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The financial crisis of 2007-2008: A discussion of the subprime mortgage meltdown and systemic amplification

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The Financial Crisis of 2007-2008:

A Discussion of the Subprime Mortgage Meltdown and Systemic Amplification

A Project Presented to
the Faculty of the Undergraduate
College of Business
James Madison University

in Partial Fulfillment of the Requirements
for the Degree of Bachelor of Science in Economics

by David Evan Botello

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Accepted by the faculty of the Department of Economics, James Madison University, in partial fulfillment of the requirements for the Degree of Bachelor of Science.

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Introduction

The financial crisis that began in 2007 and lasted throughout 2008 will most likely be remembered as one of the more substantial financial crises of our time. Surveying the complexity of the crisis can explain why it might be difficult for individuals to fully grasp the scope of events. The narrative of the financial crisis that dominates the public sphere is colored by a couple major themes: bank managers became motivated by excessive greed and extended poorly understood mortgage loans, and individuals overextended themselves and invested in real estate that would turn out to be overvalued. However, this view of the financial crisis places undue emphasis on the perceived greed of financial managers that led to their unacceptable credit decisions. Admittedly, poor credit decisions were certainly made on behalf of financial institutions and individuals. However, a more holistic analysis of the crisis would transcend problems in the mortgage market to examine an explanation for why \$500 billion in write downs on mortgage-backed securities had such a severe effect on a global market with total financial assets of \$140 trillion (Wallison, 2008).

This paper theorizes that an important aspect of the architecture of the financial system - fair value accounting standards - allowed original losses from mortgage defaults to be amplified. Under fair value accounting, or mark-to-market, firms are required to record values of mortgage-backed securities on their balance sheets at the prevailing market price (Hellwig, 2009). This connects firms together through asset prices, and can result in write downs on securities based on a depressed market price even though the present value of future cash flows from a security might not result in a write down. According to Wallison (2008), many of the write downs that

occurred during the most recent financial crisis would not have occurred prior to 1993, when the Financial Accounting Standards Board (FASB) introduced the basic elements of fair value accounting.

Therefore, this paper hypothesizes a positive relationship between the use of fair value accounting standards by financial institutions and systemic risk. Systemic risk is defined by the possibility that the failure of one institution can affect the stability of the entire financial system (Labonte, 2009). Being that fair value accounting links certain bank assets such as mortgage-backed securities to market prices, the failure of one firm can have very substantial system-wide implications.

To effectively explain the relationship between fair value accounting and systemic amplification, an overview of the causes and effects of the subprime¹ mortgage crisis will be supplied. One is more likely to understand the magnification of a problem if the original problem is clearly understood to begin with. In this case, the original problem was the subprime mortgage crisis. The subprime mortgage crisis is very complex and is not limited to one origin. Many different financial and economic factors have contributed to an environment that allowed such a problem to develop.

Risk is always present in economic transactions. It can take different forms: credit risk, counterparty risk, market risk, systemic risk, etc. An analysis of the subprime mortgage crisis is correct to focus on the credit risk aspects that resulted in a very discernable drop in lending standards in such a short amount of time. Compared to the early 2000's when subprime

¹ In this paper, subprime mortgages are considered to be those mortgages that do not meet the standards of Government Sponsored Enterprises. These loans are typically made to borrowers with lower credit scores and are accompanied by a higher interest rate than prime mortgages. Alt-A mortgages are considered to be a separate matter.

mortgages represented only 9% of the overall market for mortgages, by 2006 subprime mortgages accounted for more than 40% of all mortgages issued in the United States (Hellwig, 2009). Additionally, the quality of lending can be measured by the percentage of secured mortgages where borrowers provided limited documentation, which rose from 7% in 2001 to 18% in 2006, as well as mortgages that required less than a 10% down payment, which rose from 5% in 2001 to 14% in 2006 (Hellwig, 2009).

Typically, when investors take on extra risk they require additional compensation. The tradeoff between risk and compensation is known as a risk premium. Therefore, we should expect that an extension of credit deemed to be riskier than a conventional mortgage should be accompanied by a higher interest rate. According to Demyanfyk and Van Hermert (2011), the interest rate difference between prime and subprime mortgages in the United States dropped from 300 basis points in 2001 to 150 basis points in 2005. Observing a drop in the required risk premium for subprime mortgages while the risks for subprime mortgages were increasing over the same time period suggests that a lower demand for funds was not the primary driver of low rates. Indeed, the surfeit supply of funds might more appropriately characterize these lending conditions (Hellwig, 2009). Therefore, an examination of the causes of the excess supply of funds, and by extension a drop in lending quality, is an important aspect of this analysis.

Mortgage quality is an important factor in understanding the most recent economic downturn. U.S. real estate was the biggest loser in the recent financial crisis. In fact, just between the years of 2007 and 2008, homes in the United States lost 15.30% of their value according to the S&P/Case-Shiller US National Home Price Index. The year before, home values dropped by 3.60%. Markets reacted to this decline in home values quite dramatically, and by October 2008 the total loss prediction by the International Monetary Fund totaled over 1.4

trillion dollars. Of the total 1.4 trillion dollars, 750 billion is attributed to losses in U.S. residential lending, and the other 650 billion dollars were predicted losses on other market securities due to fallout effects. Of the losses to U.S. residential lending, approximately 500 billion of the estimate are concerning write downs on mortgage-backed securities (Hellwig, 2009). The remaining 150 billion includes wealth lost in U.S. real estate.

The effects of mortgage securitization on aspects of credit risk and systemic risk are one of the most important concepts to understand. With the advent of mortgage securitization, originators had the flexibility to sell their mortgages to an intermediary for pooling and securitization. In effect, this means that mortgages were sold, grouped together, and packaged into a security that was traded based on the value and number of mortgages in the security (Simkovic, 2011). Prior to 2007, there were some important deviations from expected behavior in mortgage securitization that resulted in credit being underpriced (Hellwig, 2009).

