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Neil Fligstein and Adam Goldstein

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**Author:**

[Fligstein, Neil](#); [Goldstein, Adam](#)

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The Anatomy of the Mortgage Securitization Crisis\*

Neil Fligstein

and

Adam Goldstein

Department of Sociology

University of California

Berkeley, Ca. 94610

U.S.A.

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The current crisis in the mortgage securitization industry highlights significant failures in our models of how markets work and our political will, organizational capability, and ideological desire to intervene in markets. This paper shows that one of the main sources of failure has been the lack of a coherent understanding of how these markets came into existence, how tactics and strategies of the principal firms in these markets have evolved over time, and how we ended up with the economic collapse of the main firms. It seeks to provide some insight into these processes by compiling both historical and quantitative data on the emergence and spread of these tactics across the largest investment banks and their principal competitors from the mortgage origination industry. It ends by offering some policy proscriptions based on the analysis.

## Introduction

The market to sell home mortgages as “securities”, what are called mortgage backed securities (hereafter MBS) is at the core of the financial crisis. It is clear that the financial community, the policy analyst community, and government officials in charge of the Federal Reserve and Treasury Department mostly underestimated what was happening and optimistically thought at many points that the crisis could be contained. The crisis apparently even came as a great surprise to the people who ran the companies that produced the meltdown. The president of Bear Stearns, James Cayne, for example, has argued that the company did nothing wrong and did not take risks they did not understand, even as his company was headed towards bankruptcy (Cohan, 2009). Even more disturbing, the actions of the regulators betrayed a deep ignorance of what was actually going on. Regulators mostly trusted in market actors to self regulate. As a result, some regulators were convinced that there never was a mortgage bubble, because markets operated efficiently (Kaufman, 2009: 235).

Given regulators placed so much faith in the standard rational actor model, it is useful to ask, how well did it characterize the economic behavior of banks? The ongoing crisis suggests, “not very well.” But how that model fails is a complex question and one that we shed some light on in the research in this paper. Our basic premise is that what was most lacking is a sense that there existed a system that structured the MBS business. We use the market model proposed by Fligstein (1996; 2001) to begin this reconstruction. This paper tries to investigate how this system of relationships between regulators, mortgage originators, mortgage packagers (both commercial and investment banks),

ratings agencies, and the holders of such bonds evolved through the rise and fall of the MBS market. We seek to uncover the inner logic of the mortgage business over time in order to understand why actors did not behave “rationally” in the narrow economic sense which regulators expected.

We do so first by setting the basic facts of the rise and fall of the MBS market straight. We show that the success of the residential real estate market and the MBS business caused a rapid expansion of that business from 1993 until 2003. This rapid expansion brought the biggest banks into the market in a big way. Over time, the largest banks increasingly based their business on making fees off of selling mortgages to individuals, packaging those mortgages into bonds, selling many of those bonds to investors, and perhaps most interestingly, retaining a significant portion in order to profit from the lucrative spreads on high yield bonds funded through capital acquired at low interest rates.

Another important set of actors in the MBS field were the ratings agencies. We document the complicity of the ratings agencies in legitimating the massive influx of subprime MBS which flooded the market from 2004-2007. We show that the three ratings companies inflated their ratings of all MBS from 2003-2007, thereby potentially misleading investors as to the underlying riskiness of the bonds. But, here too there was a system at work. Ratings agencies were paid by the packagers of MBS. If they were not cooperative in rating bonds highly, the banks would take their business elsewhere. Given that the MBS business was highly concentrated, the MBS issuers had power over the ratings companies. The ratings companies chose to be active and willing participants in

the rating of MBS in a generous fashion, and they profited handsomely from this business up through 2007.

The final and perhaps most important player in the mortgage securitization field is the federal government. The role of the government within the mortgage securitization field has been two-fold. First, contrary to the popular notion that government either inhibits the natural workings of the market or alternatively stays away and lets the free market do its work, the MBS market is a case where regulators and banks have co-evolved in a way that has put the government in the position of creating the market, underwriting it, working to make it expand, and allowing banks to take over key parts of the business, thereby supporting the expansion of the production of new financial products. Government created the first mortgage backed securities in the late 1960s, and the private market for MBS has grown up under and with the cooperation of the government sponsored enterprises (hereafter GSE) for the past 20 years. The GSEs remained the dominant player in the mortgage market over this period. Indeed, the government had to coax the banks into the MBS business. Democratic and Republican presidents and Congresses pulled the banks into the business by providing financial reforms that expanded the MBS market and worked to allow the largest banks to do anything they wanted.

Second, despite being a central part of the mortgage-securitization system, government regulators did not view it as a system. Instead, paradoxically, they bought into the rational actor / financial model which formed the dominant cultural-institutional infrastructure in which they were embedded. Allen Greenspan, Chairman of the Federal Reserve, championed a form of market fundamentalism in which he acted as if the

government had nothing to do with the creation of the market and should do little or nothing to manage the riskiness of the market. Instead he assumed that the banks would act in their own self interest to protect their investments.

This disjuncture between the regulators' actual role and their avowed role led to a type of regulatory capture. As the activities of bank expanded and they invented more and more financial products, bankers were consistently able to convince regulators and the executive and legislative branch of the government to stay away from regulating the market. Their basic arguments were that the financial innovations in the market were producing robust economic growth and that at their core these innovations made a market that was able to control its own risks. It is important to remember that the market for MBS expanded from 1992-2007 which gave these arguments more credence. In the run up to the crisis, Allen Greenspan denied there was a housing bubble. He bought into the argument that these products were expanding rapidly because they were successfully controlling risk. As a result, he prevented new regulations for the regulation of financial products such as collateralized debt obligations (CDO) and credit default swaps (CDS), and prevented regulators from using existing regulations to stop the sale of sub-prime mortgages. Looking back on what happened, it is hard not to conclude that all attempts to regulate these markets were thwarted by the regulators themselves, who bought into the arguments of the banks. This misunderstanding of the nature of the market by regulators is central to the crisis.

We argue that the real beginnings of crisis emerged after 2003 when unconventional non-prime markets rose from about 10% of the market in 2003 to almost 70% of the market at their peak in 2007. This transformation in the MBS field's product



mix was as rapid and dramatic as the field's overall growth. We show how this shift was sparked by a steep but little-discussed decline in the supply of prime mortgages after the 2003 refinancing boom. In order to maintain high profits and volume, originators and conduits aggressively pursued new sources of raw mortgages in various “unconventional” markets such as B/C, Alt-A, and home equity loans (HELs). The result was that the subprime sector of the market, which had formerly been marginal in size and dominated by specialist firms, quickly became a linchpin of the financial sector.

In presenting this history, we empirically dispel several conventional wisdoms that have taken hold. So, for example, one of the “facts” that is already taken for granted in economic analyses of the meltdown is that the banks which originated mortgages and packaged mortgage securitization never held onto the securities themselves. It is asserted that this perverse incentive made them more likely to take on larger risks. We show that contrary to this view, every large originator and packager of mortgages held onto substantial numbers of mortgage backed securities and this increased dramatically after 2001. Simply put, they believed that they could control the amount of risk they held. The result is that most of these firms are either out of business, merged into larger banks, or owned by of the federal government. Another commonly voiced myth about the MBS market is that it was highly dispersed, with too many players to control any facet of the market. On the contrary, we show that over time all of the main markets connected to MBS, the originators, the packagers, the wholesalers, the servicers, and the rating companies became not only larger, but more concentrated. By the end, in every facet of the industry 5 firms controlled at least 40% of the market (and in some cases closer to 90%). Separate market niches also increasingly condensed around the same dominant

firms. As a result, the mortgage field was not an anonymous market scattered across the country, but instead consisted of a few large firms. This concentration meant that firms very much collaborated and competed in these various markets. Firms would join together in MBS packages and assume different roles with each other. This meant that had a great deal of knowledge of the market and what the others' moves were.

Finally, we present data challenging the conventional wisdom that the complexity and opacity of financial instruments – particularly CDOs – was a chief contributor to the MBS bubble and subsequent meltdown. A mortgage-related CDO (sometimes called ABS CDO) is a securitization of existing MBS tranches. While the complexity of pricing a CDO can be very difficult due to the disparate income streams from which it is constituted, at root it is simply a claim on mortgage backed security tranches, which are claims on income from mortgage payments made by homebuyers. Although investors lost huge amounts of money on CDOs, we provide evidence based on ratings history data suggesting that CDOs were no more risky than the subprime MBS from which they were constituted. CDOs did not exhibit compositional ratings inflation (which indicates that their complexity did not contribute to the rampant grade inflation by which subprime mortgages were increasingly engineered into AAA tranches). Nor were they downgraded at higher rates than more conventionally structured securities. These findings suggest that evolution of financial instruments offers a less germane explanatory axis than many scholars have suggested (e.g. Skreta and Velkamp 2008).

## The History of the Mortgage Securitization Market

Housing is at the core of the American economy. Indeed, owning a house has been one of the linchpins of the American dream. The purchase of a house is the largest expense that any citizen ever makes. Public policy in the postwar era has recognized this as an admirable goal and governments of all political persuasions worked to make ownership a reality. To understand the current crisis, one needs to step back and understand the co-evolution of financing of housing between the public and private sectors since the 1960s. Figure 1 shows how the most people got their mortgages until the 1980s. Individuals would find a house. They would go to their local bank (most like a savings and loan bank) and apply for a mortgage. The bank would agree to lend the funds and then hold onto the mortgage until it was paid off or the house was sold. During this historical period, the largest holders of mortgage debt were private banks.

(Figure 1 about here)

Figure 2 describes the way in which the entire mortgage industry is currently organized. Here, the borrower goes to a lending company (frequently a bank, but not exclusively) who now is called an “originator” because they make the initial loan. Unlike the original savings and loans banks, these companies do not want to hold onto the mortgages they sell, but instead want to sell them off to others. Their business basically is organized to make fees off of buying mortgages. If they hold onto the mortgages, then they are unable to lend money again and their ability to generate fees goes away. So, they turn around and sell the mortgages thereby recapturing their capital and move back into the market to lend.

The mortgages are then packaged together into something called a special purpose vehicle by underwriters who are either government sponsored enterprises, investment

banks, or commercial banks. This vehicle turns the mortgages into an asset that pays a fixed rate of return based on the interest rates being paid by the person who buys the house. These bonds are then rated by bond rating agencies in terms of their risk involved and sold by investment banks to various classes of investors. These special purpose vehicles divide up the mortgages into what are called “tranches”. Here the mortgages are separately rated by bond agencies in terms of their riskiness. These bonds that contain these tranches are called collateral debt obligations (CDOs). In this way, investors can buy riskier bonds that pay a higher rate of return or less risky bonds that pay a lower rate of return. The special purpose vehicles are managed by firms called servicers, who collect the monthly mortgage payments and disburse them to the bond holder.

(Figure 2 about here)

Circa 1975, mortgages were highly geographically dispersed and held by local banks. Now, after they are issued, they migrate to a few square miles of Manhattan where in the offices of the major banks and GSEs they are packaged into special purpose vehicles. They then are re-dispersed to investors all over the world (although they are serviced from a few locations). Investors are a heterogeneous group. The largest investors in these securities are the GSEs who hold onto lots of MBS. But, MBS are held by banks, mutual funds, and private investors here and around the world. The interesting question is how did we move from a world where the local buyer went to their local bank to get a loan to one where most of the mortgages in the U.S. are now packaged into MBS and sold into a broad national and international market?

It will surprise most readers that the origins of the MBS and the complex financial structure we just presented were not invented by the financial wizards of Wall Street, but

instead were invented by the Federal government. It is probably even more surprising that this set of inventions dates back to the 1960s. The federal government has been involved in the mortgage market to some degree since at the least the 1930s. But the roots of the modern industry begin in the 1960s.

Quinn (2008) argues that the idea to create mortgage backed securities began during the administration of President Lyndon Johnson. The Democratic Congress and President had three goals: to increase the housing stock for the baby boom generation, to increase the rate of home ownership, and to help lower income people to afford housing. Quinn (2008) shows that the Johnson Administration did not think the fragmented savings and loan industry was in the position to provide enough credit to rapidly expand the housing market. But, federal officials interested in expanding home ownership were also worried about the size of the budget deficit. Because of the Vietnam War and the Great Society expansion of Medicaid, Medicare, and other social benefits, the government was running large and persistent debts. An expensive housing program where the government provided funds for mortgages would add to the deficit, because the government would have to borrow money for the mortgages and hold those mortgages for up to 30 years.

