

Catalyst of Disaster: Subprime Mortgage Securitization and the Roots of the Great Recession\*

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## **The Roots of the Great Recession**

The main cause of the “Great Recession” was the unraveling of the mortgage securitization industry beginning in 2007. What had been a relatively small niche market at the beginning of the 1990s, was transformed into the core activity of the financial sector of the American economy from 1993-2007. Indeed, at its peak in 2003, the financial sector was generating 40% of the profits in the American economy with around 10% of the labor force (Fligstein and Shin, 2007; Krippner 2010). These profits were mostly being made from businesses centering on and related to the selling of mortgages and the creation of various forms of mortgage backed securities and related financial products. The mortgage business, at its peak in 2003, represented a \$4 trillion industry, about 25% of the American economy. Beginning in late 2006 and early 2007, the financial sector fell apart. That crisis threatened the existence of the entire banking system in America. As banks panicked, the system of granting access to short and long term credit for both businesses and consumers threatened to shut the economy down. In response to this uncertainty, consumers and businesses stopped buying. This created a downward spiral in the economy and the most severe crisis in American capitalism since 1929 rapidly took hold.

The basic argument of this paper is that the great recession happened because the growing American financial sector sought to base its business around selling risky mortgages to individuals. They made money off of the fees generated by selling those mortgages, packaging those mortgages into bonds, selling those bonds to investors, and perhaps most interestingly, retaining a significant portion of the securities in order to profit from the lucrative spreads on high yield bonds that could be funded through cheap capital in the 2001-2006 period. By aggressively pumping so much credit into housing markets, the banks helped fuel a housing price bubble on which the MBS boom fed. The inevitable peaking of this bubble in late 2006 set off a wave of mortgage defaults that

reverberated back through the mortgage industry and global financial markets.

The purpose of this book is to document the recession's wide-ranging effects in various spheres of social life. This chapter helps set the stage for that discussion by tracing the roots of the recession in the development of the mortgage finance industry. We have two aims in this paper. We begin by examining how a drop in housing prices could catalyze a wholesale implosion of the financial economy. We outline the sequencing of these events and connect them to the broader economic downturn they created. Then, we present an argument about how the mortgage industry expanded during the 1990s and how the character of this expansion fed the housing bubble that ultimately led to the near collapse of the economy. The rapid expansion of that industry and the importance it played in the overall growth of the American economy is the main reason that the collapse of this sector led to the near collapse of the economy.

### **The Events of the Great Recession**

It is useful to begin by recounting some of the main events that characterize the rise and fall of the mortgage sector and with it, the economy. At the core of the crisis was the rapid increase in house prices that fuelled the economy from 1997-2007, and then just as suddenly plunged. Figure 1 shows the unprecedented rise in house prices that accompanied the securitization craze. Throughout the post-war era house prices fluctuated around an inflation-adjusted constant. Indeed, housing prices on an inflation adjusted scale remained more or less constant from 1950 to as late as 1997. Beginning in 1997, houses prices rose dramatically to peak in 2006 at nearly 160% of their long run average.

(Figure 1 about here)

Housing prices rose even more dramatically in some parts of the country. Figure 2 presents

data that shows that the states of California, Nevada, Arizona, and Florida experienced price increases at or above the rate of 15% a year from 2004-2006. Beginning at the end of 2006, housing prices started to drop precipitously in those four states and in 2008, the prices decreased a whopping 25%. The rest of the country experienced some of the bubble, but nowhere as large as those four states. Housing prices also decreased in the rest of the country, but more on the range of 5%, not 25%. In the face of these price declines, foreclosure rates also rose dramatically. Figure 2 shows that the states that had the most appreciation in housing (California, Nevada, Arizona, and Florida) had dramatic increases in rates of foreclosures. Beginning in 2006, foreclosure rates in those states from less than .5 percent to almost 3% of all mortgages by 2008. Again, foreclosure rates increased across the country, but not as dramatically as in those four states.

(Figure 2 about here)

The price increase for housing and its subsequent drop might not have had such a large overall effect on the economy if it had not been for how mortgages were being sold and financed in this period. Increasingly from 2003-2007, the number of mortgages issued that were subprime went from being about 30% of the total to almost 70% of the total. These subprime mortgages were more likely to have had adjustable rates which would reset dramatically after 24-36 months. People who had such mortgages made it a practice to refinance their mortgages before these resets occurred and they did so mainly on the basis of the appreciation in their homes. As that appreciation fell and as mortgages adjusted, people found themselves with homes that had high unsustainable payments for houses that were not worth as much as their mortgages. Figure 3 captures this dynamic by comparing the rates of adjustable rate mortgages either in arrears or in default alongside an index of the increase in housing prices. Subprime adjustable rate mortgages had relatively high default rates of around 8-10%. In 2006, when housing appreciation slowed dramatically, these rates sky rocketed to over 20%.

(Figure 3 about here)

Banks who were heavily exposed to mortgage backed securities based on subprime mortgages came under financial pressure beginning in the spring of 2007. New Century Financial, the largest subprime lender in the country filed for bankruptcy on April 2, 2007. For the next year, the Federal Reserve began to intervene into the market to help banks refund and reorganize themselves. In the spring of 2008, Bear Stearns was forced into a merger with JP Morgan. The financial crisis accelerated in the summer of 2008. Indy Mac, one of the largest savings and loans banks went bankrupt in July and the Federal Government took over the two government sponsored housing enterprises, Freddie Mac and Fannie Mae in August. Instead of calming the markets, events accelerated in September with the purchase of Merrill Lynch by Bank of America, Wachovia by Wells Fargo, and of course, the collapse of Lehman Brothers on September 15, 2008. The Federal government began to support AIG on September 17, 2008. As the crisis rushed forward, the Federal government undertook a set of dramatic moves including the legislation know as the TARP (Troubled Assets Relief Program) which authorized the use of \$700 billion to help resolve the crisis. In late 2008, both the automobile and large insurance companies requested access to the TARP money and eventually, many of these companies were granted monies.

Of course losses were not confined to investors and the large banks that caused the meltdown. Even before the historic implosion and hasty bailout of the financial system in September 2008, the rising tide of foreclosures and financial sector losses were beginning to put downward pressure on the real economy. The severity of the resulting recession reflected the fact that it was not a typical business cycle downturn, but a major crisis in an economy which had become increasingly centered in financial markets. According to the National Bureau of Economic Research's Business Cycle Dating Committee, the recession officially began in December 2007,

mid-way through the financial meltdown.

Figure 4 displays two indicators of the downturn's reverberation through the real economy: consumer sentiment and job losses. The darker line plotted on the right axis shows the index of consumer sentiment, which is based on a monthly survey and often viewed as a leading indicator that presages more systemic economic trends. The index peaked in July of 2007 and began a steady freefall thereafter. By the summer of 2008 it had reached its lowest level in 28 years. The lighter line shows that the economy began shedding jobs six months later, in January 2008. The rate of job losses accelerated throughout the next year. All told, the economy lost a net total of over 4.3 million jobs in 2008 and 2009. The worst months were between November 2008 and March 2009, when 700 to 800 thousand jobs were lost each month. Thereafter the bleeding persisted at a slower rate through the rest of 2009. Despite a highly touted job turnaround, only 4% of total losses from the recession had been regained during the first quarter of 2010 (Bureau of Labor Statistics 2010). In response to this growing crisis, The Dow Jones industrial average peaked at 14,164 on October 9, 2007 and it reached its low point of 6547 on March 9, 2010, a decline of 53%. In the midst of this crisis, President Obama got the Congress to pass a \$987 billion stimulus package on Feb. 17, 2009.

(Figure 4 about here)

The economic crisis has remained even more persistent in the housing sphere. Mounting job losses and waves of distressed home sales in 2008 put continued negative pressure on housing prices. National composite price indices had fallen 29% from their May 2006 high by the end of 2009. In some bubble areas like Las Vegas and Phoenix, house prices were less than 50% of what they were at the peak of the bubble. The continued drop in prices spread the foreclosure crisis well beyond the subprime borrowers who were its initial victims. As of the end of 2009, the combined percentage of outstanding mortgages that were either delinquent or in foreclosure exceeded 15%, which was an all-time high (Mortgage Bankers Association 2010). Over 40% of subprime loans

were over 3 months delinquent. Furthermore, an additional 11.3 million households were "underwater," meaning the amount owed on the mortgage was greater than the value of the property. This amounted to over 24% of all outstanding mortgages. In Arizona and Florida over 50% of mortgages were underwater, and in Nevada an astonishing 70% or more were underwater (First American CoreLogic 2010). Negative equity tends to be associated with heightened likelihood of default and foreclosure. Yet policy initiatives to staunch the rising tide of foreclosures have had minimal success. The most up-to-date data as of this writing comes from the widely reported RealtyTrac, which shows the number of homes foreclosed by banks increased 7% during the first quarter of 2010 to reach an all-time high (RealtyTrac 2010). Such data dims any hopes that the fallout of the crisis will soon subside without more aggressive governmental actions to force lenders into renegotiating mortgage terms.