As stated previously, it is possible that the market valuation of an asset-backed security results in a price below the expected value of all future cash flows. This concept will be explained shortly. According to an official statement by the IMF, this could have been the case for many securities (International Monetary Fund, 2008). Some financial institutions were forced to sell securities at a distressed prevailing market price during the financial crisis in order to offset deteriorating capital arising from credit write downs. When banks fire-sell securities, the market prices of related securities have the potential to be dragged down in the process. The primary consideration for holding loans is then refocused away from the solvency of the debtor toward the prevailing market price of the security (Hellwig, 2009). For better or for worse, requiring that financial institutions adopt fair value accounting standards connects banks together so that asset performance can affect the entire system of banks simultaneously.

The structure of this analysis is as follows. First, this paper will document a brief explanation of the financial crisis. Second, a comprehensive investigation of the causes of the subprime mortgage crisis will be considered. Finally, the hypothesis will be discussed through an examination of the relationship between fair value accounting and systemic fallout. Being that \$500 billion in write downs on mortgage backed securities had such a severe effect on a global market with total assets of \$140 trillion, systemic fallout is an important piece of the puzzle to analyze.

Description of the Crisis

The first substantial domino to fall during the financial crisis was an increase in subprime mortgage defaults in February 2007. The ABX, an index of the cost of insuring different types of mortgage-backed securities, is an effective way to visualize the rising cost of insuring subprime mortgages against default. The upfront fee of insuring a mortgage-backed security is subtracted from the initial index price of 100. Over time, the upfront fee became more expensive, illustrated by the declining ABX indices chart below.

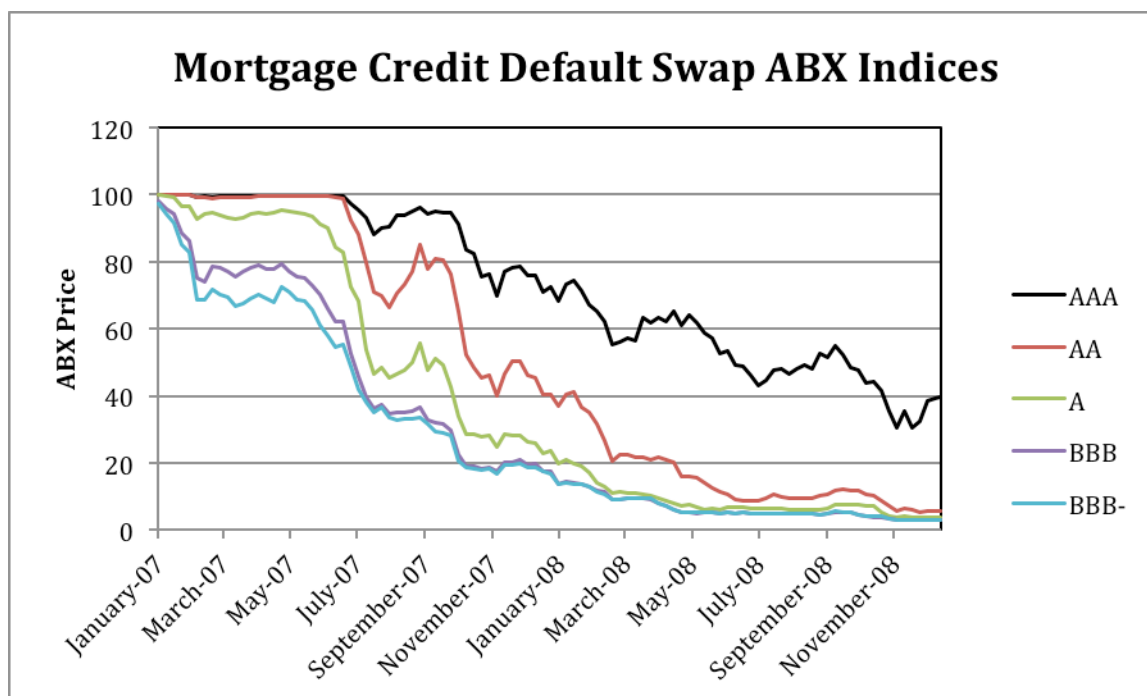


Figure 1
Source: Bloomberg

The decline in the ABX index for different credit ratings reflects the rising cost of insuring an asset-backed security against default. From February to March 2007, we can observe a quite

dramatic drop for some tranches² and an even more dramatic drop after July for all except AAA rated tranches (Brunnermeier, 2009). On February 27, as a reaction to the aforementioned developments, the Federal Home Loan Mortgage Corporation, or Freddie Mac, announced that the company would suspend purchases of subprime mortgage securities (Federal Reserve Bank of St. Louis, 2009). This is not to say that Freddie Mac suspended the securitization of subprime mortgages. In fact, Freddie Mac and Fannie Mae³ set their securitization standard at prime mortgages, and never secured subprime mortgages. However, the purchase of subprime mortgage related securities created by other financial institutions occurred as investments for the company.

In April of 2007, more bad news came forth. One of the foremost originators of subprime mortgages, New Century Financial Corporation, filed for Chapter 11 bankruptcy (Federal Reserve Bank of St. Louis, 2009). At this time, many investors in the market started to sense a trend with respect to deeper problems that could exist in subprime mortgage origination and securitization. In May of 2007, many subprime mortgage backed security deals were put on downgrade review by Moody's, adding stress to an already alarming situation. Investor fears materialized a month later when S&P and Moody's both downgraded over 100 subprime securities (Brunnermeier, 2009). This resulted in some investment banks, such as Bear Stearns, having to infuse capital to the tune of 3.2 billion dollars to support a failing hedge fund: the High-Grade Structured Credit Strategies Enhanced Leverage Fund (Federal Reserve Bank of St. Louis, 2009).

² A tranche simply refers to a specified portion of a larger mortgage-backed security deal. Most of the time, tranches are associated with varying levels of repayment likelihood, and have different credit ratings.