If the government was going to stimulate the housing market, the Johnson Administration would need to do it in such a way as to not add to the federal deficit. This caused them to reorganize the Federal National Mortgage Association (Fannie Mae) as a quasi-private organization, called a government sponsored enterprise (GSE), to lend money and hold mortgages. They also created a new entity, the Federal Home loan Mortgage Corporation (Freddie Mac) to compete with Fannie Mae and a government

owned corporation to insure those mortgages against risk of default, the Government National Mortgage Association (Ginnie Mae).

But taking these mortgage granting entities private was not the only innovation of the Johnson Administration. The government also pioneered the creation of mortgage backed securities (Sellon and VanNahmen, 1988). The government, even in the GSEs, did not want to ultimately hold the mortgages because this would limit how many mortgages it could originate. Instead, it wanted to use its capital to fund the mortgages and then offer the mortgages to investors as bonds. It did so by offering and guaranteeing the first modern mortgage backed securities (MBSs). These bonds could then be sold directly to investors and were sold by the GSEs or through investment banks (Barnat, 1990). The first mortgage backed security was issued on April 24, 1970 by Ginnie Mae (Wall Street Journal, 1970)

The private MBS market barely grew in the 1970s. There were several issues. The savings and loan industry continued to have control over the bulk of the mortgage market where they took deposits, lent money, and held onto mortgages. But potential buyers of mortgage bonds were skeptical of buying mortgage backed securities because of prepayment risk. The problem was that if you bought such a bond, people might pre-pay the mortgage before the end of the mortgage term and bond holders would get their money back before they made much of a profit. This was made worse by the fact that mortgage holders were more likely to re-finance houses when interest rates were falling thus leaving bondholders with money to invest at interest rates lower than the original mortgages (Kendall, 1996).

This problem was ultimately solved through joint cooperation between the GSEs and the investment banks. They created the system of “tranching” described above in order that investors could decide which level of risk of pre-payment they wanted (Brendsel, 1996). But there were also legal and regulatory issues involved in the packaging of bonds (Quinn, 2008; Ranieri, 1996). The most important was the problem of turning a mortgage into a security. The issue of a loan originator selling the mortgage into a pool of mortgages required changing the tax laws. The Tax Reform Act of 1986 cleared the way to the rapid expansion of the MBS market. Investment banks and government officials worked together to solve these problems.

The demise of the savings and loan banks was a fortuitous collapse that hastened the growth of the MBS market. The general economic crisis of the 1970-80s produced very high interest rates. Savings and loans banks relied for most of their funds on individual deposits. The regulation known as Regulation Q fixed the rate that savings and loan banks could pay on these deposits. Savers began to flee those accounts and the savings and loan industry faced the crisis that they could not raise enough money to make new loans. Moreover, they were holding onto a large number of mortgages that were priced at very low interest rates. Congress responded by passing the Garn-St. Germain Act. They repealed regulation Q and allowed the banks to pay whatever interest rate they chose. They also allowed the banks to make riskier investments while still guaranteeing very large deposits.

The banks responded in several ways. First, they began to sell their mortgage holdings at a great loss in order to raise capital. These mortgages were repackaged into MBS by primarily Solomon Brothers (Lewis, 1990). They also began to pay high interest

on interest rates on government guaranteed bank accounts. They then made very risky investments including many in commercial real estate which helped create a commercial real estate bubble. This caused their ultimate demise (Barth, 2004).

(Figure 3 about here)

The basic outlines of the mortgage securitization industry producing mortgage deals structured like those illustrated in figure 2 was in place by the late 1980s. The MBS market grew enormously as the Savings and Loans Banks collapsed. Figure 3 shows how the GSEs took up the slack from the savings and loan banks during the 1980s. In 1980, the GSEs had only issued \$200 billion of mortgages. This grew steadily to a peak of \$4 trillion in 2006. Figure 4 shows the dramatic decline of the savings and loans and the rise of the government backed mortgage market. As late as 1978, the savings and loan banks held almost 60% of the mortgage debt in the U.S. But beginning in the late 1970s their market share plummeted. By 1990, less than 15% of mortgages were held by savings and loans. The sharpest rise in mortgage debt was now being packaged by GSEs into MBS pools. About 50% of the mortgages were in these pools. If one adds the 10% or so of the mortgages that were being held by GSEs, the GSEs were involved in 60% of U.S. mortgages.

(Figure 4 about here)

Beginning in the early 1990s, a financial revolution began amongst banks. It is at this moment that the banks become more aggressive in all financial markets. This revolution began with the idea of securitization, but quickly created more complex and financial instruments to create new ways to invest and control risk. It is to the story of the past 15 years that we now turn.



## The Rise of the MBS Market, 1993-2003

The GSEs remained the central actors in the mortgage securitization market through the 1990s. But by the early 90s, the people who worked for investment banks came to see that mortgages could be profitably packaged and sold as bonds in the same way as their other products (Jungman, 1996). Further, the potential size of these markets was huge. The market for mortgages in the U.S. increased from \$458 billion in 1990 to nearly \$4 trillion at its peak in 2003. Most of these mortgages were packaged into MBS, and although most MBS were still sponsored by the GSEs, commercial or investment banks played an increasingly prominent role putting these packages together and helping the government sell them. As we elaborate further below, the big banks also created a massive market segment for those unconventional mortgages which the GSEs would not back, especially after 2003.

(Figure 6 about here)

The growth of MBS during the 1990s occurred alongside (and contributed to) an unprecedented period of growth in the housing market. In most of our accounts of the crash, commentators rarely spend much time discussing the rapid upsurge in housing sales first from 1990-1998 (almost tripling in size in 8 years) and then in 2000-2003 (where the market rose almost 400% between 2000 and 2003). Instead, they treat the housing market growth as a background condition and focus their attention on the end of the bubble from 2006-2008 and the role of such things as lack of regulation, the growth of the use of financial instruments, and the greed and bonus pay of bankers that caused

them to engage in riskier and riskier ventures. But all of these factors were present before the housing boom and they contributed as much to the increase in mortgages over a 15 year period as they did to the decline in 2006-2008.

It is useful to document the growth of the mortgage origination market since the early 1990s. Figure 6 presents data on total loan originations from 1990-2008. It also breaks down the loan types into various products. The American mortgage market was about \$500 billion in 1990. During the 1990s, it went up to nearly \$1 trillion in 1993, peaked in 1998 at around \$1.5 trillion. In 2000, it stood at \$1 trillion a year. The real surge in the mortgage market began in 2001 (the year of the stock market crash). From 2000-2004, residential originations the U.S. climbed from about \$1 trillion to almost \$4 trillion.

The second bubble had different causes. 2000 will be remembered as the year of the crash in “dotcom” stocks. As that crash began, the Federal Reserve, in response to the crash essentially lowered interest rates to zero. Their actions were met by similar actions in central banks around the world. The Federal Reserve did this to make sure that there was substantial credit in the economy and that lending would continue. But, the unintended effect of lowering interest rates so far was that it encouraged the housing bubble in the U.S. The rapid rise of that bubble was astonishing: mortgage origination rose 400% in four years. That the Federal Reserve knew this and did not take any actions to stop it is one of the critical facts to be explained. Alan Greenspan has testified that he did not believe this was a bubble because housing prices are a local affair in the U.S. Hence, a house in Boston is not substitutable for a house in Atlanta.

But what his analysis chose to ignore was that the cheap interest rates across the country and strong demand from investors in the secondary market encouraged banks to loan as much mortgage debt as they could. Bankers could borrow money at around 1% and loan it at 5-7%. This caused bankers to search far and wide for any local real estate market where they could make loans. Where housing was scarce and population was growing, prices rose and this encouraged banks to focus on those markets. It is not surprising that Arizona, Florida, Nevada, and parts of California were the ground zero of the housing crisis. In other words, the housing bubble's roots were systemic, and they were driven by the governmental policies that encouraged home ownership and securitization. It then dropped to \$3 trillion from 2004-2006. Then it dropped in 2007 to about \$2 trillion and in the crash in 2008 to \$1.5 trillion.

The other major factor in both the first and second housing booms was the proliferation of mortgage securitization tools and the increased participation of the bigger banks in these processes. The large banks entered these markets with the goal of growing them and growing their market share in them. They aggressively used securitization tools as a way to raise money for mortgages and a way to sell them. Figures 7 and 8 show how the top players in various parts of the mortgage market shifted over time as those markets grew. Figure 7 shows that in 1996, the largest players in the mortgage market were mostly either mortgage specialists like Countrywide or NW Mortgage or regional commercial banks like Fleet Financial or PNC. But by the end of the second bubble, the identities of the largest loan originators had changed. Now the largest mortgage originators were the large national bank holding companies like Wells Fargo, Citibank, and Bank of America. Countrywide had turned itself into a national bank as had Chase,

Wachovia, and Washington Mutual. These large players grew larger as the national market expanded.

(Figure 7 about here)

(Figure 8 about here)

Figure 8 shows a similar process for the packagers of MBS, which in the industry jargon are called “conduits”. In 1996, both Solomon Brothers (now part of Citibank) and Merrill Lynch were on the list. But the packagers of MBS were generally smaller firms who were more narrowly focused financial firms than investment banks. In 2007, the list of mortgage conduits is dominated by the investment banks. Lehman Brothers, Bear Stearns, JP Morgan, Morgan Stanley, Deutsche Bank, and Merrill Lynch dominate the list. Note that now several of the largest originators of mortgages, banks like Countrywide, Washington Mutual, Indy Mac, and Wells Fargo have taken advantage of the changes in Glass-Steagall. They now not only make mortgage loans but they act as packagers of those loans. These tables imply that the major beneficiaries and indeed the drivers of the growth in the mortgage origination and the MBS business were the largest investment and commercial banks.

One of the least remarked upon features of the mortgage origination market is the degree to which it became concentrated over the period. To our knowledge, the only other scholarly commentator who presents similar data is Kaufman (2009). Figure 7 shows that the market share of the top five originators stood at 16.3% in 1996, a remarkably low concentration ratio. But in 2007, the top five originators accounted for 52.5% of a much larger market. Figure 9 shows how the concentration of lenders changed from 1990 to 2008. In 1990, the 25 largest lenders accounted for less than 30% of the

mortgage market. This rose steadily during the 1990s and by 2007, the top 25 originators controlled 90% of the market. This data directly contradicts one of the standard tropes about the mortgage securitization business: that the market for originators of loans was remarkably unconcentrated. While it is true that the number of independent mortgage grew in number over this period, the origination market was dominated increasingly by the big national banks. They either negotiated exclusive contracts with so-called shelf originators or acquired formerly independent originators in order to assure themselves of a supply of mortgages.

(Figure 9 about here)

Table 8 also shows a similar process for the conduit market. In 1996, the top 5 producers held a 24.5% market share while in 2007 this rose to 41%. If one looks at the top 10 conduits in 2007, the total is 71%. So, there was not just a rapid growth in the size of these markets, but also a rapid concentration of activities in a fewer larger and more nationally oriented banks.

It is important to understand why the same large commercial and investment banks were at the core of each MBS market segment. Investment banks historically were involved in two related businesses. They helped package and sell corporate and government bonds for investors. They also helped firms issue stock and advised on mergers and acquisitions. These activities placed them in the center of the financial system where they acted as financial intermediaries. The Glass-Steagall Act forced banks to choose whether or they wanted to be investment banks or commercial banks, and enforced restrictions on the activities of each. During the past 15 years, policymakers and bankers have worked to have this barrier broken down. One of the reasons that this was

so is because of the MBS business. As that business became larger, commercial banks wanted to be able to sell loans (be originators), package loans (be conduits), and hold onto loans (be investors). Firms like Bank of America and Citibank saw that fees for putting together these packages ended up with investment banks, and they too wanted access to this lucrative business. Similarly, investment banks looked to secure upstream supply of mortgages by taking over originators so they could apply their deal structuring expertise on a larger scale. Both investment and commercial banks got their wish. The Glass-Steagall Act was rescinded in 1999 and banks were allowed to be in any business they chose. This removal of market demarcations allowed large firms to integrate and fully participate in every part of the MBS market.

