ANATOMY OF A FINANCIAL CRISIS

A Real Estate Bubble, Runaway Credit Markets, and Regulatory Failure

Marc Jarsulic

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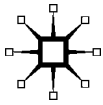

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For Ellen, Laura, and Katherine

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INTRODUCTION

Every reader of newspapers understands the outline of the U.S. financial crisis. We all know that somebody made trillions of dollars in mortgage loans to hundreds of thousands of borrowers, that lots of those loans went bad, and that the associated losses delivered a near-fatal blow to our financial system. We also know the names of many of the financial firms that failed or required government rescue. What is not so clear is how and why these important and sophisticated firms got themselves into this mess, and why financial market gatekeepers and regulators failed to intervene before disaster struck. This book attempts to provide an understandable and empirically grounded account of how the financial world ran off the rails.

Chapter one, "The Building Blocks of the Financial Crisis," describes developments in mortgage lending, in the housing market, and in capital markets that positioned our financial system for disaster. The transformation of mortgage lending is a key element of this story. The first chapter shows that nonprime lending—to "subprime" borrowers whose credit and income histories disqualified them from the lowest rates and best terms, and to so-called "Alt-A" or near prime borrowers whose credit histories were good but who did not document their income or who wanted unconventional loans—exploded both in absolute volume and as a share of total mortgage lending during the period 2001–2006. It is also shown that lending standards deteriorated significantly as nonprime lending volumes grew. Borrower credit scores declined, loan-to-value ratios increased,

and loans were frequently made with little or no documentation of borrower income or assets.

The explosion in increasingly risky nonprime lending was supported by an ongoing house price bubble. Beginning in 1998, the real price of houses began to rise at an accelerating and historically unprecedented rate. This price trend turned into an asset bubble—houses were bought at prices that made sense only if house prices continued to rise. The rapid rise in prices successfully masked the weaknesses of nonprime lending. During the bubble years, borrowers saw the value of their homes increase year after year. So when a weak borrower got in trouble, the loan could be paid off through mortgage refinance or through a sale. But this was a dynamic that could not last. Like a juiced-up baseball player deprived of steroids, the performance of nonprime loans was bound to falter once rapid house price appreciation came to an end.

However, so long as the house price boom continued there was money to be made in nonprime lending. Chapter one also describes how a wide variety of institutions—including mortgage brokers, mortgage banks, investment banks, and commercial banks—enthusiastically helped to finance the boom by playing their parts in mortgage loan "securitization." Loan securitization is a process by which large numbers of relatively illiquid mortgage loans are turned into a smaller number of securities that are more easily sold and traded. Pools of mortgages are assembled, and the principal and interest payments are pledged as payments for a set of mortgage-backed securities. The sale of those securities pays for the pool of mortgage collateral, and provides profits for the securitizer. Although many securities backed by prime mortgages are issued and insured by the governments sponsored enterprises Fannie Mae and Freddie Mac, most nonprime mortgage-backed securities were "private label," issued by large financial firms and sold to large investors.

The demand for nonprime mortgage-backed securities remained strong until the financial crisis began. An important part of that demand came from investment banks, and the

investment banking arms of major commercial banks, that were engaged in the business of constructing and selling financial derivatives. These so-called structured financial products—which included collateralized debt obligations (CDOs) and structured investment vehicles (SIVs)—were constructed in a manner analogous to mortgage-backed securities. The income from pools of collateral—in some cases including substantial amounts of nonprime mortgage-backed securities with low credit ratings—were used to back the issue of an entirely new set of CDO and SIV securities. That is to say, these financial derivatives securitized assets that had previously been created by securitization of mortgages. The performance of these new structured securities was tied to the performance of nonprime mortgages but the connection was complex and required complicated mathematical and statistical modeling to understand.

As important financial institutions originated nonprime mortgages, mortgage-backed securities, and structured financial products, they accumulated large concentrations of these assets. In doing so they were exposed to losses from the underlying nonprime loans. Unfortunately these losses were inevitable, once the housing bubble came to an end.