³ Throughout this paper, Fannie Mae and Freddie Mac will be collectively referred to as the GSEs, meaning Government Sponsored Enterprise. This name stems from the fact that Freddie Mac and Fannie Mae both exist because of a government charter and serve a public mission, as well as have an explicit government guarantee.

As doubts surfaced about how to value mortgage backed securities, lenders were no longer willing to accept these securities as backing for commercial paper (Cecchetti, 2009). As an example, in July of 2007 the German bank IKB suffered an inability to obtain financing through commercial paper and was subsequently saved by the German government under a €3.5 billion bailout package (Brunnermeier, 2009).

Throughout the developing financial crisis, downgrades continued to loom as S&P put 612 subprime securities on downgrade review and Fitch downgraded Countrywide Financial, a large mortgage originator, to BBB+ on August 16 (Federal Reserve Bank of St. Louis, 2009). Even though the Federal Reserve decided to lower the discount rate by half a percentage point from 6.25 to 5.75 on August 17, banks were suffering high costs to finance their lending (Federal Reserve Bank of St. Louis, 2009). The effectiveness of the discount rate is limited, as many market participants can view borrowing from the discount window as a sign of weakness, resulting in hesitancy for banks to use this financing route. Given that the stigma associated with the discount window was deterring banks from utilizing the window, the Federal Open Market Committee (FOMC) voted to reduce the federal funds rate by yet another half a percentage point, from 5.25 to 4.75, on September 18, 2007 (Cecchetti, 2009).

Moving forward, financial institutions realized losses and continued to write down large amounts of mortgage related debt. The continued write downs led the Federal Reserve to more action, and on October 31, 2007 the FOMC cut the federal funds rate by 0.25 percent, resulting in a rate of 4.50 percent (Cecchetti, 2009). This eased markets for a short time, but in November it was obvious that the original rough estimation of \$200 billion in aggregate losses would have to be revised to a higher figure (Brunnermeier, 2009). Additional pressure from write downs resulted in a liquidity crunch in interbank markets, and the federal funds rate was cut again in

December to 4.25 percent (Cecchetti, 2009). At this point, the Federal Reserve was under the impression that further, unconventional action would have to be taken so that banks could access liquidity. Therefore, the Term Auction Facility (TAF) was created so that banks could request short-term loans using asset-backed securities as the primary collateral. Under the new scenario banks could bid for funds anonymously (Cecchetti, 2009). The TAF allowed liquidity to flow so that lending obligations could be met, and banks could avoid the stigma associated with the discount window. Later in December, the Federal Reserve Board stated that TAF auctions would continue as long as liquidity conditions required (Cecchetti, 2009).

The new year brought the announcement of an acquisition of Countrywide Financial by Bank of America for \$4 billion because of loss related stress by the mortgage originator. Interestingly, a new development threatened the financial community: in early January 2007 Moody's, S&P, and Fitch were all considering downgrading the monoline insurers⁴ such as Ambac due to the excessive losses on the type of securities that they were insuring. The implications of downgrading the monoline insurers by rating agencies would have resulted in a downgrading of the securities that monoline insurers covered (Brunnermeier, 2009). For some securities, an AAA rating depended upon insurance coverage. This included municipal bonds, mortgage-backed securities, and corporate bonds. The total value of the securities implicated in a monoline downgrade had the potential to total 2.4 trillion (Brunnermeier, 2009). Fears materialized on January 18: Ambac was downgraded by Fitch to AA credit watch negative, while S&P placed the existing AAA rating on credit watch negative (Federal Reserve Bank of St. Louis, 2009).

⁴ According to Brunnermeier (2009), monoline insurers historically only insured municipal bonds against default. In recent years, they had decided to insure other structured products, including mortgage-backed securities.

With the fallout from the bubble's burst still resulting in continued losses by financial institutions, the FOMC again decided to cut the federal funds rate, and by January 30 the rate was 3.0 percent (Cecchetti, 2009). The repeated drop in the federal funds rate represented the Fed's concern regarding the deteriorating conditions on liquidity in the interbank lending market.