The repackaging of mortgages into bonds became the largest fee generation business for many investment banks including Solomon Brothers, Lehman Bros., Bear Stearns, Merrill Lynch, Morgan Stanley, and Goldman Sachs. Of course, commercial banks and bank holding companies like Bank of America, Wells Fargo, Citibank, and Countrywide Financial also became deeply involved in all stages of the market, from origination to packaging, to servicing.

The major firms employed strategies to profit from MBS in multiple ways simultaneously, earning money both from fees and from income on retained MBS assets. Bank originators could either use their own capital or cheap borrowed capital to make loans to home buyers (Ashcroft and Scheuermann, 2008 take up this story). Then, they could turn around and sell those loans to conduits. If they used someone else's money (borrowed at say 1-2%), then they could essentially do the entire transaction with very low cost and relatively high fees. Conduit banks could also borrow money cheaply. They

would then buy up the mortgages, package them, and sell them to investors. But, beginning sometime around 2002, both commercial banks and investment banks began to realize that they could borrow money for 1-2%, create MBS, and hold onto the MBS which might pay as much as 6-7% in interest. This allowed them to make a profit using other people's money and without risking their own capital. The low interest rates in the U.S. and the world encouraged banks of all kinds to make as many loans as they could and to hold onto MBS because they were earning money on borrowed money.

(Figure 10 about here)

But it was not just conduit banks that figured out that they could borrow money cheaply and buy and hold MBS. Figure 10 documents who owned MBS. The conduits increased their holding of MBS from about \$35 billion in 2002 to \$175 billion in 2007, a more than 400% increase. But, at the same time, commercial banks increased their holding from \$650 billion in 2002 to \$1.1 trillion in 2007. Other private investors (including hedge funds) increased their ownership of MBS during this period from \$25 billion to \$700 billion. Mutual fund operators began to buy MBS as well and went from about \$400 billion to nearly \$850 billion. Most spectacularly, foreigners increased their investment from \$200 billion to \$1.2 trillion. This shows that the world wide appetite for what were thought to be safe but high yielding investments was one of the drivers of the crisis. The demand for "safe" high yield bonds was not just being generated from the loose U.S. monetary policy but from capital supply around the world.

The massive growth of MBS led to the development of two sorts of secondary markets (Barnat, 1990). First, the collateralized debt obligation market (CDO) allowed for further pooling and tranching of risk by resecuritizing existing MBS tranches or other

income streams including such things as corporate debt and aircraft leases. Second, the credit default swap (CDS) market allowed firms to insure the risks they held on CDO and other financial instruments (see Tett, 2008 for a lucid discussion of the evolution of CDS).

As the mortgage securitization market has been negatively affected by the collapse of the subprime lending market, this has put pressure on both the CDO market and the CDS market. In the CDS market, losses have been higher than expected. Since many firms bought CDSs to protect themselves against such risks, this has meant that holders of the CDSs have come under pressure to pay off their obligations. One of the main suppliers of CDSs for mortgage backed securities was AIG, and their exposure in this market was the main cause of their takeover by the government.

### The Growth of Subprime

By 2003, investors of all kinds, commercial banks, investment banks, hedge funds, insurance companies, and other private investors had figured out how to use leverage by borrowing money cheaply to buy MBS. Investors who actually had cash, like pensions funds, insurance companies, and governments and banks around the world were seeking out safe investments that paid more than 1-2%, the going rate for government debt. American mortgages seemed like a good bet. The underlying assets of mortgages were houses and the MBS contained mortgages from all over the country, thereby appearing to be diversified geographically. American housing prices had risen steadily for as long as anyone could remember. Finally, MBS were rated and it was possible to



secure “AAA” rated bonds. This made American mortgages seem like low risk, high yield investments.

Then in 2004 the MBS market experienced a supply shock. The reverberations from this event would lay the groundwork for the market meltdown in 2008. As shown in figure 6, the supply of conventional mortgages peaked in 2003 and began a rapid decline thereafter. About \$2.6 trillion worth of conventional or prime mortgages were bought in 2003 and this dropped to \$1.35 trillion, a drop of almost 50% in 2004. The steep decline in mortgage originations reflected neither weakness in the housing market nor slackening demand from the secondary market. Rather, a saturated prime market and an interest rate hike led to a significant drop off in the refinancings which had driven the 2003 boom. So, while those who had money to buy MBS were looking for product, those who were originating and packaging MBS lacked enough to sell them. This meant that there was a huge incentive to increase the number of mortgages. This incentive sent loan originators looking for new mortgage markets to feed the securitization machine and led to the rapid growth of the “sub-prime market”, i.e. the market to lend to people with poor credit histories and little in down payments.

The rapidity with which firms gravitated toward subprime in order to make up for the diminishing inventory of prime loans is remarkable. In 2001, the largest conventional (prime, government-insured) originator did 91% of its origination business in the conventional market. By 2005 the largest conventional originator was doing less than half of its origination business within the conventional sector.

It is useful to discuss Figure 6 in more detail in order to understand the implications of this transformation of the mortgage market. At the bottom of the graph

are home loans originated by the Federal Housing Administration (FHA) and the Veteran's Administration (VA). These were never a large part of the total originated loans although they did increase slightly after 2001. The largest parts of the market were conventional and conforming mortgages. These are mortgages for people who put down 20% for their house and whose loan value is not above a certain cutoff point where they need to pay additional interest to protect the higher risk associated with a higher loan amount. The cutoff point was continuously raised as prices increased. We can see that the bulk of the mortgage market from 1990 until 2003 consisted of these two categories of loans.

But beginning in 2003, we begin to see rapid increases in non conventional loans. It is in all of these categories that banks began to search out customers. Home equity loans refer to loans made against the value of the equity in a house. These were frequently in the form of a line of credit or a second mortgage. Alt-A and subprime mortgagees (sometimes called "B" and "C" mortgages to denote their lower bond ratings) were people with poor credit history or people who lacked the ability to make a large down payment (or sometimes both). Jumbo loans have higher interest rates because the loan amount exceeds a value set by the FHA each year.

In 2004, for the first time, these four categories of loans exceeded the prime market or conventional market. In the peak of the mortgage craze in 2006, fully 70% of all loans that were made were unconventional mortgages. This astounding change in the character of the mortgage market was noticed by regulators and Congress. But, the Federal Reserve chose to ignore what was going on. Alan Greenspan has famously testified before Congress that the reason he did nothing to stop this rapid growth in

unconventional mortgages is that he did not believe that banks would not have made these loans if they thought they were too risky. He is also on record as saying that he clearly was mistaken on this point.

(Figure 11 about here)

To understand how fully the private sector banks were behind the subprime crisis, it is useful to turn to figure 11. This figure contains the amounts of MBS issuance by type of mortgage from 1995 on for private sector banks. During the 1990s and continuing through the first part of the 2000s, the conventional or prime MBS market was dominated by the GSEs. But beginning in 2001, the portion of the MBS market controlled by “non-agency” banks (i.e. private banks) rose dramatically. At the peak of the subprime market, the private banks issued almost \$1 trillion of unconventional MBS each year. Subprime lending and subprime securitization had long existed as a marginal niche market, but by 2005 this market had moved to the center of the financial sector, massive in size and populated by the biggest financial firms.

### Turning B/C Mortgages into AAA Bonds

Another key set of actors in legitimating this transformation were the ratings agencies. While virtually all commentators agree overinflated bond ratings were a central factor in producing the crisis, we currently know very little about the sources and patterns of ratings inflation. What drove ratings inflation? When did it begin? How was it related to the growth of sub-prime, Alt-A and other “nontraditional” sectors of the mortgage market? How was it related to the increasingly complex structures issuers were using to

engineer securities? In this section we provide an anatomy of MBS rating dynamics and show how the patterns revealed by this anatomy offer important insights into overarching explanations of what happened.<sup>1</sup>

(Figure 12 about here)

Figure 12 chronicles the compositional shift in the initial ratings for nonconforming mortgage MBS from 2003-2007, the core years of the run up in those mortgages. Astonishingly, as the period goes on, the percentage of issues receiving a AAA rating increases from 15% to 42%. Almost 80% of the nonconforming MBS received an A rating or above. So even as the number and size of these MBS increased, their average ratings increased as well. Here we aggregate B/C, Alt-A, and HEL MBS for the sake of space, but the same common trend toward fabricating increasingly prime-grade securities from non-prime mortgage debt was virtually identical within each of these nontraditional asset classes. This inflationary trend is all the more remarkable insofar as other evidence suggests the credit composition of borrowers was moving in the opposite direction during this period (Keys et. al., 2008).

One could argue that these ratings were legitimate. To show that unconventional MBS were increasingly overrated, one would need to examine how the ratings fared over time. A good measure of this is the number of times that a bond is downgraded. Here the data indicate that compositional inflation was coupled with considerable diminishment in ratings quality/accuracy between 2003 and 2007, especially amongst the most highly-rated tranches. First, overrating became progressively more widespread. Whereas

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<sup>1</sup> The analysis is based on longitudinal ratings history of all non-agency MRS securities contained in the Bloomberg database. The data includes non-agency residential MBS and CDOs rated by one of the big three agencies, S&P, Moodys, and Fitch. These three agencies account for virtually all bond ratings activity. Only deals issued in U.S. currency and containing primarily U.S. mortgages are included.

approximately half of the B/C, Alt-A, and HEL securities from the 2004 vintage were subjected to downgrades of at least two notches after the meltdown, over 80% of the securities issued in 2006 were significantly downgraded. This pattern is repeated more or less equivalently across each of the individual asset categories, indicating a secular trend toward more extensive MBS overrating.

(Figure 13 about here)

Second, overrating also became progressively more intensive between 2003 and 2007. Figure 13 shows the average magnitude of subsequent ratings downgrades by vintage of the bonds through May 2009. The graph shows that all bonds were subject to significant downgrades after the meltdown. But it shows that bonds issued in 2005-2007, the height of the subprime market, were particularly downgraded. A bond issued in 2006, for example, was downgraded on average 4.6 steps while a bond issued in 2002 was only downgraded 2.8 steps. Not only were bonds issued after 2004 more highly rated, but they were also clearly more overrated as evidenced by the large downgrades they took as the market deteriorated. Figure 18 breaks this out by the type of bond. Again we see a tendency for the bond downgrades to affect all types of MBS. But generally, the riskier B/C, HEL, and Alt-A -backed bonds experience the most severe downgrades.

### Causes of the Crisis

We would argue that the proximate causes of the crisis can be found in two shifts in the structure of the mortgage securitization field. First, the easy credit available to all forms of financial investors after 2000 meant that money could be made by borrowing

money at a low interest rate and then turning around and buying MBS. This process of leveraging was the core strategy of banks and many other financial institutions. Investors worldwide who were not leveraged were also searching for higher, but safe returns and American mortgages looked good to them. These strategies brought all of the major banks aggressively into mortgage securitization, and brought mortgage securitization into a linchpin of the financial sector.

But, the second cause (which is not well understood) is as important as the first. By 2004, there were simply not enough prime or conventional mortgages left in the U.S. to package into MBS. This brought about a search for new customers, many of whom had less money to put down or worse credit. It was the dramatic growth of the subprime and Alt-A market that came to replace the prime or conventional market. The aggressive pursuit of that market by banks of all kinds has led us to the current situation. The main role of the credit ratings agencies was to allay concerns by assuring participants that the transformation of the securitization market was not a dangerous one. The main role that regulators played was to refuse to intervene into these markets. The Federal Reserve was dominated by people who believed that in spite of this dangerous shift in the market, market actors would not take on too much risk. We now know this was wrong. The evolution of banks' strategies since the early 2000s had left them highly leveraged on assets which were largely junk.

It is useful to briefly outline the mechanics of how mortgage defaults reverberated through the financial system. There were two main forces that eroded the positions of banks and the GSE beginning in 2007. First, the rate of foreclosures on “AAA” subprime MBS bonds turned out to be higher than was predicted. By July 2007, delinquency and

foreclosure rates had risen to the point that even the reticent bond ratings agencies were forced to start mass downgrades of subprime tranches. As their price dropped, banks who had taken loans to buy the MBS had to either pay off those loans or put up more collateral to keep them. This was because most of their loans contained covenants that required them to up their capital investment if bond prices fell or the credit rating on the collateral was downgraded. Most banks were very highly leveraged and eventually found it impossible to raise enough capital to cover their loans. By mid-2007, it was clear that subprime mortgages were undermining bond prices and pressure was brought to bear on all of the banks. By spring of 2008, banks like Bear Stearns began to fail.