## **Mortgage Finance and the Financial Meltdown: What Happened?**

### *Background and Structure of Mortgage Securitization*

The "facts" of the Great Recession are quite daunting. The depth and rapidity of the decline is astounding. But, these events also spur us to wonder why this happened. How did housing become so important to the American economy? Why did the trading of mortgage backed securities become such a fundamental business in the U.S.? Why did the market for subprime mortgages expand so quickly and how did their decline come to be able to bring down the entire system of finance? Finally, how did mortgage finance come to be so intimately connected to the overall health of the American economy to such a degree that its decline cascaded through all of American business? To understand how a decline in house prices could catalyze a national and then a worldwide recession, it is necessary to understand the profound transformations in the structure,

size, and significance of the housing finance sector in the United States during the previous three decades.

The mechanics of mortgage finance remained relatively simple through the 1980s. Individuals would find a house. They would go to their local bank (most likely a savings and loan association) 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. Mortgages were geographically dispersed and held by local banks. This system was upheld by a set of regulatory laws that protected local savings associations from competition and treated them as socially beneficial instruments for promoting the American Dream of home ownership.

Now, after mortgages are issued, they migrate to a few square miles of Manhattan where in the offices of the major banks and government sponsored enterprises (hereafter, GSEs, i.e. Fannie Mae, Freddie Mac) they are packaged into securities. They then are re-dispersed to investors all over the world. Figure 5 describes the way in which the mortgage industry was organized by the 1990s. 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 as an intermediary broker. 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 pools of mortgages into an asset that pays a fixed rate of return generated from income streams on the underlying mortgages. These bonds are then rated by



bond rating agencies in terms of their riskiness and sold by investment banks to various classes of investors. Once issued, mortgage backed securities (hereafter, MBS) are managed by trustees, who perform administrative tasks, and servicers, who collect the monthly mortgage payments and disburse them to the bond holder in return for a fee.

(Figure 5 about here)

There are several ways an MBS issuer can structure the securities, which over time became more varied and complex. By the 2000s most MBS deals were divided up into risk-stratified securities called “tranches”. While backed by common pools of mortgages, the various tranches provide different risk profiles. In this way investors can buy riskier bonds that pay a higher rate of return but are the first to default in the event of losses, or they can buy less risky bonds that pay a lower rate of return. The rationale for these securities is that they could be engineered to manage risk: even though there is always a chance that an individual borrower might default, agglomeration of mortgage debt meant that investment banks and other issuers to create supposedly safe “AAA” securities from risky mortgage debts. These MBS packages that were divided up into tranches were called collateralized debt obligations (hereafter CDOs).

While the complexity of pricing a CDO can be very difficult due to the disparate income streams from which it is constituted, it is simply a claim on income from mortgage payments made by homebuyers. By the middle of 2007, there were between \$6.7 and \$9.1 trillion in outstanding bonds and derivatives backed by American mortgages (Inside Mortgage Finance 2009; SIFMA 2009). Trillions more were invested in tertiary derivatives related to these instruments, the companies which held them, and over-the-counter trading indices which tracked them. Housing finance had not only become an enormously complex enterprise, it had come to occupy the epicenter of the financial economy.

How did we move from a world where the local buyer went to her sleepy 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 depicted in figure 5 were not invented by the financial wizards of Wall Street, but instead were invented by the Federal government. Fittingly, MBS had its genesis in an off-balance sheet accounting maneuver: During the 1960s federal officials were interested in expanding home ownership as part of Johnson's Great Society agenda. To do this they wanted to find a way for the federal government to help pump credit into mortgage finance. But they were also worried about the size of the budget deficit. Because of the Vietnam War and the recent 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.

To overcome this problem the government created the quasi-public GSEs (Fannie Mae, Freddie Mac, and Ginnie Mae) to issue mortgage backed securities and insure them (Sellon and VanNahmen, 1988; Quinn 2008). The first mortgage backed security was issued on April 24, 1970 by Ginnie Mae (Wall Street Journal, 1970). By turning mortgage debt into bonds and selling them to investors, the GSEs could then re-circulate the proceeds back into the mortgage markets, maximizing the provision of credit. And by insuring these so-called "agency-backed" bonds against default, the government could encourage private capital to purchase them (Barmat, 1990).

### *The Housing Boom and the Rise of Subprime Securitization*

Mortgage securitization grew slowly during the 1970s and only became a significant repository of mortgage debt after the decline of Savings and Loans Banks during the mid-1980s.

The GSEs remained the central actors in the mortgage securitization industry 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. More important, after 2003 the big private banks created a massive market segment for those unconventional mortgages which the GSEs would not back, especially after 2003.

(Figure 6 about here)

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. About 70% of this rise was accounted for by people refinancing their conventional mortgages at lower interest rates.

One much-discussed set of factors behind the housing credit boom were low interest rates in the U.S. coupled and a glut of capital savings around the world in search of safe yet high-yielding assets. The availability of cheap, plentiful capital was an important macro-economic background condition. But the other major factor in the housing boom 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. Table 1 shows how the top players in various parts of the mortgage market shifted over time as those markets grew. It 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.

(Table 1 about here)

The table also shows a similar process for the packagers of MBS, which in the industry jargon are often 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 the Glass-Steagall Act which allowed them to move into the investment banking business. They now not only make mortgage loans but they act as packagers of those loans into MBS.

The table highlights not only the shifting composition of the dominant players in the mortgage finance field, but also its increasing concentration. 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. Table 1 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. The significance of these trends is that the dynamics of mortgage finance markets increasingly became a function of the strategies that this relatively small set of firms pursued.

After 2003, the major banks' strategies pointed increasingly toward subprime and other non-conventional mortgage segments. Figure 6 highlights the remarkable degree and rapidity with which firms gravitated toward nonprime lending (we discuss the reasons for this shift further below). It was the growth of this multi-trillion dollar shoulder on the upper right part of the graph that would prove pivotal in producing the meltdown. It is useful to discuss the components of figure 6 in greater detail in order to fully 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 or "conforming" mortgages. These are prime-rate mortgages for people who put down 20% for their house and whose loan value does not exceed the size limitations imposed by the government for inclusion in GSE pools. The loans were generally securitized into agency-backed MBS, which was insured against default and thus paid relatively lower rates of return. 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 compositional shift toward non-conventional loans. In contrast to conventional loans, securitization of these types of mortgages was centered on private-sector banks rather than GSEs. Jumbo loans are a heterogeneous category that refer to loans

which exceed government-set size limits and hence are not eligible for GSE pools. Jumbos are used to purchase expensive real estate and many but not all are sold to affluent persons with strong credit. 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 and were usually sold to persons who had equity but lacked sufficient income. Predatory origination practices were especially prevalent within the HEL segment. Alt-A and subprime mortgages (sometimes called “B/C” mortgages to denote their lower credit quality) were sold to people with impaired credit history, or people who lacked the ability to make a large down payment, or people who did not have verification of their income. Alt-A is not strictly defined but is generally viewed as an intermediate category that encompasses borrowers with FICO scores to qualify for prime but who lack some other qualification. 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. It is useful to be explicit about what constituted impaired 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).

In 2004, for the first time, these four categories of loans exceeded the prime market or conventional market. In 2001, the largest conventional (prime, government-insured) originator did 91% of its origination business in the conventional market, and only 9% in the non-prime market. By 2005 the largest conventional originator was doing less than half of its origination business within the conventional sector (Inside Mortgage Finance 2009). In the peak of the mortgage craze in

2006, fully 70% of all loans that were made were unconventional mortgages. This meant in a very short period of time, banks reoriented housing finance – one of the largest industries in the economy – around securitizations of highly risky loans. 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 believed banks would not have made these loans if they thought they were too risky.