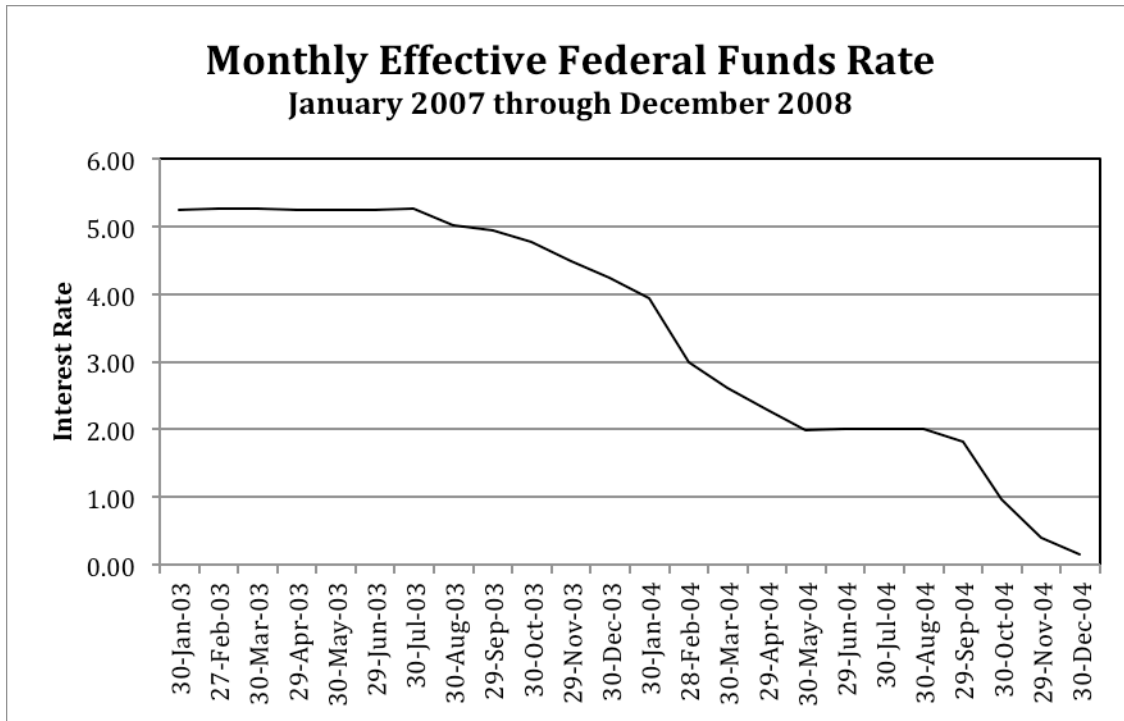


Figure 2
Source: Wharton Research Data Services

While the investment bank Bear Stearns was able to avoid crisis for quite some time, in March of 2008 one of Bear Stearns' debtors, Carlyle Capital, was experiencing difficulty meeting margin calls. Carlyle had a very large exposure to the market for mortgage backed securities, so when the difficulty with margin calls resulted in Carlyle being forced to liquidate collateral assets, the move only served to widen the interest-rate spread between treasury securities and asset-backed bonds, hurting Bear even more (Brunnermeier, 2009). Seeing that

Bear Stearns was directly involved in Carlyle's mess, the Federal Reserve announced on March 11 the establishment of the Term Securities Lending Facility (TSLF) (Cecchetti, 2009). This allowed the banks to borrow Treasury securities for short periods of time against the type of agency mortgage-backed securities that were the cause of Carlyle and Bear Stearns' problems (Federal Reserve Bank of St. Louis, 2009).

Media problems turned into liquidity problems for Bear Stearns that same night. Goldman Sachs was asked by one of Bear Stearns' hedge funds to assume exposure to Bear Stearns. Goldman's late response was assumed to be a denial of the request, which resulted in a run on Bear Stearns by its hedge fund customers. Not long afterward on March 14, financing arrangements were organized by the Federal Reserve of New York for JP Morgan to acquire Bear Stearns, because the fallout effects of letting Bear Stearns fail were deemed to be too severe (Brunnermeier, 2009). Bear Stearns was acquired at a severe discount totaling \$10 per share. Also, to facilitate the deal, the New York Fed offered a \$30 billion dollar guarantee to JP Morgan (Cecchetti, 2009). These actions by the New York Fed, along with further cuts in the federal funds rate by the FOMC, served to ease market tensions for a time.

Defaults on prime mortgages eventually increased to account for 19% of all foreclosures in the United States by the end of 2008 (Mortgage Bankers Association, 2008). This development, combined with investment losses on risky subprime mortgage-backed securities, culminated in Freddie Mac and Fannie Mae being unable to raise capital as cheaply as before the crisis. In other words, interest rates on GSE debt were rising. On July 13, the Federal Reserve Board authorized the New York Fed to extend credit to the GSEs if conditions warranted. Additionally, that very same day, the Treasury made clear that there was a possibility it might purchase equity in the two firms to keep them afloat.

The markets interpreted the news as a sign of intense weakness. To counteract the negative fallout effects, the Securities Exchange Commission stated that all naked short selling⁵ was, in fact, prohibited for all securities of the GSEs (Brunnermeier, 2009). Once more, the FOMC reduced the federal funds rate, this time to 2.0 percent (Cecchetti, 2009). After the Federal Reserve, U.S. Treasury, and federal government all stated provisions for the potential nationalization of the GSEs, on September 2007 the Federal Housing Finance Agency moved to put both Fannie Mae and Freddie Mac in government conservatorship, making the previously implicit government guarantee of the two corporations very explicit (Cecchetti, 2009). The Treasury complemented the decision by the FHFA by providing a secured lending facility to the GSEs and planing to purchase preferred stock in both firms (Federal Reserve Bank of St. Louis, 2009).

Early in the month of September 2008, it was quite apparent that Lehman Brothers was encountering problems managing the slow degeneration of its balance sheet (Gray, 2011). The use of the Federal Reserve's special lending facilities did not prove to be enough, and upon release of the news that the Korea Development Bank would not consider the purchase of Lehman, share prices dropped dramatically (Brunnermeier, 2009). The situation became even more unfortunate in mid-September when it was clear that the government would not provide a guarantee to Lehman Brothers (Gray, 2011). Lehman filed for Chapter 11 bankruptcy because no bank was willing to purchase Lehman without a guarantee. While the federal government might have intended to send a message regarding their reluctance to bail out failing banks, matters tested their resolve when American International Group (AIG) disclosed massive losses causing their share price to drop 90% on September 16, the day after Lehman filed for

⁵ Naked short selling is the practice of short selling any type of security without first borrowing the security.

bankruptcy. In the opinion of the Federal Reserve, AIG was too interconnected in the market for credit derivatives to be allowed to fail. For this reason, the Fed took an 80% stake in the company for \$85 billion dollars in equity (Brunnermeier, 2009).

Upon the failure of Lehman and the bailout of AIG, the turmoil in markets prompted the SEC to temporarily ban all short selling on every financial services firm. However, this didn't prevent vulnerable banks from experiencing bank runs. On September 25, the Office of Thrift Supervision shut down Washington Mutual Bank in the midst of a bank run. The bank was subsequently sold to JP Morgan in a transaction brokered by the FDIC (Federal Reserve Bank of St. Louis, 2009). In the aftermath of Lehman, Wachovia Corporation was considering a deal offered by Citigroup for acquisition, but Wachovia was eventually sold to Wells Fargo upon reaching a more mutually agreeable deal that did not include a loss sharing agreement by the FDIC (Federal Reserve Bank of St. Louis, 2009).