(Figure 14 about here)

It is useful to look at what has happened to the top banks that were leaders in the mortgage securitization business circa 2005. Figures 14 and 15 show how the top ten firms in the subprime mortgage origination business and the subprime MBS business fared. Seven of the ten largest subprime lenders in 2005 are either out of business or absorbed by merger. Eight of the ten top subprime MBS firms in 2005 are either out of business or merged into other entities. The collapse of the subprime market essentially wiped out all of the firms that had grown large on that business. The big investment banks at the core of the subprime MBS market no longer exist with the exception of Morgan Stanley and Goldman Sachs. Citibank, Bank of America, JP Morgan Chase and Wells Fargo have emerged as large conglomerate banks having absorbed many of the subprime losers, while both Goldman Sachs and Morgan Stanley have reorganized themselves to become commercial banks.

(Figure 15 about here)

One can expect many more bank mergers and it is likely that a few large conglomerate banks will end up dominating the American banking scene across all products. The complete collapse of the investment banks shows the folly of sub-prime mortgage securitization. The managers of the firms that took this risk have lived by the sword and died by the sword. What has saved the economy is the government takeover of the GSE and the propping up of the rest of the banking system. The Federal Reserve now is the largest purchaser of MBS. In an ironic way, the MBS market has come full circle. The government began by attempting to stimulate the housing market in the 1960s and 1970s. They were pleased to invent and support the market and do what it took to bring in private investment. But eventually, those banks expanded their activities into risky investments with borrowed capital. The government has returned full bore into the market and now underpins it.

### Subprime MBS: Some Myths and Realities

There are several alternative perspectives on the crisis to the one we present above. In this section we examine these competing accounts and show that they are inconsistent with key pieces of evidence. One popular account of the crisis focuses on the structure of transactional incentives. Proponents of this account argue that perverse incentives and information asymmetries between the sellers and buyers of MBS encouraged the former to sell off risky assets. It also meant that those who bought the bonds did not know how risky subprime mortgages were.



Because MBS are bonds, they are regulated by the Security and Exchange Commission (SEC). When a conduit bank wanted to issue an MBS, it has to file a prospectus with the SEC. These prospectuses are public information that can be accessed via the web in two or three clicks of a mouse. The term subprime actually has a set of formal definitions. To qualify for a prime or conventional mortgage, a person needed 20% down and a credit FICO score of 660 or above (the average score is 710 on a scale from 450-900). Mortgagees who did not have these qualifications were not eligible for prime or conventional mortgages. But, if they were willing to pay a higher interest rate, they could qualify for an Alt-A or subprime mortgage.

It is useful to be explicit about what constituted bad credit. Here are some of the conditions that could qualify a mortgagee as subprime: two or more delinquencies in the last 12 months; one or more 60 day delinquencies in the last 24 months; judgment, foreclosure, or repossession in the prior 24 months; bankruptcy in the past 5 years; a FICO score less than 660; and debt service to income ratio of 50% or greater (i.e. the monthly payment was more than 40% of the gross income of the household). It should be noted that these sets of characteristics were listed in all of the prospectuses filed with the SEC.

(Figure 16 about here)

Figure 16 presents the key institutions that helped create one special purpose vehicle for subprime mortgages: GSAMP Trust 2006-NC2. The originator for the trust was New Century Financial, one of the largest subprime originators. Goldman Sachs acted as the conduit for the trust. Moody's rated the bonds in the trust. Ocwen acted as

the servicer of the trust. Deutsche Bank and Wells Fargo acted as advisers to the trust. This trust is typical of the MBS packages that were done during this period.

The following information is available in the prospectus for the trust. Interested readers can go online to the SEC and find this information at [http://www.sec.gov/Archives/edgar/data/1366182/000112528206003776/b413822\\_424b.txt](http://www.sec.gov/Archives/edgar/data/1366182/000112528206003776/b413822_424b.txt). There were 3,949 subprime mortgagees in the trust worth \$881 million. 43.4% were used to buy a new house while the rest were re-financing of existing loans. 90.7% of the mortgagees were going to live in the house. 73.4% were single family dwellings and the rest were condominiums. 38% of the homes were in California and 10.5% in Florida. The average borrowers had a FICO score of 626. 31.4% had a score below 600, 51.9% had a score between 600-660, and only 16.7% had a score above 660. The ratio of total debt to income was 42% in the whole set of mortgages. Figure 17 shows the tranches and the bond ratings of the tranches. About 79% of the bond offering was rated “AAA”, the highest ratings. Less than 5% were rated “B” which should be more typical of a subprime rating.

(Figure 17 about here)

This information is quite detailed. It suggests that anyone who even quickly looked over the prospectus would see that the underlying mortgages in this package were risky. It is clear from the detail of this information that anyone who wanted to understand what they were buying in GSAMP 2006-NC-2 could not claim to not understand what they were viewing.

A second myth about subprime MBS is that neither the issuers nor the conduits held onto the bonds. We have already briefly discussed figure 10 which presents data on

the largest holders of MBS from 2002-2008. The GSE are the largest holders of bonds. From 2002-2008 as the supply of subprime mortgages increased most rapidly, commercial banks and bank holding companies increased their holdings of MBS from \$650 billion to \$1.1 trillion. As we noted earlier, conduits who packaged the MBS deals increased their MBS holdings 400% from \$30 Billion to \$175 billion between 2002 and 2007, even as bonds became progressively riskier over those vintages (Inside Mortgage Finance 2009). The conduits and commercial banks were deeply involved in the production of MBS; the fact that they retained such a significant portion of the assets (and often went bankrupt as a result) casts doubt on the notion that the crisis occurred because intermediaries strategically sold off all the riskiest assets to unwitting investors.

A third place where commentators have identified problematic incentives is in the ratings process. The basic problem here was that the security issuers paid the rating agencies rather than buyers. This put the agencies in the position of having to inflate ratings to satisfy their customers (the issuers), who would otherwise take their business elsewhere in a practice known as ratings shopping. The result is that issuers are able to bid up the ratings for their securities. Proponents of this explanation point to the fact that so-called shopped ratings for a given security tend to be higher than unsolicited ratings. It is also consistent with the data we presented above, which shows the agencies greatly inflated bond ratings for new MBS issues as the market grew. The problem with this explanation, however, is that this same perverse incentive structure had been in place for some time. Only after 2003 did it lead to rampant ratings inflation.<sup>2</sup> While perhaps necessary, perverse credit rating agencies incentives are insufficient to explain the over-

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<sup>2</sup> Mackenzie (2009) suggests that ratings shopping was especially amplified by the significant presence of a third agency, Fitch, in the MBS market.

time change in ratings composition. What exactly happened here remains a bit of a puzzle.

Overall, an explanation of the credit crisis based on the structure of incentives fails to account for the behavior of the main players. It is true that the structure of incentives suggested that cunning, rational firms should have securitized risky subprime mortgages and then sold them all off to unwitting investors who could not possibly understand the risky assets contained within their opaque structures. But empirically this is not what happened in the case of subprime MBS. The firms that originated, packaged, and issued subprime MBS did hold onto a considerable portion, largely because they were yielding high short-term profits. Secondly, those investors who purchased the remaining portion of subprime MBS could easily access information on the underlying mortgage collateral. Rather than a scenario in which each actor was fleecing the next guy down the line, the data is more consistent with a theoretical imagery of collective, field wide delusion.

In particular, the fact that the banks held onto so much of their own junk poses a problem for the rational actor model. One important question this raises is if banks knew the assets they held were extremely risky, why did they hold onto them? Even more important, why did almost all of the banks in the core of the market do it? Indeed, with the exception of Goldman Sachs and to a lesser degree, JP Morgan, all of the large banks continued to hold onto the subprime MBS to the very end. Answering this question is beyond the scope of this paper, but we return to this issue below as an important area for future research.

Another competing perspective on the credit crisis focuses on financial engineering innovations and the resulting complexity of securitized assets. While not mutually exclusive, this explanation differs from ours by focusing explanatory attention on the technology of financial instruments over the strategies of financial actors. For instance, Mackenzie writes that “The roots of the crisis lie deep in the socio-technical core of the financial system” (2009: 10).

There are several reasons why the growing complexity of financial assets may have heightened risk or served to conceal the risk of subprime MBS. Whereas standard MBS allowed issuers to construct predominantly AAA tranches from subprime mortgages, CDOs essentially allowed for a double upgrade by taking the mezzanine-level (BBB) tranches from conventional MBS securities (those tranches that were first to lose in the event of default), and repackaging them as AAA CDO tranches. Mackenzie argues this made CDOs especially dangerous while simultaneously making them appear less risky and more palatable. However, there has been no empirical evidence that CDO structures contributed to the meltdown above and beyond the MBS assets from which they were constituted. In other words, proponents of the complexity explanation have provided little evidence that complexity had an independent effect.

One way to empirically test the complexity argument is to examine how ratings dynamics for credit default options differed from more conventionally-structured MBS assets. If these arguments are correct, ratings inflation should be most pronounced amongst the most complex instrument classes (CDOs), and CDOs instrument’s increased riskiness should be evident in the subsequent downgrades they experienced after the bubble burst.

(Figure 18 about here)

Contrary to the hypothesis that financial engineering drove ratings inflation, the data shows that the most highly complex and innovative CDO instruments actually displayed the greatest constancy in their overall ratings composition. As shown in Figure 18, the initial ratings for newly issued CDOs remain remarkably stable over time compared to the inflationary trends evident in the MBS assets. What this means is the repackaging of MBS tranches into CDOs did not further contribute to ratings inflation. Despite a great deal of talk about the especially acute dangers of complex CDO instruments, our data show that these instruments were no more dangerous than the underlying MBS on which they were built, at least as measured by subsequent downgrades. In fact, as figure 19 shows, CDOs, along with Whole Loan (i.e. non-conforming “jumbo”) securities, actually tended to be somewhat less overrated than B/C, Alt-A, or HEL securities. This suggests that variations in overrating were related more to the underlying quality of the mortgage debt than the complexity of the bond structure. It also suggests that those who pin the sources of the crisis on the growth of more complex securitization structures must present better evidence for how CDOs heightened the riskiness of the underlying MBS on which they were based.

(Figure 19 about here)

## Conclusions

We began this paper by suggesting that there has been a symbiotic relationship between government regulation, the housing market, and the main private sector players

in that market for the past 40 years. Beginning in the 1960s, the government wanted to stimulate the market in order to expand the opportunities that citizens would have to own homes. Because of budgetary problems stemming from the Great Society and the War on Poverty in the 1960s, the Johnson Administration innovated a set of tactics to increase the incentives of the private sector to loan money for mortgages. They created the government sponsored enterprises Fannie Mae, Freddie Mac, and Ginnie Mae to buy mortgages and re-package them into mortgage backed securities.

The private part of this market struggled to take off in the 1970s and early 1980s due to a number of problems. Some of these were regulatory and some were the lack of interest on the part of private capital to invest in mortgages. Investment banks like Solomon Brothers and Morgan Stanley convinced the federal officials to support changes to the tax laws to make MBS possible and attractive to investors. The deregulation of the savings and loans banks inadvertently further promoted the mortgage securitization revolution by pushing the savings and loan banks out of their traditional Main Street mortgage finance role. This left a vacuum which Wall Street progressively filled. Government regulators were always friendly towards the investment bankers and commercial bankers who worked with the GSE to push forward MBS. For example, they worked to let banks introduce variable rate mortgages. These products protected banks against sudden increases in interest rates while forcing consumers to pay more if interest rates went up.

The mortgage market expanded rapidly during the 1990s and securitization tools allowed consumers to get mortgages and all other forms of credit more easily and cheaply. The mortgage market shifted from a \$500 billion to a \$1.5 trillion a year market

by the end of the decade. This attracted the largest banks in the country to enter the expanding market. It also caused them to lobby the government to allow banks to be in all parts of the mortgage business. Once again, both the executive and legislative branch accommodated the wishes of the financial sector. The largest commercial banks which had become holding companies and the investment banks came to dominate the market by the turn of the 21<sup>st</sup> century.

After the stock market crash of 2000, the Federal Reserve dropped interest rates dramatically. This created the conditions for a rapid expansion of the mortgage securitization market. One fact that we have noted that has not been widely noted elsewhere, is that this created a huge demand for MBS. To fill this demand, originator banks and conduit banks (sometimes the same people) needed to find a new mortgage market. The market they found was the subprime market. The Federal Reserve consistently refused to reign in the fast growing subprime part of the market. In the end, almost all of the large players in the financial system came to own lots of MBS. The ones who did so by borrowing money cheaply found themselves in a liquidity crisis beginning in 2007.