There were two main reasons banks pursued these risky subprime loans so aggressively. The first, which we discuss at greater length below, is that there were fewer and fewer loans left to sell in the saturated prime market. The other reason is that subprime origination and securitization turned out to be enormously profitable. According to a study by the consulting firm Mercer Oliver Wyman, nonconventional lending accounted for approximately half of originations in 2005, but over 85% of profits (National Mortgage News 2005). Once lenders figured this out they would often try to sell subprime loans even to persons who qualified for a cheaper prime loan. The repackaging of nonconventional mortgages into bonds also became the largest fee generation business for many investment banks including Lehman Bros., Bear Stearns, Merrill Lynch, Morgan Stanley, and Goldman Sachs. 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 subprime loans as they could, earn fees from packaging them into MBS, and then also hold onto a portion of the securities as investments. The massive amounts of money banks borrowed to fund this strategy are the reason they were so highly leveraged when the liquidity crisis hit in 2008.

(Figure 7 about here)

Figure 7 shows holdings of non-agency (i.e. unconventional) mortgage-related security assets for several major banks and thrifts. Unlike investment banks and private mortgage companies, firm-level data on commercial bank and thrift holdings is publicly available. Each of these firms was amongst the top 15 private-label MBS issuers at the peak of the market. Each was also amongst the top 15 non-prime originators (Inside Mortgage Finance 2009). There are several things worth noting here. First, the graph shows that the firms issuing MBS were holding onto a significant portion of the bonds. Second, they were rapidly increasing their positions even as the bubble grew. Indy Mac, which appears as the flattest line on the graph, actually increased its holdings by over 50% per year on average during this period. Citibank increased its MBS holdings by almost 400% to \$41 billion during 2007. The firm subsequently took a \$35 billion write down on these assets. Although consistent firm-level data is not available, the same pattern of growth is evident amongst investment banks. As a group they increased their non-agency holdings from 5 billion in 2002, to 60 billion in 2005, to 180 billion by June 2008 (Inside Mortgage Finance 2009).



## *The Housing Bubble*

The massive growth of unconventional mortgage securitizations fueled and fed on an unprecedented housing price bubble during this period. 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. Prices followed a similar pattern. 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 Phoenix. There were in fact quite a few markets like Atlanta and Denver that were experiencing population increases without concomitant price bubbles.

But what his analysis chose to ignore was the role of securitization in creating causally linked bubbles in many markets. A good deal of research suggests that the cheap interest rates across the country and strong demand from investors in the secondary market encouraged banks to pump as much credit into housing markets as they could (e.g. Mian and Sufi, 2008; Herbert and Apgar, 2010). Bankers could borrow money at around 1% and loan it at 5-7%. Where housing was scarce and population was growing, prices rose and this encouraged banks to focus on those markets. This in turn encouraged further price increases as borrowers could use plentiful credit to bid up prices. After investment banks convinced the SEC to allow them to take on greater leverage

in 2004, they dramatically increased the amount of sub-prime credit being pumped into zip codes where housing prices were rising (Nadauld and Sherlund 2009).

Part of the reason banks focused on these markets is that the upward price trends fit the models used by the banks and credit ratings agencies to gauge default risks. MBS issuers could attain safer credit ratings for securities by including in them a larger proportion of mortgages from zip codes with high price appreciation since these were thought to be less prone to default. Sub-prime securitization thereby fed itself forward in the aggregate as the aggressive provision of credit in selected markets helped further inflate prices. All of the top thirteen subprime MSAs by this metric were located in the boom states of Arizona, California, Florida, and Nevada. Housing markets in these states effectively became linked through the common strategies banks adopted towards them. It is not surprising then that Arizona, Florida, Nevada, and parts of California turned out to be ground zero of the subprime lending boom, the housing price bubble, and the subsequent the foreclosure crisis.

### *The bubble pops and defaults rise*

The precipitant of the meltdown was the busting of the securitization-fueled housing bubble. Slowing house appreciation led to rising mortgage defaults, which in turn led to far larger than expected losses on mortgage-backed securities (Mayer, Pence and Sherlund 2009). The stall in housing prices activated all the latent risks of subprime lending which the persistent rise had repressed. We have already detailed the link between the peaking of the housing bubble and the rise in defaults as well as its regional concentration. We have also shown how defaults were concentrated within the subprime segment which had grown rapidly from 2003-2007.

The more fundamental reason subprime mortgages were at the epicenter of the rising

defaults in 2007 derives from the fact that their basic design was predicated on a housing bubble. Traditionally the rationale for subprime loans was that borrowers with impaired credit could get a loan at a relatively high rate for a few years, build their credit with steady payments, and then refinance at a better rate. In other words, it was risk-based pricing for under-served borrowers who needed credit but were considered risky by financial institutions. But as the bubble grew, the underlying logic and structure of subprime loans became less about building borrowers' creditworthiness and more about making speculative bets on the housing market (Gorton 2008; Davis 2009).

The structural correlate of this shift was the increasing use of hybrid adjustable-rate mortgages (hereafter, ARMs) (Mayer, Pence and Sherlund 2009, p.31). Hybrid ARMs became popular because lenders could sell more loans by charging less interest initially. But two-year “teaser” rates on 2/28 ARMs were not simply a predatory marketing ploy to draw uncanny consumers and then lock them into high rates. Lenders were willing to bet that house prices would continue going up in the short-term, offsetting other credit risks and justifying a somewhat lower initial interest rate. Borrowers could then refinance using quickly accumulated home equity before the mortgage reset to the higher adjustable rate. This incentive to refinance every two years is why approximately two-thirds of subprime originations from 2000-2006 were refinances rather than new purchases.

Once housing prices stopped appreciating, however, the design of subprime loans made them especially prone to default. Borrowers who had been promised they would be able to refinance in two years suddenly found it much more difficult to do so once the downturn spurred lenders to rapidly contract subprime credit availability. Instead of the lower payments that had been anticipated, borrowers instead faced a reset shock as their monthly payments ballooned to the higher adjustable rate (Demyanyk and Van Hemert 2009). Thus the fact that defaulting subprime loans

sparked the financial crisis was due not only to the heightened risk profile of subprime borrowers, but the fact that subprime ARM loans even more than others were built on a bubble that could not last.

### *Financial Meltdown*

The massive growth of nonconventional mortgage securitization had spread at least \$3.8 trillion of assets directly linked to these mortgages to financial institutions around the world by the beginning of 2007. Nonetheless it is clear that the markets, the credit ratings agencies, regulators, and most of the large banks all registered comparatively little response when housing prices started to stall out and mortgage default rates began to rise in late 2006. Several large banks such as Merrill Lynch and Citibank continued expanding their non-prime businesses aggressively during the first two quarters of 2007. In March of 2007 Fed chairman Ben Bernanke stated in congressional testimony that “at this juncture, the impact on the broader economy and financial markets of the problems in the subprime market seems likely to be contained.” The credit ratings agencies also continued to maintain an implausibly upbeat outlook through the first two quarters of 2007.

Only after they faced widespread mocking on the financial blogosphere, congressional questioning, and an overall crisis of legitimacy did the agencies take serious steps to adjust MBS bond ratings to reflect the deteriorating conditions in the mortgage market. Their reasons for reticence were clear. First, they had a vested interest in hoping the situation would improve since their reputations and significant portion of the revenues rested on a strong MBS market. Second, they knew what downgrades would mean. Moody’s CEO Raymond McDaniel justified its cautious approach to downgrades, noting that “because we are an influential voice, we can create a self-

fulfilling prophecy by saying that there are risks in the market ahead of those risks being revealed” (Bloomberg 2007).

By July of 2007, credit supply for non-prime mortgages ground to a halt as secondary market demand plummeted and banks became weary of the quickly weakening housing market. The volume of subprime originations declined by 90% between the first and second half of 2007 (Inside Mortgage Finance 2009). The drying up of credit to fund non-prime originations began hampering attempts by borrowers with adjustable rate mortgages – even those whose houses had not yet declined in value – to refinance before their mortgage got reset to a higher rate. It also imperiled the business of large mortgage specialists like Ameriquest and Countrywide and began eating into the revenue streams of the commercial and investment banks which had come to rely on fee revenues from their vertically integrated mortgage finance franchises.

Bond defaults were initially concentrated amongst the lower-rated equity tranches that were the first in line to lose in the event of revenue losses. But the rising tide of subprime delinquencies and foreclosures soon put pressure on the supposedly safe “AAA” tranches as well. Figure 8 shows weekly counts of negative credit actions taken by one of the big three ratings agencies against non-agency MBS and mortgage-related CDOs. Aside from a few small blips of activity in April and July of 2007, there were few downgrades on MBS until they increased rapidly in September.