Apparently, the financial crisis unfolding in the U.S. and other global markets was enough to move Congress to action. On October 3, 2008, President George W. Bush signed the Emergency Economic Stabilization Act into law (Federal Reserve Bank of St. Louis, 2009). This law essentially provided taxpayer funds in the form of the Troubled Asset Relief Program (TARP). Broadly speaking, TARP allowed for the purchase of underpriced assets from banks and other corporations in order to strengthen their financial position. While the law was primarily meant to ease the liquidity conditions in the financial sector, U.S. automakers lobbied Congress in November of 2008 and were able to access TARP funds to ease their financial troubles as well. By the end of 2008, it was unmistakable that the problems created by the subprime bubble permeated the entire global economy. Through emergency measures, the

balance sheet of the Federal Reserve had increased by over one trillion dollars by December 2008 (Brunnermeier, 2009).

The effects of the financial crisis were much more widespread than covered in this overview. Here we have discussed the major events that took place in the U.S. financial sector throughout the end of 2008. Moves by the United States Federal Reserve in December of 2008 to extend the duration of three different emergency credit facilities⁶ revealed the degree by which the central bank thought the financial sector was unhealthy and in need of extra liquidity. In addition, the FOMC decided to target the federal funds rate between 0 and 0.25 percent in December. The usefulness of the federal funds rate is constrained at 0 percent. A drop below 0 percent would result in negative returns. Therefore, the Federal Reserve continued to utilize the ability to purchase almost any kind of underpriced asset so as to provide equity to various firms the financial sector.

⁶ These emergency credit facilities were: the Primary Dealer Credit Facility (PDCF), Asset-Backed Commercial Paper Money Market Fund Liquidity Facility (AMLF), and the Term Securities Lending Facility (TSLF)

Potential Explanations of Causes

It is nearly impossible to quantitatively separate causes of the subprime crisis to determine which elements had more of an impact than others. Here, the foundations of the subprime mortgage crisis are discussed, which will hopefully shed light on many of the actions and structural incentives that resulted in such poor credit risk decisions. With this understanding, one might more clearly understand how the structure of the financial system became an amplifying mechanism for many of the existing problems.

Generally speaking, there is not a high degree of commonality between the causes of the crisis. For example, Federal Reserve policy regarding interest rates in the early 2000s had more to do with attempting to avoid potential deflation resulting from the dot-com bubble than anything remotely associated with real estate or mortgage lending (Taylor, 2009). Furthermore, moral hazard stemming from conflicts of interest within rating agencies were directly associated with subprime mortgage financial instruments. The purpose of this section is to briefly document how some seemingly unrelated macroeconomic and industry-specific factors combined to create a mosaic catalyst that resulted in a dramatic underpricing of credit risk and subsequently set the stage for a systemic risk factor to threaten the condition of the entire global financial system.

Loose Monetary Policy

A short-term interest rate environment throughout the early 2000s had a direct effect on the rate of housing appreciation and relaxation of lending standards in the years before the financial crisis. Economist John B. Taylor, Senior Fellow in Economics at the Hoover Institution, stated that policies enacted by the U.S. Federal Reserve and other major industrial economies' central banks greatly contributed to the 2007-2008 subprime mortgage crisis (Taylor, 2009).

The basis for Taylor's assertion is an examination of the U.S. federal funds rate in the most relevant years leading up to the crisis, 2000-2007. In a research paper entitled Housing and Monetary Policy (Taylor, 2009) presented at the annual Jackson Hole conference, Taylor compared two sets of data: the actual federal funds rate and the federal funds rate implied if the Federal Reserve were following his Taylor rule. The Taylor rule is essentially a suggested short-term interest rate based on important macroeconomic variables such as, most importantly, changes in inflation and output. If central banks were to follow the Taylor rule in setting short-term interest rates, exemplified by the federal funds rate in the case of the United States, Taylor asserts they would be replicating the kind of interest rate environment that the U.S. market experienced throughout the 1980s. Taylor refers to this time frame as the period of "Great Moderation," a time period characterized by low macroeconomic volatility.

When comparing the actual federal funds rate to the rate implied by the Taylor rule, Taylor's research finds a considerable deviation of the actual interest rate from the implied or suggested interest rate. The specific time period analyzed, as stated above, is 2000-2007. At the

beginning of 2002 the federal funds rate rested right below 2%. From 2002 to 2004 the federal funds rate steadily declined from 2% to 1%. Beginning in mid-2004, the rate consistently rose to 5% by the end of 2006. By contrast, the Taylor rule implies a rate of 2% at the beginning of 2002 that rises consistently by 1% every year (Taylor, 2009). The results of this policy difference are quite extreme depending upon the year one investigates. By 2004 at the peak of the discrepancy, the difference was 3% (Taylor, 2009). In 2004, the National Home Price Index rose by 13.90% (Hellwig, 2009). The year after in 2005, the appreciation rose by an even higher rate of 15.60%. Even though the short-term interest rate difference between the actual rate and the rate implied by the Taylor rule disappears by 2006, the period of roughly 4 years of loose fitting monetary policy was enough to accelerate the housing boom (Taylor, 2009).

One might ask why the Federal Reserve decided to pursue a loose fitting monetary policy. The low discretionary federal funds rates implemented by the Federal Reserve were primarily due to fears that the United States would experience a deflationary period similar to the one that Japan experienced throughout the 1990's known as Japan's "lost decade." This, coupled with fears that the stock market tech bubble would result in equity price deflation that could potentially lead to larger economy-wide deflation, was the most apparent reason for the actions of the U.S. Federal Reserve (Brunnermeier, 2009). Taylor reasons that the "loose-fitting" central bank policies around the world, like those policies in the U.S., have led to housing booms and busts. As prices rise, the incentive to default on a mortgage falls dramatically. However, when home prices begin to fall and the value of some homes fall below the total value of their associated mortgages, the incentive to default rises. This inverse relationship was quite explicit beginning in late 2003, when home prices rose while delinquencies and foreclosures fell.

Additionally, the two factors reversed in early 2006, as housing prices fell and delinquencies and foreclosures rose.

