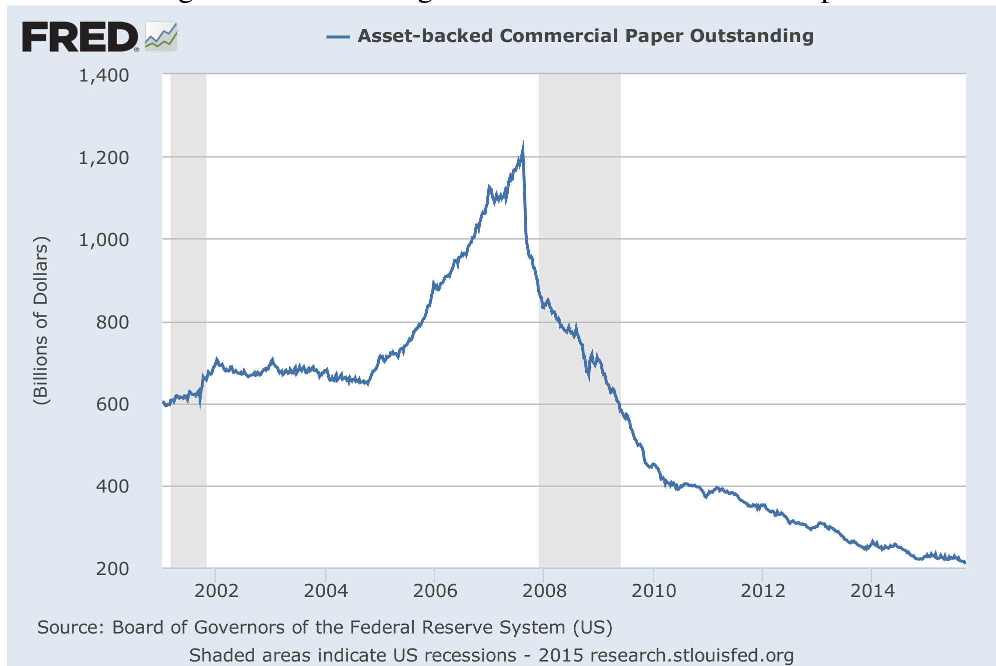
The increased delinquencies in the subprime mortgage market caused financial markets to increase their observed aversion to risk. They now perceived MBSs as riskier than average, and more correlated with each other, which makes it harder to aggregate this risk away. It therefore became more difficult for financial institutions to roll over their ABCP based debt.

In mid-2007, ABCP fell by about $\frac{1}{3}$. (also see Figure 5 in Mizen). The following table from the Federal Reserve shows that this decline has yet to stop. It represents important evidence that access to credit did dry up in response to the crisis:

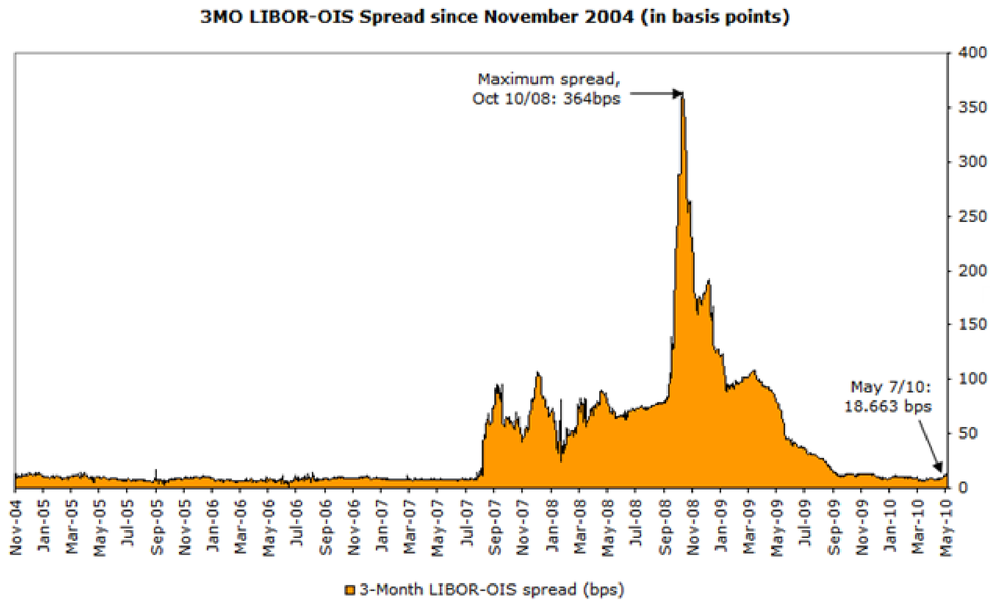
A common measure of credit spreads is the difference between LIBOR, a rate at which banks lend to each other (and which ARM loans are often based) and a relatively risk free rate.[6] The