It is common to hear discussions of the subprime market in two sorts of terms. First, commentators often view subprime mortgagees as either ill informed about what they were buying or else profligate for trying to live beyond their means. Second, critics of this perspective argue that the goal of subprime mortgages was to expand home ownership to poorer people or people with less stellar credit. Since home ownership is one core part of the American dream, there are commentators who praise the rapid expansion of such credit to those consumers.



While sympathetic to the second claim, our discussion suggests that the speed with which the subprime mortgage market was expanding should have alarmed government officials. The rapid decrease in the conventional mortgage share of the market coupled with the rapid increase in the nonconventional part of the market should have alerted government officials to a potential problem. Moreover, the increasing use of leverage to buy and hold MBS was a clear sign that low interest rates was driving banks to find people to lend money to in order that the banks might borrow money to loan to those consumers and then hold onto the bonds. Finally, the rapid inflation in the ratings for subprime mortgages as they grew to comprise an ever larger portion of the market should have raised many questions. The entire structure of the core of the U.S. banking system quickly found its way to making its main profits from putting together MBS deals for nonconventional mortgages.

We began this essay by suggesting that one of the main problems of regulators is that they actually lack a view of how the financial market was a system. By system, we mean a set of markets that had a small set of participants, all of whom knew one another, watched one another, and imitated one another's moves. These same players came to want to occupy positions in all parts of the mortgage market in order to expand their businesses and make fees off of selling mortgages to consumers, packaging those mortgages for investors, selling those mortgages to investors, and holding onto a sizeable part of the MBS which they bought with borrowed money. In this system, every bank could make money in every way.

Regulators facilitated the creation of this structure in many ways. They helped pioneer the instruments and they supported the market by creating GSE which offered

government guarantees to mortgage investors. They passed friendly legislation whenever the industry asked for it. Most importantly, they declined to intervene into the markets almost under any circumstances. They did so trusting that the bankers knew what they were doing. We would argue that this was a kind of passive form of regulatory capture. Bankers made their wishes known to regulators and they eventually got favorable legislation and lax regulation. Bankers also took advantage of regulators by shopping for regulators who would treat them favorably (Davis, 2009). Government officials essentially trusted the market and believed that the private incentives were in place to prevent any form of meltdown.

If we are correct, this implies that any changes in regulation must begin with the idea that the mortgage securitization industry was a system, a set of interconnected market dominated by a few players with a set of tactics that every knew. In the introduction, we argue that regulators, legislatures, the executive branch, the banks themselves, and the bond ratings agencies have all been part of the MBS story. We note that until 2003, the MBS market appeared to be working fine. It provided large amounts of loans to a large number of consumers and it grew dramatically. It is our belief that this success made regulators after 2003 cautious in thinking that anything might have been wrong. But, with hindsight, we think there are some important lessons to learn and some obvious reforms to be made.

What don't we know?

The story we have told has outlined the anatomy of how mortgage securitization rose and fell. We show how consistent with a view of markets as fields, the government played a critical role in the founding of the market and its subsequent evolution. We have also showed how the government over time also wanted the private sector to become more and more involved in providing mortgages to more and more Americans. This meant that presidents, Congress, and regulators generally acted to give private firms what they wanted in order to get them to be more involved in the market.

This raises two interesting questions. First, government officials certainly broadly accepted what Kaufman has called “economic libertarianism” (2009: 235). By this he means that they viewed the role of government as mostly needing to stay out of the way of financial market processes. In other words, financial markets were efficient and they worked. They had this view certainly from the mid 1980s on and it caused them to seem to forget that the government had initiated the market and continued to underwrite it through the GSEs. One of the most curious questions is how did such policymakers understand the link between their more overt roles in helping to produce and sustain this market and their more prosaic view that the market was self regulating?

A related question is the role of the banking industry in this process. We have two imageries here. One is individual banks appear to use the system ruthlessly to their advantage by working to escape regulations and shopping for the easiest regulation they can get. The other is that the industry got what it wanted through regulatory capture: allowing for variable mortgages, changing tax laws so MBS could be held by pension funds and insurance companies, repealing Glass-Steagall, and affecting the accounting

involved with MBS they held. Was there regulatory capture or did firms really have to regulation shop to get what they wanted?

There are a number of other unanswered questions. We have just begun to explore the degree to which the mortgage business changed, particularly from 1990 on. The conventional wisdom is that 1980s financial deregulation and the decline of Savings and Loan associations led to vertical disintegration of the mortgage finance value chain. On the contrary, our data suggest that banks grew bigger and more integrated around mortgage finance. It also implies that banks viewed it as necessary to partake in each transaction along the chain, from selling mortgages to individuals, to packaging mortgages into MBS, to servicing those loans, and finally to retaining a portion of their MBS as investments. It is important to understand better this vertically integrated market structure. One argument is that banks shifted from client based banking to transaction or fee based banking in the 1990s. This shift in their underlying conception of control is not well documented nor well understood. To the degree that it happened, it explains why banks found it irresistible to capture all parts of the mortgage transaction chain. This represents a whole field of study using archival, interview, and quantitative data.

The question of what investors really knew about the MBS they were buying also remains not totally understood. Behavioral finance claims that actors are greedy, tend to underestimate risk, tend to be too optimistic, tend not to have good knowledge of risk, and finally tend to follow herds. The dominant explanation for this and other bubbles rests on these assertions (for examples of this kind of argument see Schiller, 2008, Akerlof and Schiller, 2009; and Krugman, 2009).

We are skeptical of strong forms of this argument for a couple of reasons. There is evidence that the buyers and sellers of MBS did believe that mortgages were relatively safe and that this was based on historical data and the use of CDS as insurance. We see little evidence that information about the riskiness of subprime loans/MBS was unavailable to investors. However, we do not know how much they sought such evidence out or whether they were duped by high credit ratings and convincing bond salesmen. We also do not really know the degree to which higher level executives did or did not know how risky the investments their underlings were making or if they just did not care because the housing market seemed like a safe bet and they assumed the government would bail them out if there were truly a disaster. There are several possible answers future research might explore. First, there is a great deal of anecdotal evidence that bank executives understood CDSs as a form of insurance which they thought would protect them in a downturn. Second, all of the banks were making lots of money off of borrowing money at low interest rates and holding onto subprime MBS investments. Many of these firms probably thought that if they had to sell off the MBS, they could do so into what seemed like a relatively liquid market. Since they were making essentially free money off of these investments, losses would have to be prohibitively large to offset the gains to date.

Another related issue concerns the rationality of the main actors after the housing market began to stall. How rational were banks in understanding what was going on once these markets began to unravel? Were they in denial as James Cayne of Bear Stearns appeared to be or were they caught in a downward spiral that they understood, but could do little about given the tight interconnectedness of the financial system?

It is clear that the markets and most of the dominant firms registered little response when housing prices started to stall out and foreclosure rates began to rise as early as late 2006.. Several large banks such as Merrill Lynch continued to aggressively expand their non-prime businesses in early 2007, and signs of troubles in the subprime market were widely portrayed in the financial news media as an isolated issue. Only once Bear Stearns could no longer fund their obligations did the markets also begin to look for other banks that were similarly vulnerable. It was this cascade of information that eventually brought the whole show down.

Finally, we know little about the people who used subprime mortgages to buy their homes and why they did so. We have multiple images of such buyers. First, we are told that poor people were sold a bill of goods whereby they got home ownership but with a predatory loan. These were people with no jobs, no income, and no down payment. Second, we are also told that about one quarter of loans at the end of the mortgage bubble were going to speculators who never intended to live in their homes but instead intended to sell the properties as soon as prices rose. Third, we have the image of people who live in parts of the country where home prices are rising so fast, that they no longer can afford to buy with a conventional mortgage. These middle class people seeking out good neighborhoods and good schools for their families end up deeply in debt. They are forced into the subprime market because they can't afford a conventional loan. It is important to sort out the degree to which each of these stories is true in order to protect consumers and regulate mortgage markets more effectively.

#### Policy Recommendations

Even without knowing everything about what happened in great detail, it is possible to consider what types of regulation might make sense. There are a number of areas where government regulators either failed to use the powers they had or Congress refused to add additional regulation. We list those below and suggest regulatory actions.

1. Subprime borrowers were the victims of predatory lending practices. There is sufficient evidence for this point (not presented here). What we have presented here is that banks rapidly moved to sell mortgages to people who probably have credit very far beyond what made sense. There is evidence suggesting that frequently, these people did not know what they were buying.

Solution: Laws should be passed and enforced prohibiting such lending practices. Such laws would have protected consumers and tempered the rapid growth of the subprime bubble, without altogether inhibiting the provision of housing finance to those underserved populations who legitimately needed it.

2. The credit rating agencies are paid by the packagers of the bonds. This creates a conflict of interest whereby the bond rating agency does not help the buyer of the bond but the seller.

Solution: Credit rating agencies should be held responsible for the transparency of their rating schemes. It would also be a good idea to figure out how to have the buyers of MBS pay for the credit ratings and not the sellers of loans. There is a clear conflict of interest here and one that obviously had an effect.

3. Investment banks and other investors used loans to buy mortgage securities and formulas that assumed inappropriately low default rates and inappropriately high prices. This meant they were leveraging their capital substantially. When the underlying assets began to fall, they were unable to back them up and raise additional capital.

Solutions: Banks should be regulated more closely to insure that their capital is adequate to cover their potential losses. Banks should also have to put all of their financial risks on their books and not be allowed to have special purpose vehicles that remain off books. They should also have to use more realistic risk assessment models for those securities.

4. The Federal Reserve decided to keep interest rates low in the 2001-2005 period. This encouraged the housing bubble and it encouraged banks to borrow money cheaply to buy mortgage backed securities.

Solutions: The Federal Reserve should take more seriously its role in providing the fuel for bubbles whether they are stock market or housing market related. Had the Federal Reserve raised interest rates earlier, the investment banks would not have had the incentive to borrow money cheaply to buy mortgage backed securities. They should have also been wary of rapid shifts in markets such as took place from 2003-2007 in the MBS market and not assume that market actors understood the risks.



5. The largest banks that emerged were allowed to use their highly regulated activities to provide capital for their riskier activities. This meant that when their loans went bad, they were deemed “too big to fail” and required large bailouts.

Solution: Bank regulation should provide for the separation of activities of bank holding companies such that the riskiness of the banks endeavors is properly accounted for in their capital.

6. CDS were viewed as a form of insurance. Since the CDS market was not transparent, it was not clear who was insured against risk and how much insurance they had.

Solution: If the CDS market is to be an insurance market, it should be regulated like insurance. This would prevent companies like AIG from not properly exposing their risk to CDO products.

If these sets of regulations were in place, would they have been enough to prevent the current financial crisis? We think that if regulators had effectively enforced such a set of regulations, they would have made it more difficult for subprime lending to expand so dramatically after 2003. The general level of the housing bubble meant that not just subprime borrowers were at fault. Here, the Federal Reserve probably should have undertaken efforts to keep the housing bubble under control. They could have done so by raising interest rates which would have had the effect of making it less attractive for investment banks to borrow money to buy mortgage based securities. Similarly, if the bond rating agencies had done their jobs more transparently and effectively customers would have had a better idea about what they were buying.

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Figure 1: The mortgage industry circa 1975



Figure 2: A Mortgage Securitization Package (adapted from L.T. Kendall, 1996, p.3).