The impact of low short-term interest rates on banking intuitions in the United States and Europe in the early 2000s also softened lending standards (Maddaloni, 2011). Banks in the U.S. obtain a significant amount of their financing through short-term borrowing. The federal funds rate was kept low for 19 consecutive quarters between 2001 and 2006 (Maddaloni, 2011). Given that financial institutions obtain a significant amount of funding through short-term means, the federal funds rate can have a significant effect on financial risk-taking behavior. Robust evidence was presented through GLS regressions of lending standards and short-term rates: declines in standards to firms and households followed loose monetary policy decisions, and additionally, a tightening of standards followed a tightening of monetary policy (Maddaloni, 2011).

Excess Global Saving

The low interest rate phenomenon in the United States has been argued by other academics to be attributable to more than one root. Taylor (2009) has stated that global savings did not contribute to the low interest rate environment, even after monetary tightening in 2004. However, other arguments exist that pin excess global savings to the low interest rate environment that led to the subprime mortgage crisis. The former secretary of the U.S. Treasury, Henry Paulson, has stated that global savings increases from countries such as China and oil exporters have led to “depressed global real interest rates” resulting in a search for yield and underpricing of risk (Obstfeld, 2009). Paulson’s statements clearly suggest that the low interest rate environment preceding the subprime mortgage crisis was not solely caused by loose monetary policy by the Federal Reserve.

In this same vein, IMF data illustrates global savings increasing over the period before the crisis: in 2003, global savings was at 20.9 percent of global output, rising to 24.4 percent in 2007 (Obstfeld, 2009). In theory, the increase in global savings must be matched by an increase in investment, however, “an interpretation of the data as being driven by an exogenous increase in investment demand seems inconsistent with the failure of long-term real interest rates to rise to anywhere near late 1990s levels in the middle 2000s” (Obstfeld, 2009).

Loose monetary policy and the dot-com crash’s impacts on investment demand are both viewed as catalysts for low long term interest rates in the early 2000s. The important point that Obstfeld and Rogoff (2009) make is that monetary easing paved the way for global savings to

rise, resulting in depressed long term global real and nominal interest rates⁷, even after a move toward monetary tightening in 2004. Taylor (2009) confirms a move by the Federal Reserve to tighten the federal funds rate from 1 percent in 2004 to as high as 3 percent in 2005.

⁷ Specific global interest rates referenced include: US 10-yr TIPS rate, France 10-yr euro inflation indexed, and UK 10-yr inflation indexed. There is a steady decline in all rates between 2004 and 2005.

Competition in Securitization

The market structure of an industry can have a large effect on the incentives that market participants face. In the case of mortgage securitization and origination, data from Simkovic (2009) illustrates the relationship between increased competition (in both origination and securitization) and decreased mortgage quality. On the mortgage origination side, the quality of underwriting decreased between the years of 2004 and 2007, fueled in combination by: a diversification away from prime mortgage origination, a relaxation of standards by those firms securitizing mortgages resulting from competition for market share, and the seller power of originators eventually overpowering the buying power of the GSEs (Simkovic, 2009).

Conventional conforming mortgages were those historically sold to GSEs for securitization. These mortgages lost half of their market share between 2004 and 2006, dropping from 62 percent of the market to 33 percent (Simkovic, 2009). Subprime originations increased to approximately 20 percent of the market in 2006 from only 7 percent of the market in 2000. As subprime and other non-traditional mortgage loan features became manifest in the market, it became quite clear that underwriting standards were falling by traditional loan to value (LTV) standards between 2004 and 2006 (Simkovic, 2009).

When firms securitizing private label mortgage backed securities relaxed standards in order to compete for market share, the balance of power shifted away from the GSEs (Simkovic, 2009). Originators suddenly had many more options for selling their securities and did not need to conform to the strict prime standards of GSEs. While total non-agency issuance of mortgage-

backed securities totaled fewer than 600 billion dollars in 2002, by 2005 total issuance peaked at 1.4 trillion (Simkovic, 2009).

Misuse of Tranches

Requiring mortgage originators to retain a tranche that is highly exposed to mortgage defaults is a theoretical way to manage the quality of lending in mortgage securitization (Hellwig, 2009). Tranching is a method of ranking a security, such as a mortgage-backed security, by priority. Tranches with higher priority have contractual claims on cash flows. The basic names of tranches by priority are: senior, mezzanine, and equity tranches. Therefore, the return on the mortgage portfolio is first paid to the holders of the senior tranche. If the return exceeds the contractual claim on the senior tranche, holders of the mezzanine tranche are paid, and if both the senior and mezzanine tranche are paid out, the subordinated equity tranche is then paid the remainder of returns. In extreme cases, individuals holding a claim on mezzanine or equity tranches may not be paid if the returns on the mortgage portfolio do not exceed the contractual obligation of the senior tranche (Hellwig, 2009).

Equity tranches are expected to carry most of the risk associated with a mortgage-backed security deal. It is hypothesized by Franke and Krahen (2006) that originators holding equity tranches would take more care in screening for loan quality. Unfortunately, in many cases originating institutions did not hold equity tranches. Instead, equity tranches were sold off to investors such as investment banks and hedge funds, by the mortgage-backed security issuer. The increasing demand for yield led hedge fund and investment banks to invest in equity tranches (Hellwig, 2009). Additionally, it's suggested by Brunnermeier (2009) that an additional motive in investing in equity tranches might have stemmed from the fact they were difficult to

value because they traded so infrequently. Infrequent trading gave fund managers and investment banks more control over revaluating portfolios, and subsequently, monthly returns.

Originators by and large did not hold equity tranches; the incentive was on loan volume, not loan quality. Requiring that originating institutions hold equity tranches would have done much to advance care in screening borrower creditworthiness prior to the subprime mortgage meltdown.

Flaws in Rating Securities

Instances when literally hundreds of mortgage-backed securities were downgraded at once should be enough to pique interest in the method by which these securities were rated. If so many securities were improperly rated, what was the reason for the failure? Over-optimism was certainly apparent in the difference between AAA credit ratings and the associated defaults on some securities, but the root of the optimism in projected defaults might have as much to do with the structure of the relationship between rating firms and security issuers as the flawed models used to rate asset-backed securities.