[6] A recent scandal over rate manipulation calls into question the reliability of LIBOR.

Figure 5: Outstanding Asset Backed Commercial Paper



following shows this credit spread:[7]



Consistent with our theoretical model of credit, credit spreads prior to the crisis were quite

[7] Taken from William R. Horton, Jr., writing for *MD Physician Services*, 5/7/10.

small, about 10 basis points (0.1%). In the aftermath, however, they jump to a very high 364 basis points by 10/10/08. This represents a major contraction of credit in the economy.

Financial institutions began to suffer losses based on their holdings of subprime MBSs. The largest losses occurred at Citigroup ($46.40 billion, see Table 1 in Mizen), Merrill Lynch ($36.80 billion), UBS ($36.70 billion), and AIG ($20.23 billion). Initially, these financial institutions were able to bear these losses without failing.

These loses did have adverse effects through the credit channel. Consider the effects on the access to credit when financial re-price risk:

i) Lenders apply tougher standards for new loans.

ii) Some lenders become dissatisfied with the level of debt that they are holding. In order to improve their balance sheet, they may shed some of their existing loans. This may take the form of calling in outstanding loans (when legally possible), reducing existing lines of credit, and no longer allowing financial institutions to roll over their ABCP.

This story is not limited to the United States. Similar re-pricing of risk were occurring in many other advanced economies.

Northern Rock is an English Commercial Bank that was heavily leveraged with subprime backed securities. In February 2008, as defaults increased, its losses drove Northern Rock into bankruptcy. Eventually, the British government had to nationalize the bank at a cost of 25 billion pounds.

Bear Stearns

The contraction of credit in 2007 triggered talk of an impending recession. In early 2008, however, it was not obvious that the economy would enter a recession. The Dow Jones Industrial Average had begun to decline (from about 14,100 in October 2007 to 11,900 in early March 2007), but the effects of tighter credit on GDP and unemployment had not yet materialized.

Bear Stearns was heavily leveraged in order to purchase MBSs, more than 35-1 according to *Fortune*. As rumors circulated about the firm's liquidity, agents became unwilling to further roll over Bear Stearn's ABCP. The firm lacked the assets to pay off its debt and faced bankruptcy.

The Federal Reserve feared a massive contraction of credit, if Bear Stearns failed. It therefore devised a two part solution:

i.) It accepted some of Bear Stearn's MBSs as collateral for a $29 billion loan.

ii.) It arranged for Bear Stearn's sale to JPMorgan Chase at a reduced price (eventually $10 per share compared to over $130 per share, which was its 52 week high.). As part of the deal, JP Morgan was exposed only to the first $1 billion of Bear's losses, the Fed assumed an additional $29 billion in risk.

The Fed's actions appear to have mitigated any broader adverse effects from Bear Stearn's collapse. Nevertheless, the Fed's actions remain controversial. The Dow did not decrease after Bear Stearns collapse (keep in mind that the Dow is, at best, a flawed measure of macroeconomic health). There are several potential downsides:

i.) The Fed assumed $29 billion in risk from the loan. Although this loan has been repaid, it was far from clear at the time that it was a good bet.

ii.) Critics argued that the Fed's actions introduced moral hazard into the economy where future lenders will be encouraged to lend recklessly with the expectation that future losses would be borne by the public while profits would be retained by the private sector. This moral hazard was mitigated, however, because many top executives lost their positions as part of the collapse.

iii) By preserving a failed lender (albeit as part of JP Morgan), the Fed was reducing the efficiency of the free market.