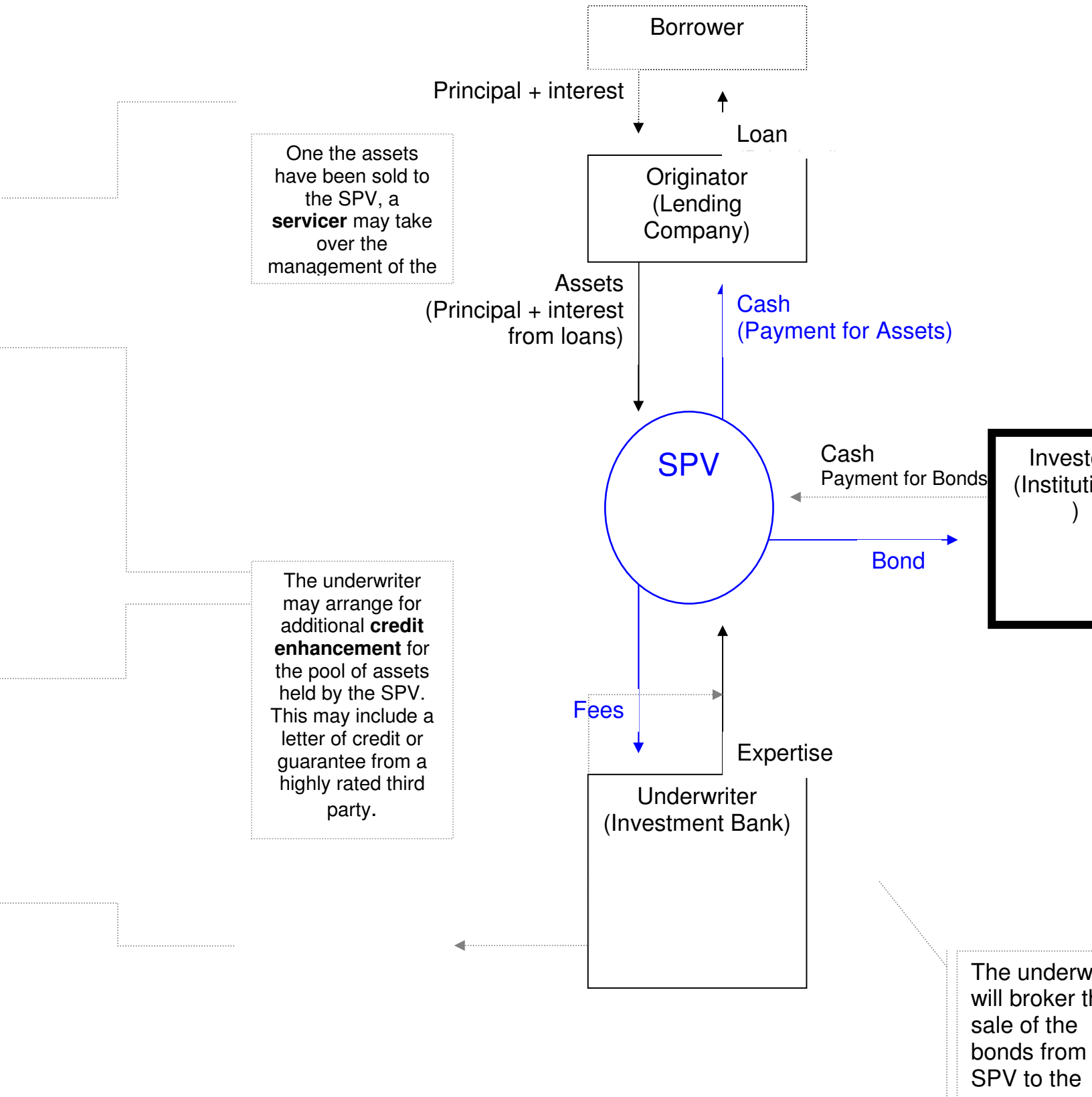
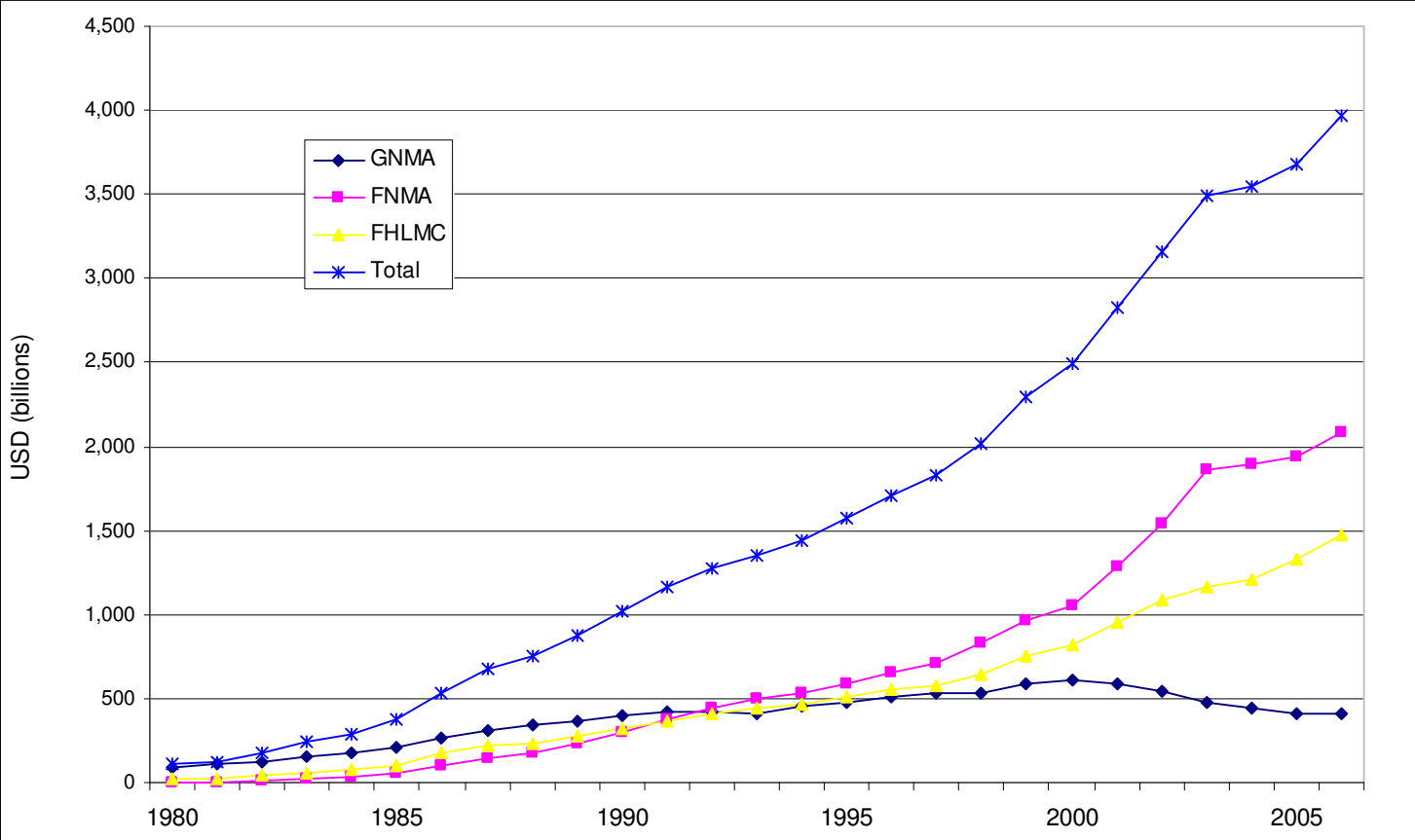


Figure 3: Agency Mortgage-Backed Debt Outstanding, 1980 - 2006



Source: Securities Industry and Financial Market Association (SIFMA)

Figure 4: Percentage of mortgage debt held by institution. Source: Green and Wachter, 2007.

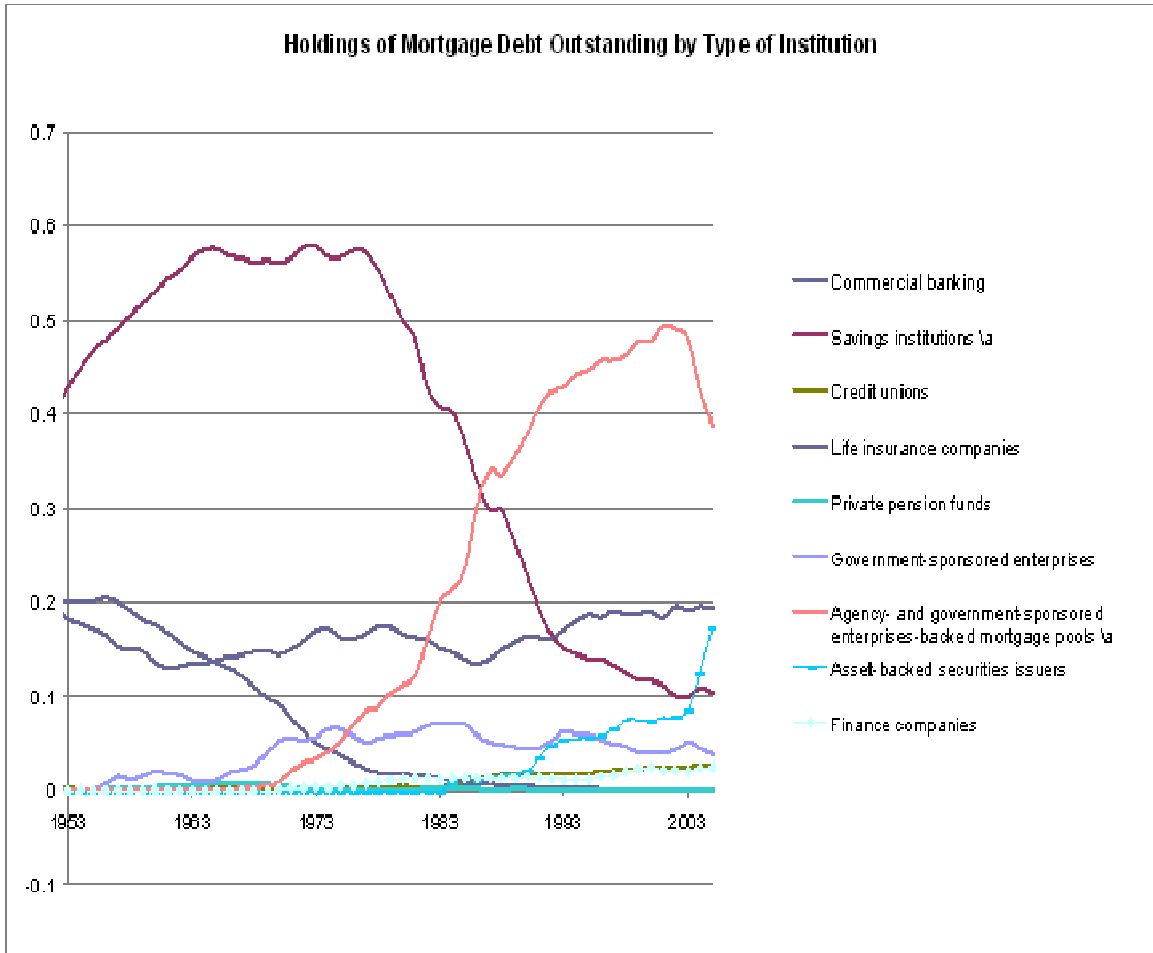


Figure 6: Source: Inside Mortgage Finance, 2009

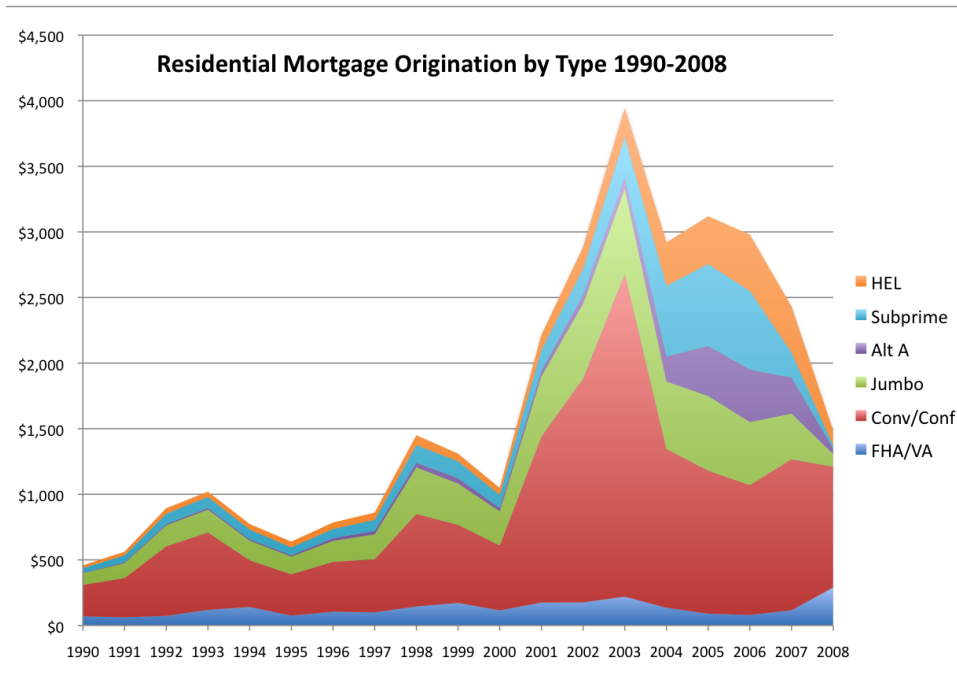




Figure 7: Top 10 Mortgage Originators 1996 and 2007. Source: Inside Mortgage Finance, 2009.