According to Brunnermeier (2009), the models used by rating agencies to forecast future defaults on structured products⁸ were optimistic about the occurrence of mortgage defaults. Rating agencies used statistical models that were both based on historical data and developed through close working relationships with the models that clients used to create the securities (Buiter, 2007). It might seem strange to find fault with models that use historical data, for what else exists to forecast future performance? However, defaults on loans in large volumes were rare events, the possibility of a nationwide decline in real estate was considered to be almost non-existent (Hellwig, 2009). Further, any significant decline in real estate in the period after World War II was limited to specific regions of the United States. Therefore, rating firms hypothesized that asset diversification across U.S. regions provided an extra level of security (Brunnermeier, 2009).

⁸ Here, “structured products” is a basket term, including all types of asset-backed securities and collateralized debt obligations.

This use of inherent bias in the data can be pinned on both the issuers of the securities and the rating firms. Instead of scrapping the models used by investment banks used to forecast risk in the securities, in many instances the clients' models heavily influenced risk models developed by rating agencies (Buiter, 2007). In the eyes of rating agencies, both the complexity of many structured products and the volume of workflow necessitated this working relationship between rating firms and investment banks (Crotty, 2009). With hindsight, it is clear that models used by rating agencies used to forecast default risk on structured products would have benefitted from a perspective independent of their clients' models.

Additionally, a clear conflict of interest existed for a rating agency offering rating services on structured products. Rating agencies are paid not by the buyer of the security, but by the seller. In a market structure such as this, it's not too far fetched to assume that investment banks would "shop around" for rating services as has been suggested by Crotty (2009). If one rating firm were to give a realistic assessment of the risks surrounding a security while other firms were more willing to give unrealistic expectations, the market share of the one firm would predictably fall (Crotty, 2009). Typically, individuals might assume that the reputational harm stemming from an incorrect rating would outweigh the profits earned from sacrificing rating quality. However, when the number of rating opportunities rises substantially the conflict between rating quality and growing market share becomes more prominent (Schwarcz, 2008). In 2005, 40% of Moody's revenue stream was directly attributable to rating services on securitized debt (Crotty, 2009). Threatening this line of business was not seen as an attractive strategy.

It is also important to note the added conflict of interest that existed for rating firms when consulting and rating services were both offered to investment banks. Consulting arms would assist banks in constructing securities to meet certain rating specifications, whether that be AAA

or BBB. Upon the execution of the rating service, it would have called into question the competency of the entire rating agency if rating services questioned the structured products that their advisory and consulting arms helped to build (Buiter, 2007).

The small probability of loss suggested by inflated ratings on structured products only added to the appeal of these securities. The high expected return associated with various products such as securitized subprime debt coupled with low probability of default implied by inflated ratings likely contributed to the popularity and growth of the subprime mortgage products.

Which Cause Best Fits the Facts?

At this point, it should be clear that a variety of elements contributed to the subprime mortgage crisis. The actions of rating agencies illustrate a moral hazard that, in hindsight, could have been actively addressed even before the onset of the subprime mortgage crisis. The complications arising from increased competition over market share and securitization and its effects on lending quality may well be viewed within the context of a larger set of interest rate incentives created by monetary authorities. Monetary authorities in the United States and in Europe may have formulated policy with good intentions of avoiding a deflationary period following the dot-com crash, but the acceleration of the housing boom and reduction in lending standards that largely set the stage for a subprime mortgage bubble and subsequent financial crisis should carry the most blame. In the view of this paper, tighter monetary policy in the early 2000's would have resulted in much less severe outcome.

Fair Value Accounting as an Amplifying Mechanism

So far, this paper has discussed the facts of the financial crisis and some potential explanations for what factors caused the financial crisis to occur. One reason the Federal Reserve was so active attempting to prevent the crisis from bankrupting many investment banks was to contain the system-wide repercussions of fire sales and write downs of securitized debt. Actions of these types by one bank can quickly affect others through connectivity factors such as fair value accounting standards, standards that all financial institutions are obliged to implement.

Fundamentals of Fair Value Accounting

The Financial Accounting Standards Board (FASB) formally introduced the fair value accounting standard in 1993. Since then the standard has been guided by two critical underlying concepts. First, asset valuations should be uniformly applied across industries so that firms can be easily compared. Second, if market prices for an asset can be determined, the market price for an asset should be carried on the balance sheet of the firm by which it is held. In practice, these principles can result in sub-optimal outcomes. The sub-optimality results from the different rationale for which assets are held and the volatility in earnings created under this accounting regime (Wallison, 2008).

In the Statement of Financial Accounting Standards 115, financial assets are divided up into three categories: assets held to maturity, held for trading purposes, and available for sale (Wallison, 2008). In both the “held for trading purposes” and “available for sale” categories assets must be marked-to-market (i.e. held on the balance sheet at the going market price). Many restrictive rules exist that exclude assets from the “held to maturity” category. For example, if an asset could potentially be sold to meet liquidity needs, then the asset has to be held under “available for sale.” This practice likely results in many assets being marked-to-market, even if the purpose of holding these assets was to produce cash flows. A high degree of volatility in earnings can result from this accounting requirement.

Guidance was provided to accountants by the FASB in 2006 on how to properly mark assets to market prices. The FAS 157 statement defines the fair value of an asset to be the price that an individual would receive for selling an asset. One might consider instances where there

is quite a large gap in the price quoted to buy an asset and the price one is willing to sell an asset. In instances when markets have broken down completely, FAS 157 makes an exception where there is “little, if any, market activity.” Gauging market activity in the language of the FASB is done through “maximizing the use of observable inputs” (Wallison, 2008). In this case, observable inputs are market prices. When market prices are not available “unobservable inputs” may be used as valuation techniques. Cash flow estimates and expectations of asset performance are generally used in these cases. Even though an exception was technically allowed for a situation in which there is a breakdown of market activity, the bias toward market prices was made exceptionally clear. The use of market prices was used if any market price was available (Wallison, 2008). Predictably, the use of market prices for asset valuation was widespread among auditors during and after the financial crisis (Wallison, 2008).