(Figure 8 about here)

The downgrade plot’s resemblance to a seismograph image is apt. Each round of mass downgrades sent tremors through the financial system. The significance of credit downgrades was that they forced leveraged banks that had taken loans to buy MBS to either pay off those loans or post additional collateral with their creditors. This was because most of their loans contained covenants that required them to increase their capital investment if bond prices fell or the credit rating on the MBS collateral was downgraded. The problem, however, was that most banks were

already very highly leveraged and eventually found it impossible to raise enough capital to cover their loans. This was the link between the implosion in the mortgage market and the freezing of the credit system.

While the financial meltdown emerged from a novel configuration of forces, it spread in the relatively straightforward mold of a classic banking panic. Lenders made calls on collateral, and the entities that had become highly leveraged in order to buy MBS suddenly found themselves in a liquidity crisis, unable to raise funds to cover debt backed by assets whose value was rapidly plummeting. This process first played out within the so-called shadow banking system of special investment vehicles, which were usually linked to a larger institution but funded themselves through short-term debt. As the price of their MBS and CDO assets fell, they needed cash to post as collateral with creditors, but since the credit markets were weary of extending them emergency money, they generally had to be rescued by their parent firms and placed back on the parent's balance sheet.

Two hedge funds affiliated with Bear Stearns were the first major shadow banking institutions to fail in July of 2007. A similar crisis soon afflicted Citigroup, which would take over \$55 billion in write downs on mortgage-related assets (Bloomberg 2008). The problem, as Gillian Tett (2009) and others have dramatically documented, was that the elaborate system of accounting vehicles banks built to hide their leverage from regulators and the elaborate network of credit default swaps they created to hedge their risks, made it impossible for the market to discern which banks were exposed to the “toxic assets.” The financial crisis escalated throughout the summer of 2008 in spite of efforts by the Federal Reserve to make emergency capital available.

It is useful to look at what happened to the top banks that were leaders in the mortgage securitization business circa 2005. 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 issuing 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. Most of the institutions that survived only did so on account of the TARP bailout and most took massive write downs on MBS assets. .

### *Summary*

Based on the preceding discussion, we would argue that the proximate causes of the crisis can be found in two shifts in the structure of the mortgage finance 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 to the center of the financial sector. It also made the financial position of these firms especially sensitive to the credit markets that would become negatively impacted by the core of the market, along with millions of households and the rest of the American economy.

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. The

steep decline in mortgage originations after 2003 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 refinancing activity that 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 subprime and Alt-A markets. The aggressive pursuit of those markets by banks of all kinds has led us to the current situation. 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.

### **Myths and Half-Truths**

While it is early to develop any comprehensive explanations of why the meltdown occurred, already several conventional wisdoms have emerged. In this section we evaluate several oft-repeated arguments about the mortgage meltdown and show that they are inconsistent with key pieces of evidence.

#### *Perverse Incentives and the “Hot Potato” Theory*

One of the most oft-repeated conventional wisdoms about the crisis is that it happened because of misaligned incentives in the securitization process. This is often known as the “originate-to-distribute hypothesis,” or, more colloquially, the “hot potato” theory. This explanation argues that cunning actors securitized risky subprime mortgages and then sold them off to unwitting investors who could not possibly understand the risky assets contained within their opaque structures.



The originate-to-distribute hypothesis attributes systemic risk to perverse transactional incentives: Mortgage brokers and originators had an incentive to engage in reckless and fraudulent underwriting since they were selling loans off to an MBS packager and hence had no interest in assuring the borrower's long-term ability to repay. MBS packagers in turn had little interest in monitoring the underlying quality of the bonds because they were selling these assets off to investors (e.g. Purnanandam 2009). This incentive-based analysis of the crisis forms much of the conventional wisdom underlying current regulatory reform proposals, for instance the provision in the pending Senate bill that would require issuers of securitized assets to retain at least 5% of the credit risk.

Gorton (2008) has argued that the originate-to-distribute model, which focuses on the securitization process as such, is over-determined because it fails to identify the roots of the crisis in particular features of subprime mortgages. More fundamentally, our data shows that most of the premises of the originate-to-distribute thesis turn out not to be true. First, the actual structure of the mortgage securitization industry differed from that presumed by the theory. The pursuit of vertical integration by the large MBS producing firms meant that as the bubble grew banks were increasingly originating, packaging, underwriting, and servicing MBS in-house rather than passing risk along a value chain of market transactions. We document this trend more thoroughly elsewhere (Fligstein and Goldstein 2010). Second, as shown in figure 3 above, the idea that MBS issuers did not hold onto the bonds turns out to be a myth. MBS producers aggressively marketed risky assets to investors all around the world. They also retained a considerable portion of the assets themselves, largely because they were yielding high short-term returns.

The fact that the firms most deeply involved in the production of risky MBS also 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 they were strategically selling the riskiest assets to unwitting

investors. With the exception of Goldman Sachs and to a lesser degree, JP Morgan, all of the large banks involved in the production of risky MBS continued to hold significant positions on these assets until the very end. Rather than a scenario in which systemic risk was created because each actor was strategically fleeing the next guy down the line, the data is more consistent with an imagery of collective delusion amongst almost all the actors at the core of the market. The key players knew it was risky, but they thought they could control their risks through ploys like quasi-insurance in the form of CDSs. And they were making untold profits in the meantime.

What about the idea that underwriting standards were declining and investors who bought mortgage backed securities from investment banks could not know how risky the underlying loans were? Evidence of declining underwriting standards during the 2000s is mixed. There are two sets of information about loan pools: the “hard” reported characteristics such as FICO scores and loan to value ratios, and “soft,” “unobservable” information such as a borrower's true income in cases of stated-income loans (so-called low-documentation or liars' loans). The soft information is often referred to as unobservable characteristics since it is not seen by securitizers, ratings agencies, or investors. There is little evidence of systematic declines in observable characteristics within various mortgage segments (sub-prime, Alt-A, etc.). But there is also evidence that declining underwriting standards were rendering loans riskier than the hard information would suggest. The use of low-documentation loans expanded considerably as the bubble grew, particularly in the Alt-A segment. Studies have found that these low-documentation loans ended up defaulting at a significantly higher than their observable characteristics would predict. (Mayer, Pence, and Sherlund 2009). This implies that declining underwriting standards were making mortgage loans ever-riskier as the boom grew, and that they were doing so in a way that was unobservable by investors and credit rating agencies.

But pinning the crisis on such factors as fraudulent underwriting and increasing use of low-

documentation loans elides the fact that the observable information itself told a very risky story.

When a conduit bank wants to issue an MBS, it has to file a prospectus with the SEC that includes information on the loan collateral. These prospectuses are public information and can be accessed via the web in a few clicks of a mouse. Here we briefly examine the information contained in the prospectus for a typical subprime MBS issue during the height of the bubble: GSAMP Trust 2006-NC2. Interested readers can go online to the SEC and find this 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. 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.

This information is quite detailed and it was readily available to investors. It suggests that anyone who looked over the prospectus would see that the underlying mortgages in GSAMP 2006-NC-2 were quite risky. In our view the problem was not so much that origination practices were surreptitiously rendering subprime loans even riskier than they appeared. Rather, the problem was that risky mortgages were becoming vastly more prevalent on account of banks’ voracious appetite for raw mortgages to fuel their securitization machines. In this way high-risk loans came to constitute an ever-greater portion of financial assets.

*Financial Engineering and Instruments of Mass Destruction*

Another explanation of the crisis focuses on the role of financial engineering innovations and the rise of exotic, highly complex financial instruments. 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 products like CDOs 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. One argument is that this made CDOs especially dangerous while simultaneously making them appear less risky and more palatable (e.g. Mackenzie 2009). Another argument is that CDOs were problematic because progressive layers of abstraction in instrument structures entailed a progressive loss of information (Gorton 2008).

As we have shown elsewhere, the data is not consistent with any strong argument that instrument complexity was a driving force behind the crisis (interested readers should consult Fligstein and Goldstein [2010]). Contrary to the hypothesis that financial engineering drove ratings inflation, the most highly complex and innovative CDO instruments actually displayed greater constancy in their overall ratings composition compared to B/C MBS. Data also shows that these instruments turned out to be no more dangerous than the underlying MBS on which they were built, at least as measured by the magnitude of the subsequent downgrades they experienced after the meltdown. CDOs actually tended on average to be somewhat less overrated than the 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. In other words, the driving force behind the meltdown is that banks were producing trillions of dollars of MBS securities on the back of a housing bubble – not that they were doing so using ever more complex security structures.