Total Market

1996	Market Share	2007	Market Share
Norwest	6.6	Countrywide Financial	16.8
Countrywide	4.9	Wells Fargo	11.2
Chase	4.3	Chase	8.6
Fleet Financial	2.3	Citibank	8.1
Bank America	2.0	Bank of America	7.8
NationsBank	1.5	Washington Mutual	5.7
WaMu	1.4	Wachovia	4.0
Standard Federal	1.3	Indy Mac	3.9
FT Mortgage	1.3	Residential Capital	3.2
Resource Bancshares	1.3	SunTrust	2.4

Subprime Market

1996		2007	
Associates Capital	7.0	Citibank	10.2
Money Store	4.3	Household Finance	9.3
ContiMortgage	3.5	Countrywide	8.8
Beneficial Mortgage	2.8	Wells Fargo	8.0
Household Finance	2.6	1 <sup>st</sup> Franklin	7.0
United Co.	2.3	Chase	6.0
Long Beach Mortgage	2.2	Option 1	5.8
Equicredit	2.1	EMC	4.1
Aames Capital	2.0	Ameriquest	3.3
AMRESOS Capital	1.9	BNC	3.2

Figure 8: Top Mortgage conduits. Source: Inside Mortgage Finance, 2009.

### 10 Leading Mortgage Conduits

1996	Market Share	2007	Market Share
GE Capital	8.4	Countrywide	13.6
Independent National	5.0	Wells Fargo	7.8
NW Assets	4.5	Lehman Brothers	7.1
Merit	3.6	Bear Stearns	6.8
Prudential	3.3	Washington Mutual	5.7
Solomon Bros.	3.3	JP Morgan	5.7
Merrill Lynch	3.1	Merrill Lynch	5.6
Donaldson, et. al.	2.0	Morgan Stanley	4.8
Structural Assets	2.0	Deutsche Bank	4.4
PNC	1.9	Indy Mac	4.0

### Top Conduits for Subprime MBS

1996		2007	
Money Store	10.3	Merrill Lynch	10.1
United Co.	6.4	Countrywide	7.9
ContiMortgage	5.3	Morgan Stanley	7.8
Beneficial	5.0	Lehman Brothers	5.5
AMRESO	4.5	Bear Stearns	4.3
Aames	4.3	Barclays	3.4
Household Finance	4.2	Citibank	3.3
Residential Finance	4.2	Deutsche Bank	3.2
Associates Mutual	4.1	Washington Mutual	2.7

Figure 9: Source: Inside Mortgage Finance, 2009.

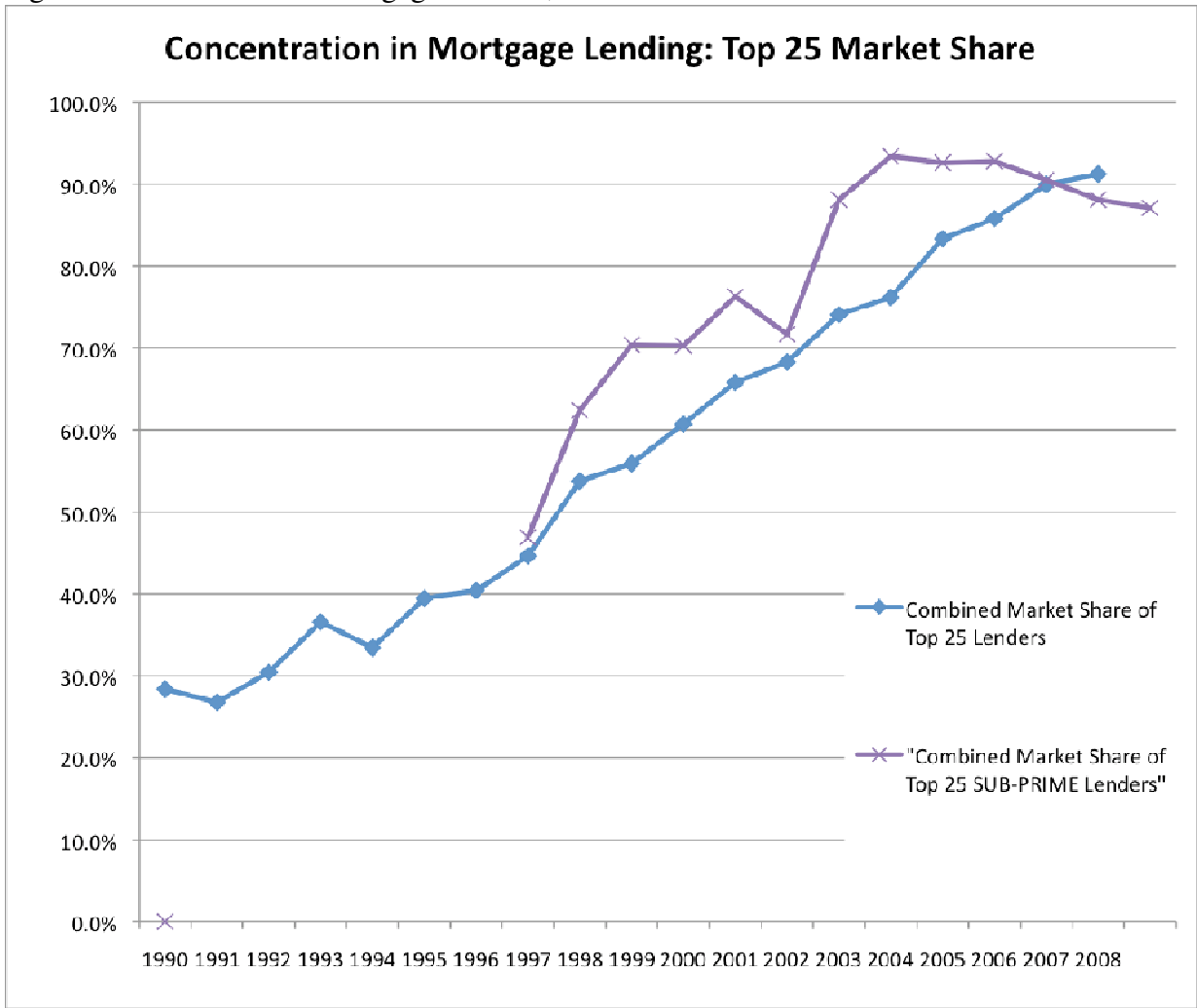


Figure 10: Source: Inside Mortgage Finance, 2009.

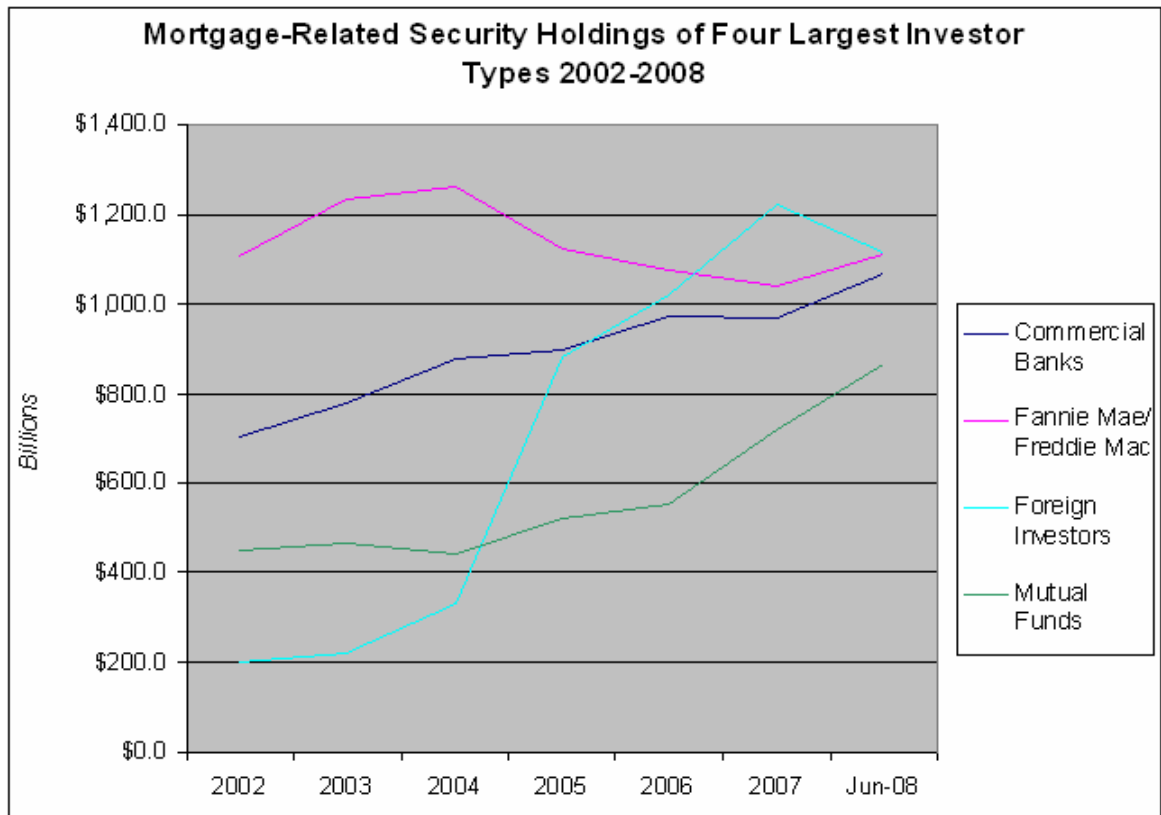


Figure 11: Amounts of MBS Issuance by type for non-agency firms. Source: Inside Mortgage, 2009.

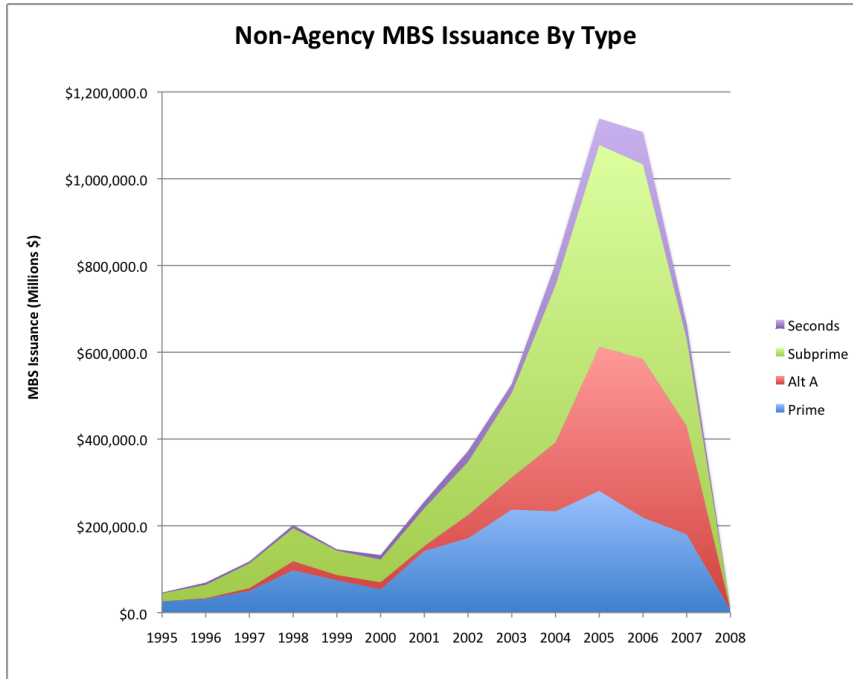


Figure 12: Source: Bloomberg Financial, 2009.