Connection to Systemic Risk

An expert characterization of the effects of mark-to-market accounting was made by the Institute of International Finance in an April 2008 report:

Often-dramatic write downs of sound assets required under the current implementation of fair-value accounting adversely affect market sentiment, in turn leading to further write downs, margin calls and capital impacts in a downward spiral that may lead to large-scale fire-sales of assets, and destabilizing, pro-cyclical feedback effects. These damaging feedback effects worsen liquidity problems and contribute to the conversion of liquidity problems into solvency problems. (Page 1)

Due to the difficulty associated with meeting the standard for holding assets to maturity, most AAA rated assets were required to be marked-to-market by investment banks. Continued write downs on securitized debt during and after the financial crisis was, in many cases, a reality of malfunctioning markets, not a stark revaluation of expected cash flows (Wallison, 2008). It seems that the fate of Bear Stern's rescue by the Federal Reserve was precipitated by write downs required by the fair value accounting standard, and subsequent fire sales resulted from a need to raise capital. The complete failure of Bear Sterns would have resulted in a further depreciation of asset prices, arguably creating an even more dramatic spiral effect than what actually materialized.

One might ask why market prices were required to be used for valuation during the financial crisis. Language in FAS 157 technically would have made it possible for accountants to adjust their valuation technique for securitized debt during the financial crisis. According to

FAS 157, measuring fair value rests upon the ability to obtain prices in an “orderly transaction.” Further, an “orderly transaction: “...assumes exposure to the market for a period prior to the measurement date to allow for marketing activities that are usual and customary for transactions involving such assets or liabilities; it is not a forced transaction (for example, a forced liquidation or distress sale).” (FAS 157, 3, paragraph 7.) However, the SEC, being the delegator of authority to the FASB, stated in March of 2008 that market prices must continually be used to value assets, even if it is considered that market values are the result of distress sales or liquidations (Wallison, 2008).

The definition of fair value in the United States differs from definitions in European markets because the U.S. GAAP definition is crafted from a market perspective (Schmidt, 2009). However, the U.S. definition is not superior to the definition under the current International Financial Reporting Standards (IFRS) because under both regimes the seller’s preferred price is irrelevant. The market price of an asset is completely determined by the buyer, not the seller. The notion of an “orderly transaction” is irrelevant if the seller is simply a price-taker (Schmidt, 2009). Fundamentally, there is no consideration for the possibility that market prices could be completely determined by fire sales.

The credit crunch was defined both by the lack of liquidity in the market and the difficulty of obtaining credit. As previously stated, the breakdown in the markets for many structured products resulted in an inability to accurately value financial assets. Easley & O’Hara (2010) developed a model that attempted to illustrate how illiquidity can arise from uncertainty about financial assets. Statements offered by the SEC effectively downplayed the importance of malfunctioning markets. However, it was shown by using a model of uncertainty that the absence of trading arises when traders demonstrate incomplete preferences over portfolios

(Easley, 2010). Incomplete preferences over portfolios can arise in real-world situations when there is uncertainty about the value of an underlying asset. This was clearly the case in 2007 - 2008 when hundreds of credit downgrades caused investors to doubt asset quality. The result of the model developed illustrated that non-participation is a probable outcome in markets where limited information and uncertainty exists (Easley, 2010). Attaching fair value to asset prices in times when uncertainty breeds illiquidity in markets is comparable to assuming a functional market when no transaction would actually occur. This non-participatory outcome implies that the use of mark-to-market during illiquid periods will not result in prices that carry information about the true value of a portfolio or a security (Easley, 2010).

Urooj Khan studied an empirical connection between systemic risk and fair value accounting and published his findings (Khan, 2010). Bank contagion⁹ is used as a proxy measurement for systemic risk, and the ratio of assets recorded at fair value to the sum total of bank assets serves as a proxy measurement for the degree by which the accounting regime of a financial institution is fair value oriented (Khan, 2010). Bank contagion is specifically measured by monthly returns of money center banks¹⁰ in the United States. The relationship between fair value accounting and an increase in contagion is statistically significant. Cross sectional analyses also provided by Khan (2010) document the likelihood that the contagion associated with fair value is more likely to affect banks that are poorly capitalized and possess higher proportions of fair value assets to total assets. There is no claim to have found causal links through Khan's analysis. However, a significant positive relationship between bank contagion

⁹ Here, contagion is simply defined as the spread of market shocks from one financial institution to other financial institutions.

¹⁰ Money center banks are similar in function to common banks, but the borrowing and lending activities of money center banks are with governments, large corporations, and common banks. (Source: Investopedia)

and fair value accounting clearly exists. The spread of market shocks through a downward spiral of financial health presents a clear systemic risk.

The problem with fair value accounting lay both in its inability to correctly represent the value of some securities during a breakdown of financial markets and in the procyclical effects it creates. The procyclical tendency of fair value accounting during market booms results in rising asset prices that strengthens capital, inducing further acquisition of assets (Wallison, 2008). Fair value accounting standards amplify the creation of bubbles and the resulting rapid decline in asset prices. Policy should be created that counteracts the effects of the rises and declines of market bubbles so that a less volatile market is created.

Conclusion

While the role that fair value accounting will play in the future is unknown, it should be clear that the practice of requiring securities be marked-to-market in sufficiently illiquid markets presents serious problems. Systemic risk largely draws meaning from connectivity factors and the possibility that some financial institutions might be too big to fail. Here, we have attempted to tell the story of the financial crisis beginning with the subprime mortgage debacle that set off a spiraling chain of events, continuing to a discussion of potential explanations for the subprime crisis, and concluding with an important factor, fair value accounting, that links financial institutions together and increases the threat of systemic risk. It is quite evident that more thought must be given to the exceptions of fair value accounting and when those exceptions might be invoked to prevent unnecessary write downs and amplified losses in the future.

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