Those who pin the sources of the crisis on the growth of more complex securitization structures must present better empirical evidence for how CDOs heightened the riskiness of the underlying MBS on which they were based.

### *Black Swans and Long Tail Events*

Another overarching view of the crisis is to see it as emerging from the long tail: actors underestimate the probability of rare and improbable events like a systematic drop in housing prices. We are skeptical of strong forms of this argument for a couple of reasons. First the housing bubble looked like a bubble. And it did so not merely through the haughty wisdom of 20/20 hindsight. During the height of the boom there was a great deal of discussion in mortgage finance trade journals about whether there was a bubble or merely local “bubblettes” as one commentator suggested. Zuckerman (2010) has conducted a content analysis which shows that the frequency of *discussion about a housing bubble* in the business press tracked the growth of the actual bubble. This is not a case of the blindsided herd. Moreover, the voices warning of mounting risks were not merely those of obscure contrarians. Several prominent economists including Federal Reserve Board Governor Edward Gramlich had sounded numerous warnings about the subprime bubble for several years. Even more striking is that key industry actors recognized the risks. Countrywide CEO Angelo Mozilo warned colleagues that they could all face an impending “catastrophe” during conference of mortgage industry executives at the height of the bubble in 2005 (National Mortgage News 2005, p.4). Far from being beyond the realm of normal expectations, actors at the center of the bubble (who had much to lose if it popped) recognized a crash a distinct possibility if not foregone conclusion. One important question for future research to answer is why, given this, almost all the banks continued behaving so recklessly until it was too late.

### ***Conclusion***

In presenting this account of the financial meltdown, we challenge several conventional

wisdoms that have taken hold. So, for example, one of the “facts” that is already taken for granted by commentators of various stripes 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 since they could simply pass risk along the value chain. We show that contrary to this view, almost every large originator and packager of mortgages held onto substantial numbers of mortgage backed securities and they increased their holdings 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 the federal government.

Second, we argue against the conventional wisdom that the increasing complexity and opacity of financial instruments – particularly CDOs – was a chief contributor to the MBS bubble and subsequent meltdown. We cite evidence to suggest that the most complex mortgage-related derivatives did not perform any worse than simpler ones backed by risky mortgages. Finally, a third 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.

In the end, it was the strategies these firms pursued that created the conditions for the meltdown. Banks used cheap capital to create a bubble. Their lending strategies fueled and fed off the housing bubble, and they did so using mortgage products whose performance was premised on

continued growth of that bubble. After 2004, the financial industry coalesced around high-risk mortgage lending as their primary cash crop. Subprime mortgages, which had been an effective if sometimes shady means of extending credit availability to under-served borrowers, suddenly became a foundation of 21<sup>st</sup> century financial capitalism. The complete collapse of the financial system and resulting recession have shown the folly of that strategy. What has saved the financial sector is the government takeover of the GSEs and the bailout 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. 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. Low interest rates gave banks access to cheap capital that they could lend to households and create MBS. It also effectively heightened demand for MBS from investors since yields on treasuries were so low. But by the end of 2003 the supply of raw mortgages had begun to run out. To fulfill secondary market demand, originator banks and conduit banks (increasingly the same people) needed to find a new mortgage market. The market they found was the subprime market, which turned out to be wildly profitable. 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.

Regulators and policymakers enabled this process at virtually every turn. Part of the reason they failed to understand the housing bubble was willful ignorance: they bought into the argument that the market would equilibrate itself. In particular, financial actors and regulatory officials both

believed that secondary and tertiary markets could effectively control risk through pricing. For instance, the idea that banks could buy quasi-insurance in the form of Credit Default Swaps was one of the arguments for allowing them to take on more leverage. If the market thought the risk of default was high, then the price of the CDS would reflect that risk.

But perhaps most important of all is that regulators like Alan Greenspan failed to see how the industrial-scale infusion of credit brought on by securitization linked real estate markets together in new ways. Lenders pumped easy credit into zip codes with quickly appreciating housing prices because it satisfied the assumptions built into their mortgage products. This of course further contributed to the bubble (Mayer, Pence, and Sherlund 2008; Naduald and Sherlund 2009; Herbert and Apgar 2010). As a result, housing prices that had historically been driven by local dynamics became collectively linked vis-à-vis the lending strategies of the big firms.

The basic structure of the adjustable-rate mortgages that lenders used to grow the subprime market was premised on continued house appreciation. Once the housing bubble peaked subprime ARM loans suddenly became extremely prone to default. The confluence of a downturn in housing prices with tightened credit and interest rate resets created a downward spiral. As housing prices continued to drop, many loans went underwater, meaning that the amount owed on the loan was greater than the value of the house. This in turn led to additional defaults and further downward pressure on house prices as a large number of distressed properties came onto the market.

It is no accident that this historic debacle was centered in housing finance. Securitization was first developed in this area and was most mature there. Residential real estate also held special status, allowing firms to justify risky practices as contributing to the American dream of home ownership. Perhaps most importantly, the MBS-fueled bubble was abetted by the ingrained myth that house prices always go up. When that idea proved to be wrong, the lives of millions of Americans have been tragically shattered.

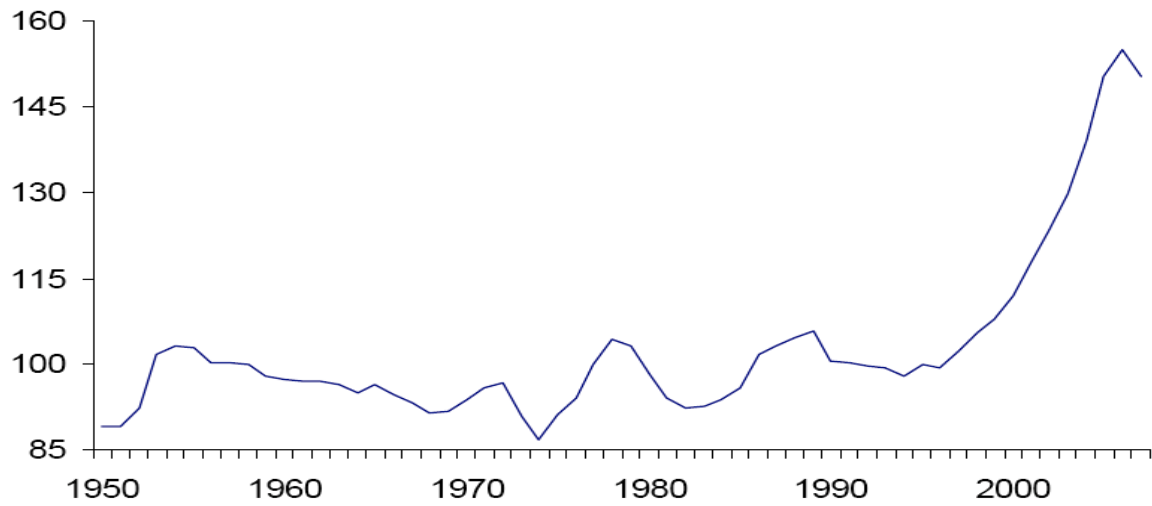


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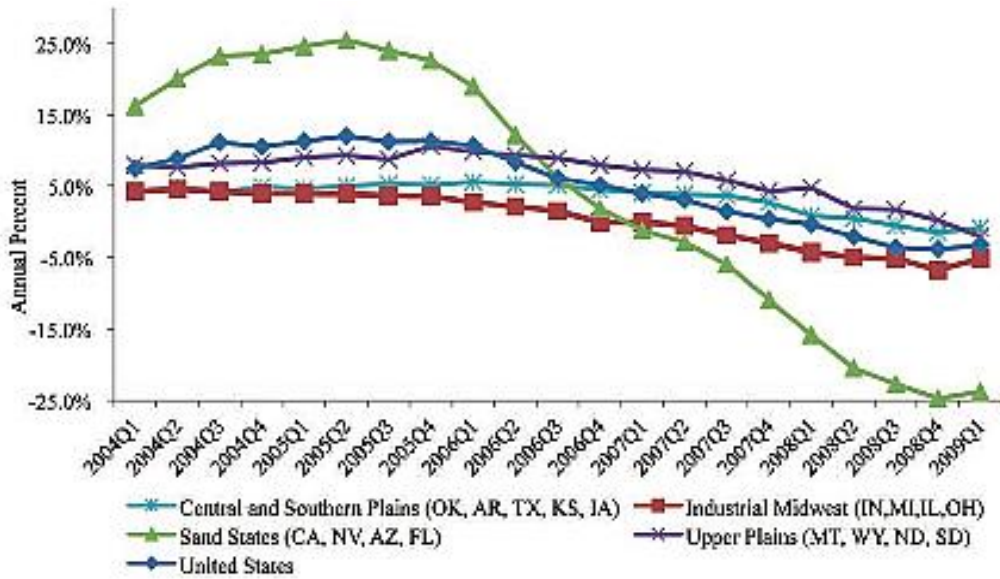
Figure 1: Inflation-Adjusted National House Price Index (1995=100).