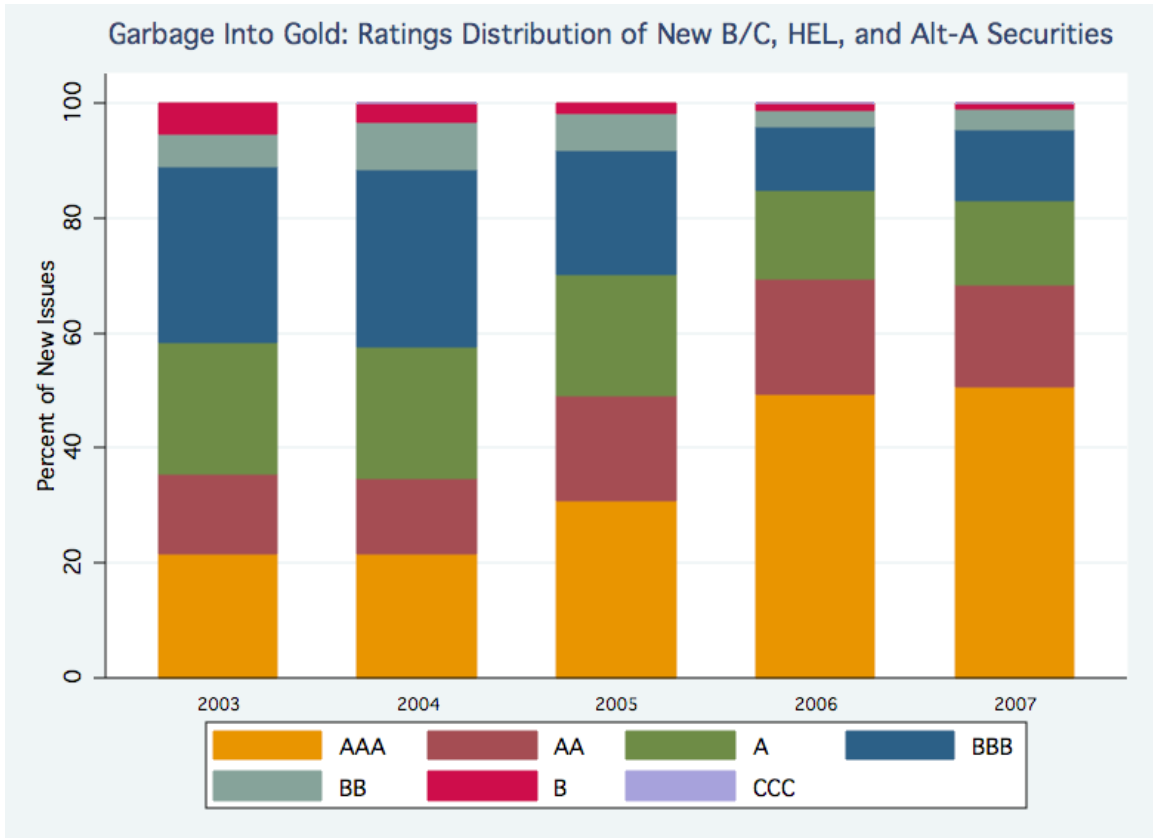


Figure 13: Source: Bloomberg Financial, 2009.

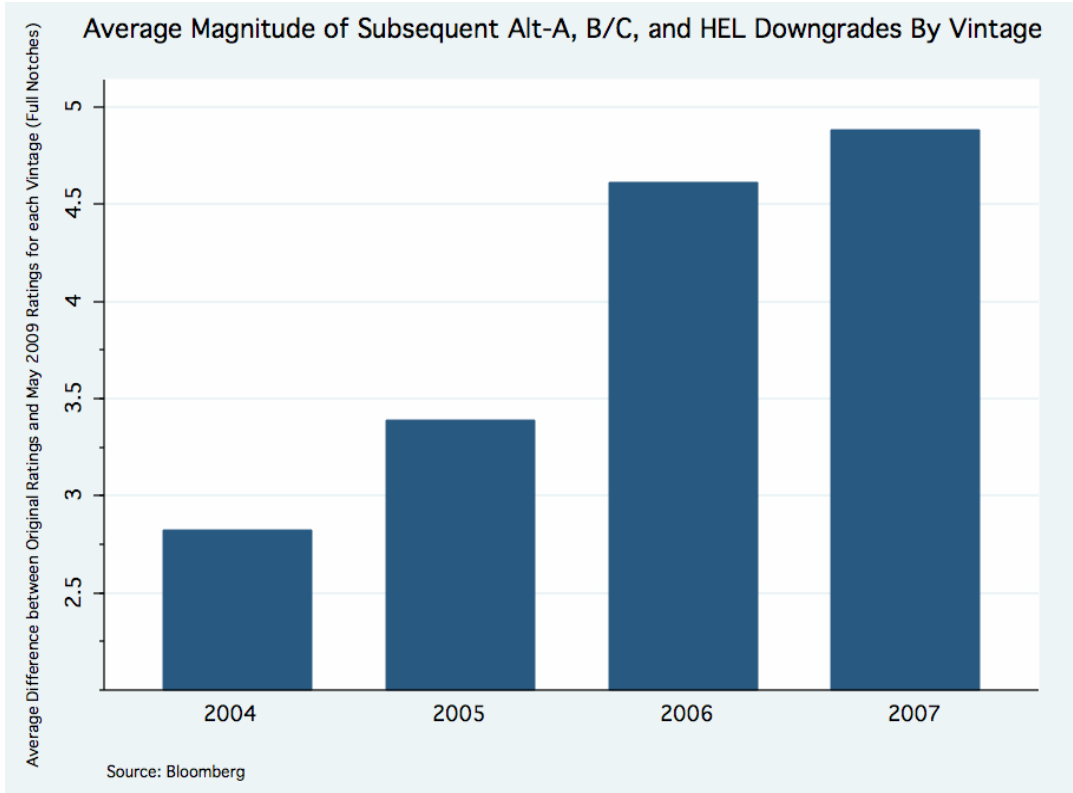


Figure 14: Source: Inside Mortgage Finance, 2009.

**Top 10 Subprime Lenders in 2005 (Red are now bankrupt)**

2005			
Rank	Lender	Volume	Mkt. Share
1	Amerquest Mortgage, CA	\$79.68	12.0%
2	New Century Financial, CA	\$56.10	8.4%
3	Countrywide Financial, CA	\$44.64	6.7%
4	Wells Fargo Home Mortgage, IA	\$42.35	6.4%
5	Option One Mortgage, CA	\$40.05	6.0%
6	Fremont Investment & Loan, CA	\$36.24	5.4%
7	Washington Mutual, WA	\$36.10	5.4%
8	First Franklin Financial Corp, CA (Merrill Lynch)	\$29.33	4.4%
9	GMAC-RFC, MN	\$25.26	3.8%
10	HSBC Mortgage Services, IL	\$25.08	3.8%



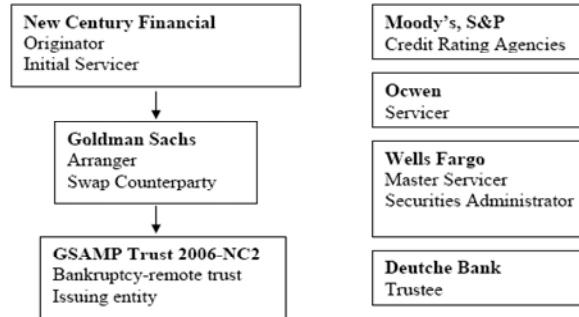
Figure: 15 Source: Inside Mortgage Finance, 2009.

**Top Subprime MBS Issuers in 2004-05 (Red are bankrupt)**

Rank	Issuer	Volume	
		2005	2004
1	Ameriquest Mortgage	\$54,237.1	\$55,126.5
2	Countrywide Financial	\$38,101.7	\$40,602.5
3	Lehman Brothers	\$35,295.1	\$27,336.1
4	New Century	\$32,357.7	\$22,306.2
5	GMAC-RFC	\$28,657.4	\$25,988.2
6	Option One	\$27,153.1	\$17,528.4
7	Bear Stearns	\$20,882.3	\$10,297.3
8	CS First Boston	\$19,651.2	\$18,152.3
9	WMC Mortgage	\$19,569.8	\$12,778.9
10	First Franklin (Merrill Lynch)	\$19,394.4	\$19,522.2

Figure 16:

Figure 2: Key Institutions Surrounding GSAMP Trust 2006-NC2



Source: Prospectus filed with the SEC of GSAMP 2006-NC2

Figure 17:

Click to add title

**Table 17: Capital structure of GSAMP Trust 2006-NC2**

Class	Tranche description			Credit Ratings		Coupon Rate	
	Notional	Width	Subordination	S&P	Moody's	(1)	(2)
A-1	\$239,618,000	27.18%	72.82%	AAA	Aaa	0.15%	0.30%
A-2A	\$214,090,000	24.29%	48.53%	AAA	Aaa	0.07%	0.14%
A-2B	\$102,864,000	11.67%	36.86%	AAA	Aaa	0.09%	0.18%
A-2C	\$99,900,000	11.33%	25.53%	AAA	Aaa	0.15%	0.30%
A-2D	\$42,998,000	4.88%	20.65%	AAA	Aaa	0.24%	0.48%
M-1	\$35,700,000	4.05%	16.60%	AA+	Aa1	0.30%	0.45%
M-2	\$28,649,000	3.25%	13.35%	AA	Aa2	0.31%	0.47%
M-3	\$16,748,000	1.90%	11.45%	AA-	Aa3	0.32%	0.48%
M-4	\$14,986,000	1.70%	9.75%	A+	A1	0.35%	0.53%
M-5	\$14,545,000	1.65%	8.10%	A	A2	0.37%	0.56%
M-6	\$13,663,000	1.55%	6.55%	A-	A3	0.46%	0.69%
M-7	\$12,341,000	1.40%	5.15%	BBB+	Baa1	0.90%	1.35%
M-8	\$11,019,000	1.25%	3.90%	BBB	Baa2	1.00%	1.50%
M-9	\$7,052,000	0.80%	3.10%	BBB-	Baa3	2.05%	3.08%
B-1	\$6,170,000	0.70%	2.40%	BB+	Ba1	2.50%	3.75%
B-2	\$8,815,000	1.00%	1.40%	BB	Ba2	2.50%	3.75%
X	\$12,340,995	1.40%	0.00%	NR	NR	N/A	N/A

Source: Prospectus filed with the SEC of GSAMP 2006-NC2

Figure 18: Source: Bloomberg Financial, 2009.

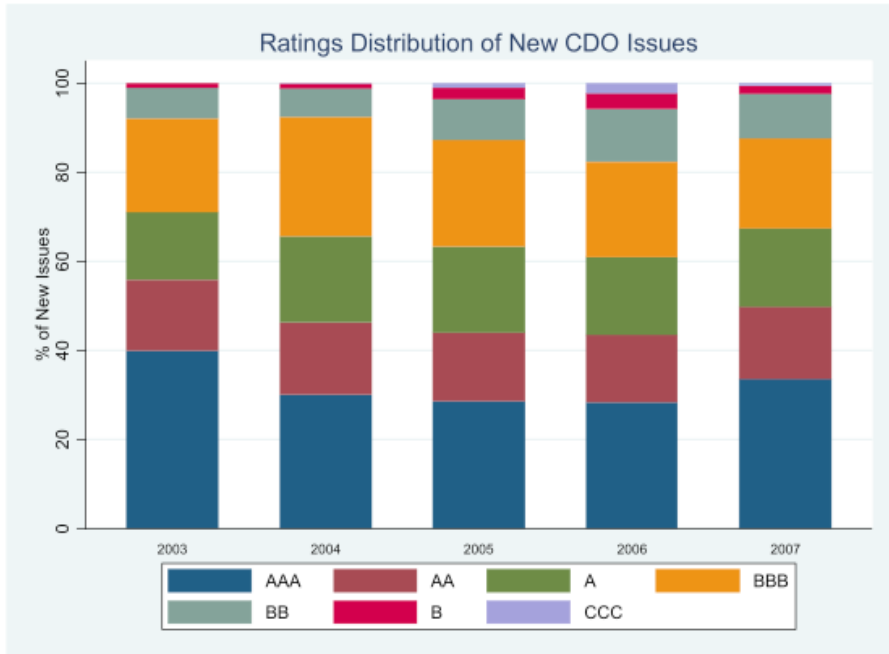


Figure19: Source: Bloomberg Financial, 2009.