Fannie and Freddie

Recall that the GSEs bore large amounts of the risk associated with mortgage debt both by holding MBSs on prime and near-price securities and by insuring payment on MBSs that they created and then sold. Fannie and Freddie supported more than half of the $12 trillion U.S. mortgage market. As delinquencies rose, Fannie and Freddie's began to suffer substantial losses. In July 2008, the GSEs appeared to be unable to raise $75 billion in additional funding needed to continue operations as normal. Both GSEs faced bankruptcy.

Much of the private sector had long believed that the GSEs operated with an implicit guarantee of government intervention in the event of a crisis. On July 14, 2008, the Treasury Department confirmed this guarantee by extending a credit line of $300 billion. Later that month, Congress passed legislation giving the Treasury Department additional authority to support the GSEs.

In September 2008, the Federal Housing Agency Placed Fannie and Freddie into conservatorship. They remain there.

The debate over the Treasury Department's intervention mimics that of the Fed's involvement in Bear Stearns. Had the GSEs failed, it would have crippled the secondary mortgage market, greatly restricting access to credit. The arguments against intervention include the potential losses associated with conservatorship and moral hazard.

[Note: At this point, the Mizen paper is published and does not recount the events that follow.] Note that Table 1 of Gorton and Metrick provides a longer timeline.

AIG

The American Insurance Group (AIG) is one of the world's largest insurers. One type of insurance that it sells is the guaranteeing of payment on private label MBSs. recall that private label MBSs include those based on subprime loans. As delinquencies rose, so did the claims paid out by AIG, as well as its losses.

On September 16 2008, faced with AIG's failure, the Fed authorized a loan of $85 billion to AIG.

The existence of stable insurance markets limits agents' exposure to risk. The Fed feared that AIG's failure would de-stabilize insurance markets and accelerate the re-pricing of risk that was already starting to drag the macroeconomy downward.

Lehman Brothers

Many macroeconomists view the collapse of Lehman Brothers, and the lack of a bailout, as the demand shock that triggered the current recession which has been amplified by tighter credit.

By September 2008, the economy was deteriorating. It still was not clear, however, that a recession would occur and few forecasters were anticipating a severe recession. At this time, the Dow was still over 11,000.

The source of Lehman's collapse is similar to that of Bear Stearns. Highly leveraged in order to purchase MBSs, Lehman was only able to remain in operation for as long as it was able to roll over its ABCP. Prior to its bankruptcy, financial markets seem to have expected government intervention. This expectation, likely motivated by the Bear Stearns experience, probably allowed the bank to have continued access to credit when it would have otherwise failed earlier.