Source: Federal Reserve (2008).

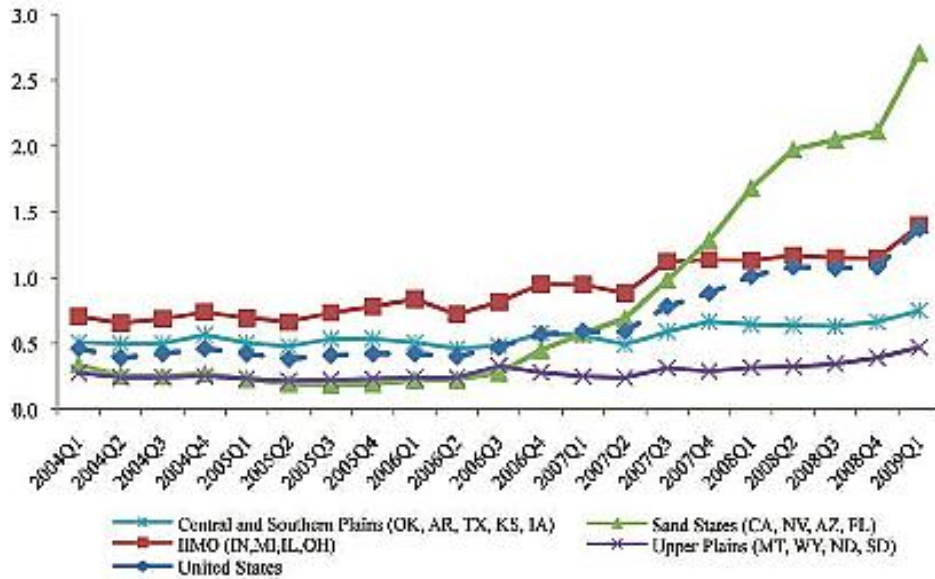
Note: Prices are based on the Case-Shiller Index from 1950-1974, and the OFHEO index from 1975-2007. Prices are deflated using the CPI.

Figure 2: Housing Price Appreciation and Foreclosures by Region



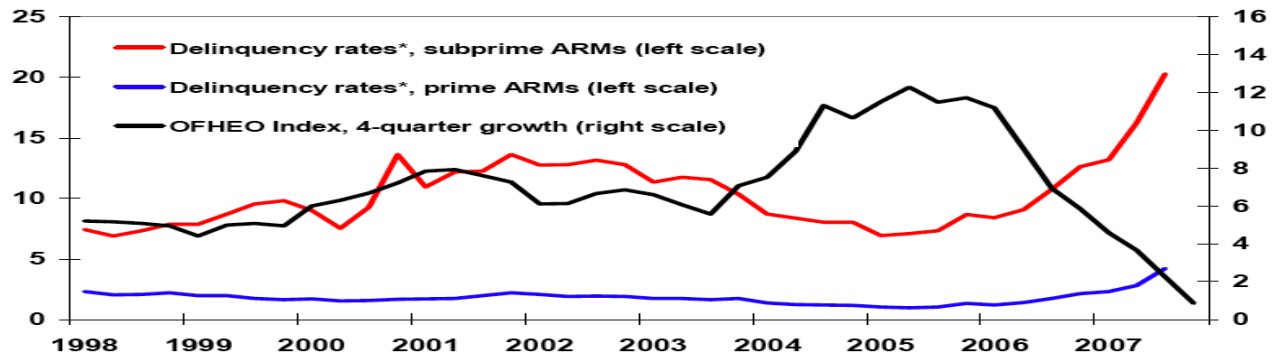
Source:  
HUD (2009)

Note:  
Housing price changes are based on averages of Federal Housing Finance Agency's state-level price indices.



Mortgage foreclosure rates are based on the Mortgage Bankers Association's widely used delinquency survey.

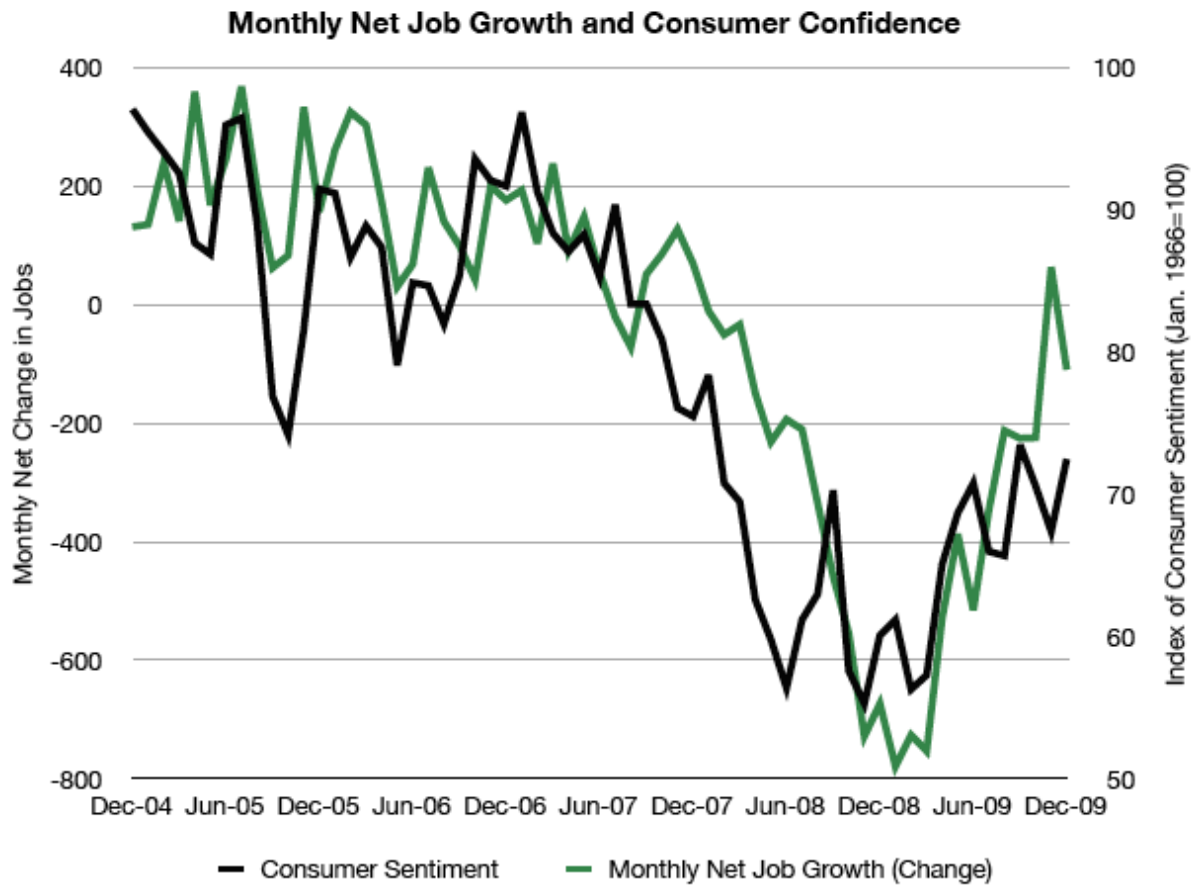
Figure 3: Mortgage Delinquency Rates (left scale) and House Price Appreciation (right scale)



Source: Furlong (2008) from OFHEO and Mortgage Banks Association Data

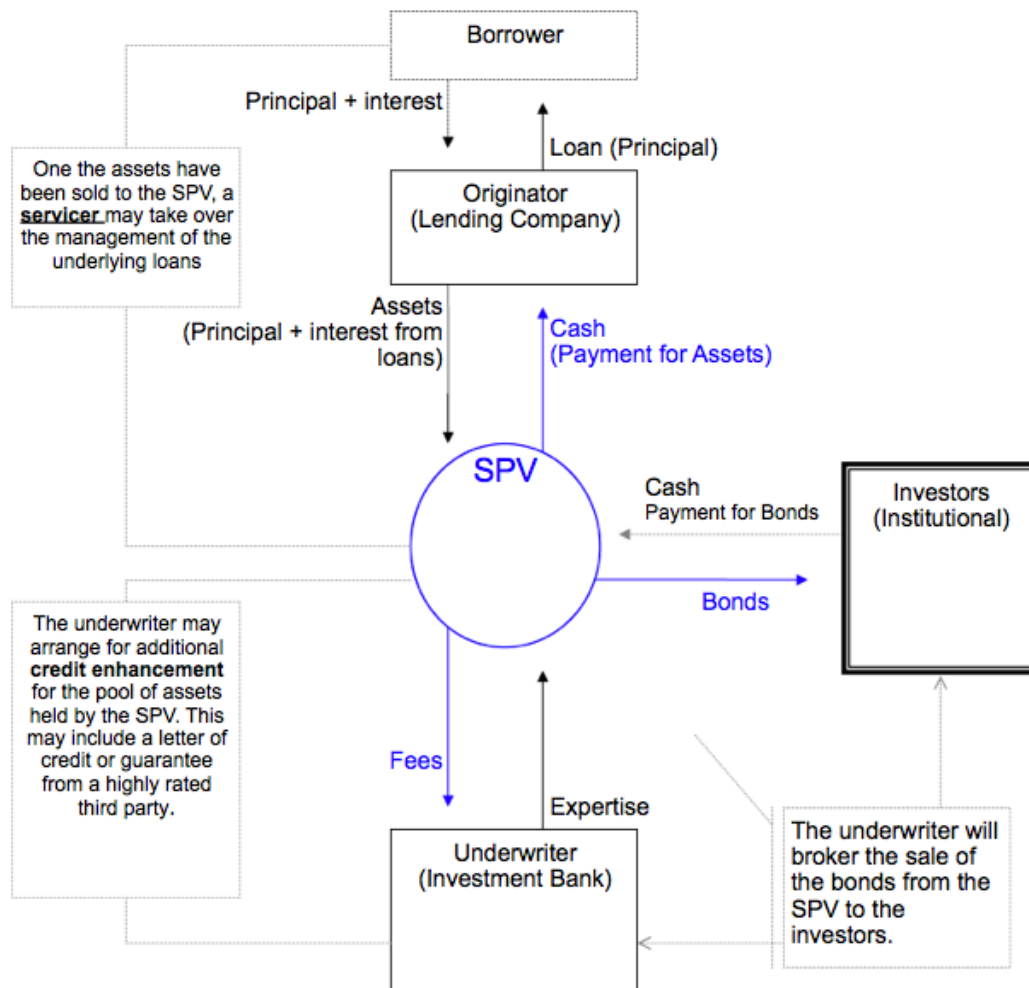
Note: Delinquency rates here combine mortgages 2+ months delinquent and mortgages in foreclosure.

Figure 4: Recession Indicators



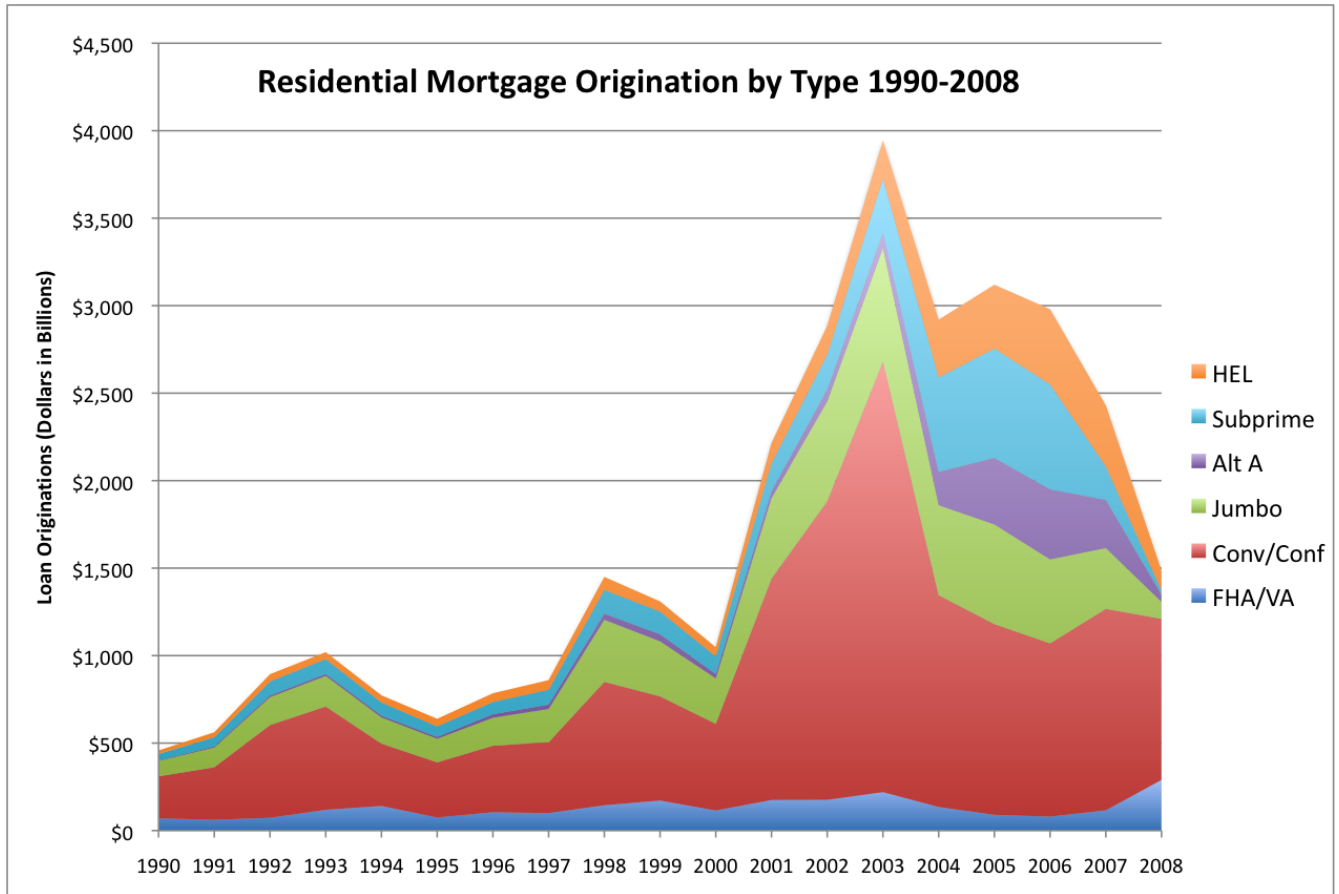
Source: BLS and Michigan Survey of Consumer Sentiment