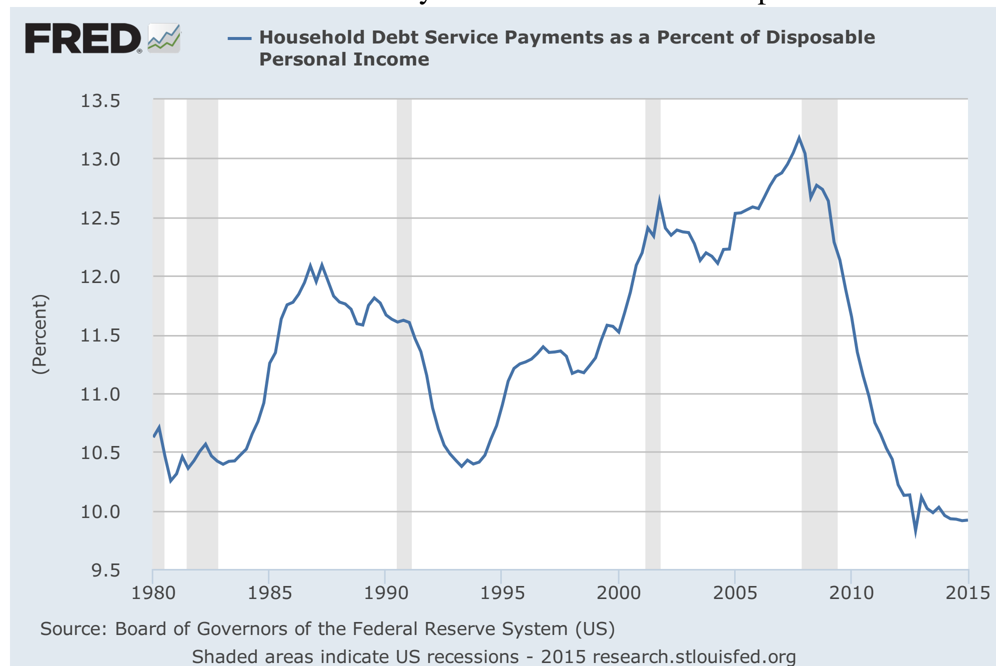
On September 13, 2008. The Fed decided that it would not intervene. This surprised financial markets. On September 15, 2008, Lehman Brothers filed for bankruptcy and was eventually liquidated.

Lehman's collapse triggered a major re-pricing of risk. The LIBOR-OIS spread, which averaged about 8 basis points (0.08%) in the 12 months prior to August 2007, jumped to over 350 basis points by October of 2008. [Note: It has since moved back to the neighborhood of its historical average.] When the stock market opened on September 15, 2008, the Dow fell by over 500 points. It began a fall that would end in March 2009 with the Dow near 6500, one of the worst stock market crashes in U.S. history.

The financial crisis significantly reduced the net worth of both firms and households. This provided an incentive for agents throughout the economy to improve their balance sheets by reducing

debt instead of investing or consumer. The follow figure illustrates the fraction of disposable income used by households to service their debt burdens. Since the financial crisis, this figure has fallen from 14% to 11%. This reflects both declining debt levels and lower interest rates.

Figure 6: Household Debt Service Payments as a Percent of Disposable Personal Income



Many macroeconomists view the current recession as a credit crunch like the one that this class modeled in the last topic. After Lehman failed, unemployment began to rise, eventually reaching 10.0 in October 2009.%.

An important question is why the government decided not to bail out Lehman Brothers. The following explanations may have played a role.

i) The arguments against the bailouts of Bear Stearns, AIG, and the GSEs may have accumulated to the point where the Fed was sufficiently concerned with potential losses and moral hazard not to conduct an additional bailout.

ii) Policy makers seem to have underestimated the markets' reaction to the collapse of Lehman.

iii) Unlike with Bear Stearns, the Fed was unable to find a suitable buyer for Lehman Brothers. That type of bailout may therefore not have been feasible.

iv) The Treasury Department may have lacked the legal authority to save Lehman Brothers.

The term *panic* best describes the aftermath of Lehman Brother's failure. Policy makers immediately became much more aggressive in their response to the struggling macroeconomy. We will discuss many of these policies in more detail later in the course. For now, I will simply list some of the policy responses:

i) The Fed increasingly lowered interest rates.

ii) The Treasury Department proposed the Troubled Asset relief program (TARP).

iii) Debate began over a stimulus package.

The effects of Lehman Brother's collapse also spread into the political arena. The financial crisis increasingly became the dominant issue in the presidential race between John McCain and Barack Obama.

The End of Independent Investment Banks

Merrill Lynch also faced bankruptcy in September 2008. Unlike Bear Stearns, however, Merrill Lynch was able to find a buyer and is now part of Bank of America.

With the demise of Merrill Lynch, Lehman Brothers, and Bear Stearns, only two independent investment banks, Goldman Sachs and Morgan Stanley remained. These firms converted to bank holding companies later in 2009. As bank holding companies, they are now regulated as commercial banks by the Federal Reserve.