Figure 5: A Mortgage Securitization Package



Source: Adapted from L.T. Kendall, 1996, p.3

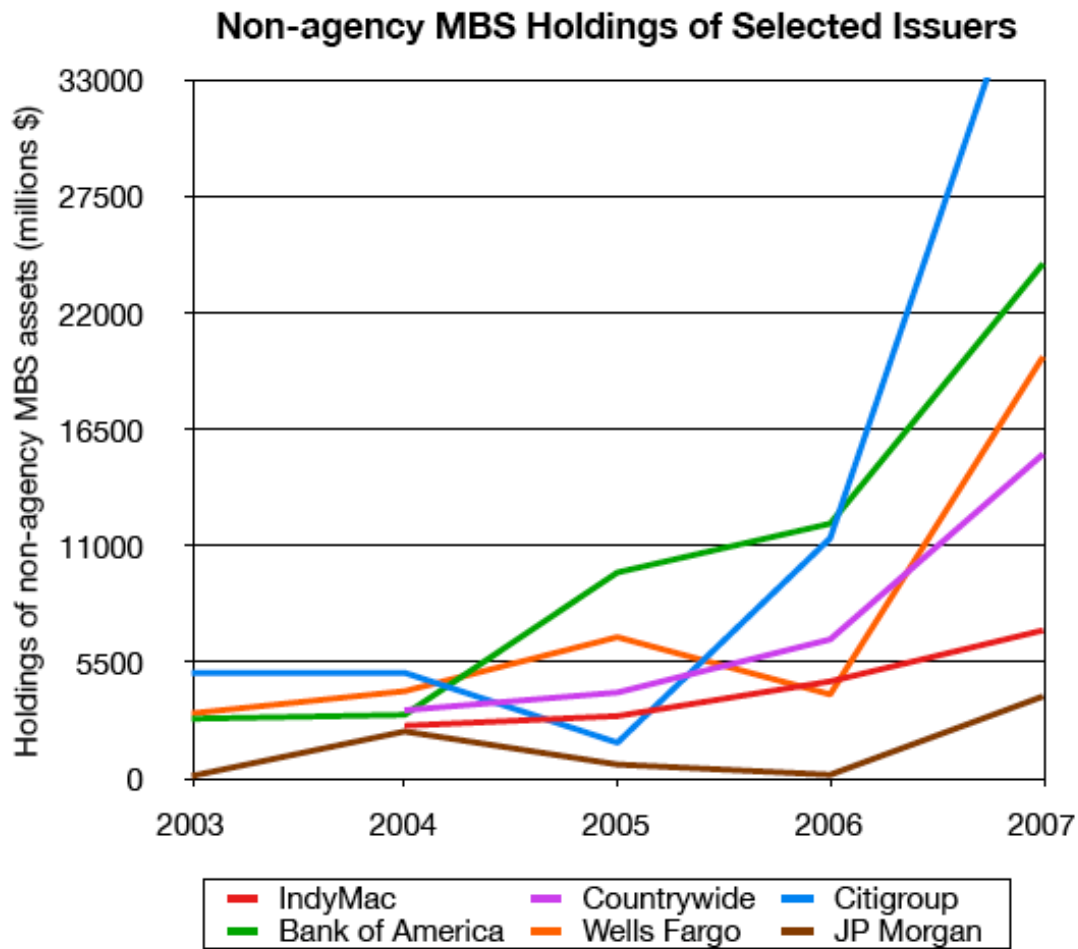
Figure 6: Mortgage Origination in the United States



Source: Inside Mortgage Finance

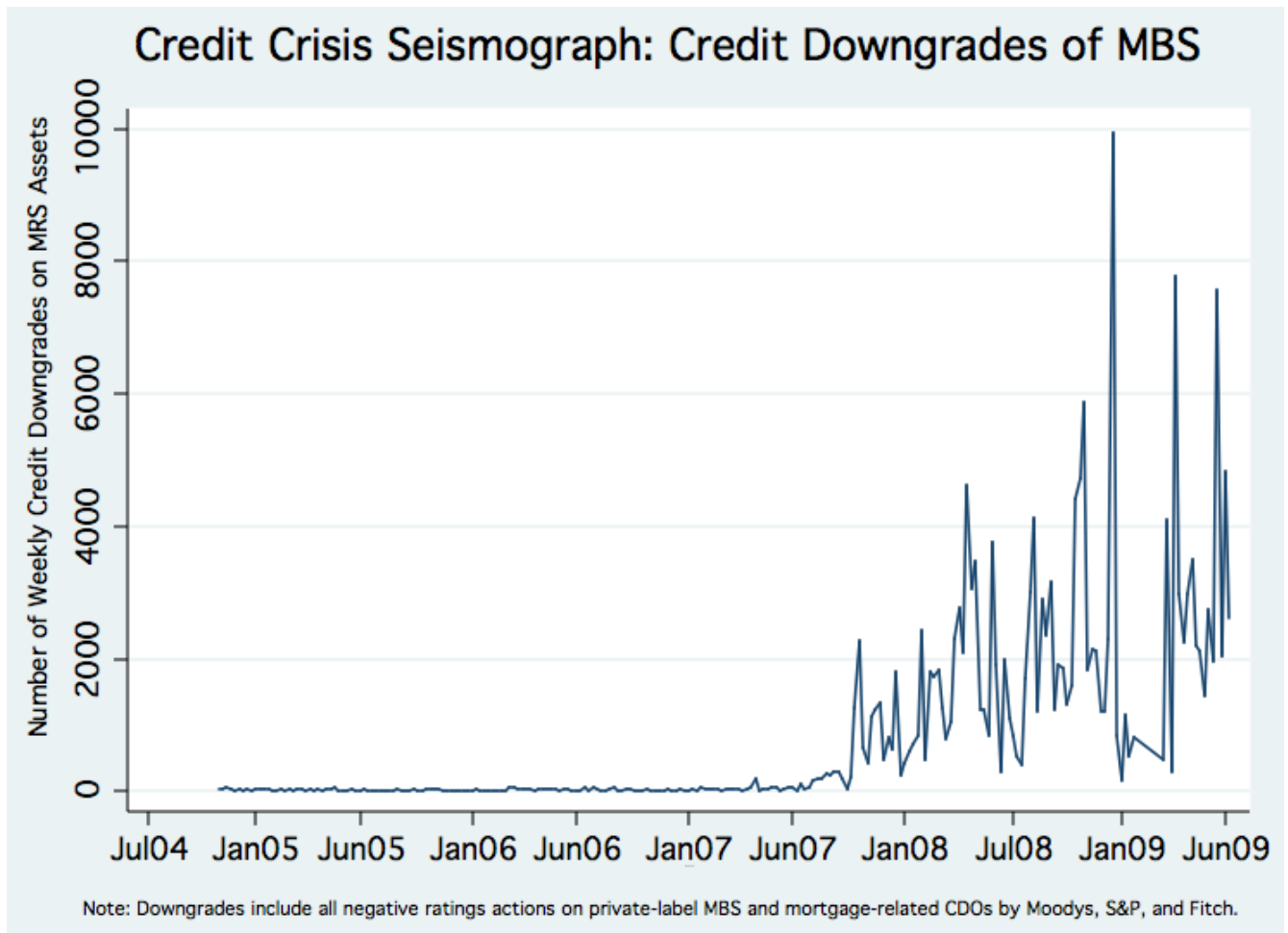


Figure 7: Non-Agency MBS Holdings of Selected Banks and Thrifts



Source: Inside Mortgage Finance

Figure 8: Timeline of MBS Credit Downgrades



Source: Authors' tabulation from ratings actions reported by Bloomberg.

**Table 1: Dominant Firms in Selected Mortgage Finance Segments 1996 and 2007**

<b>Top Overall Mortgage Originators and Mkt. Share</b>				<b>Top Subprime Originators and Mkt. Share</b>			
1996		2007		1996		2007	
Norwest	6.6	Countrywide Financial	16.8	Associates Capital	7	Citibank	10.2
Countrywide	4.9	Wells Fargo	11.2	Money Store	4.3	Household Finance	9.3
Chase	4.3	Chase	8.6	ContiMortgage	3.5	Countrywide	8.8
Fleet Financial	2.3	Citibank	8.1	Beneficial Mortgage	2.8	Wells Fargo	8
Bank America	2	Bank of America	7.8	Household Finance	2.6	1st Franklin	7
NationsBank	1.5	Washington Mutual	5.7	United Co.	2.3	Chase	6
WaMu	1.4	Wachovia	4	Long Beach Mortgage	2.2	Option 1	5.8
Standard Federal	1.3	Indy Mac	3.9	Equicredit	2.1	EMC	4.1
FT Mortgage	1.3	Residential Capital	3.2	Aames Capital	2	Ameriquest	3.3
<b>Top Non-Agency MBS Issuers and Mkt. Share</b>				<b>Top Subprime MBS Issuers and Mkt. Share</b>			
1996		2007		1996		2007	
GE Capital	8.4	Countrywide	13.6	Money Store	10.3	Merrill Lynch	10.1
Independent National	5	Wells Fargo	7.8	United Co.	6.4	Countrywide	7.9
NW Assets	4.5	Lehman Brothers	7.1	ContiMortgage	5.3	Morgan Stanley	7.8
Merit	3.6	Bear Stearns	6.8	Beneficial	5	Lehman Brothers	5.5
Prudential	3.3	Washington Mutual	5.7	AMRESO	4.5	Bear Stearns	4.3
Solomon Bros.	3.3	JP Morgan	5.7	Aames	4.3	Barclays	3.4
Merrill Lynch	3.1	Merrill Lynch	5.6	Household Finance	4.2	Citibank	3.3
Donaldson, et. al.	2	Morgan Stanley	4.8	Residential Finance	4.2	Deutsche Bank	3.2
Structural Assets	2	Deutsche Bank	4.4	Associates Mutual	4.1	Washington Mutual	2.7

Source: Inside Mortgage Finance