Chapter two, "The House Price Bubble Ends, the Foreclosure Wave Begins" provides details on the development of the house price bubble, and explores the connection between declining house prices and the continuing wave of nonprime mortgage foreclosures. The national house price bubble came to an end in the middle of 2006, but some economists noticed the existence of a bubble well before. Although their statistical models, which were based on historical data, could not predict the course of the bubble, they did show that house prices were no longer explained by economic factors such as construction costs and population growth. By 2005, data on inventories of houses for sale—especially those that were vacant—were clearly showing that prices had risen far too high to clear the market. An end to price increases was in sight, well before it happened.

The end of house price appreciation meant the end to the effortless accumulation of homeowner equity, the phenomenon

that had previously made life easy for weak borrowers. As prices began to decline, all homeowners began to see an erosion of the value of their houses. This change triggered the initial wave of subprime foreclosures, and has more recently led to increased foreclosure rates among prime borrowers.

Foreclosures add to inventories of houses that are vacant and for sale, and that puts continuing pressure on house prices. This negative, self-reinforcing dynamic has been intensified by the deep recession that began in 2007. It is perfectly understandable that it would. Job loss means the loss of household income, which can make it difficult for households to sustain their mortgage payments. Chapter two includes statistical evidence of the connection between job loss, house price declines, and observed foreclosure rates. These statistical results are used to estimate the course of foreclosures over the coming year. The results suggest that, unless government programs are able to slow foreclosures, it is very likely that excess inventories will continue to accumulate and put continuing pressure on house prices.

Chapter three, "The Credit Bubble Bursts, the Financial Crisis Begins," shows how losses on nonprime mortgages ultimately produced the failure of major, highly leveraged financial institutions. Although large losses were inevitable once house price appreciation ended, the development of system-wide problems took time. At first disruptions were confined to the periphery of the financial system. Mortgage banks that had specialized in nonprime lending found they could no longer borrow from the capital markets to fund their businesses. Burdened with stocks of nonprime mortgages with declining market value, many went bankrupt, without a producing a big market effect.

But after the credit rating agencies downgraded several subprime mortgage-backed and CDO securities in mid-2007—an indication that losses on these securities had become more probable—it became much harder to ignore the fact that major financial firms were exposed to potentially large losses on mortgage assets. The market for asset-backed securities began a rapid contraction, as investors became wary of the entire class of

assets. Banks that provided liquidity guarantees to off-balance-sheet entities containing nonprime assets—such as SIVs—were forced to provide that liquidity, and in some cases take losses onto their books. Bankers could no longer be sure who was a creditworthy counterparty, so the market for unsecured interbank lending was disrupted.

The investment banks with large holdings of nonprime mortgages, mortgage-backed securities, and CDO securities were the next to come under pressure. Their stock prices declined, and the short-term borrowing that was crucial to their business dealings began to evaporate. Bear Stearns failed in March 2008, and was merged into JPMorgan Chase. Six months later Lehman Brothers failed outright and entered bankruptcy.

The Lehman bankruptcy triggered a more general financial panic. By defaulting on its short-term debt, it forced a money market fund to "break the buck" and return shareholders less than one dollar for each share redeemed. This provoked a run on money market funds generally, as corporations and individuals fled to safer assets. This disrupted a principal source of funding for the commercial paper market. In addition, the Lehman failure introduced a new level of uncertainty in financial markets, since it had been demonstrated that large, important firms were not guaranteed a government rescue. Banks and other intermediaries became increasingly conservative about lending to businesses, individuals, and each other, as they tried to conserve capital and survive the crisis. The collapse or rescue of major financial institutions continued into 2009. AIG, Citigroup, and Bank of America were rescued, Washington Mutual was seized by the FDIC, and Wachovia was merged into Wells Fargo to prevent its failure.

The cascade of financial disasters was ultimately halted by a dramatic series of policy actions taken by the Federal Reserve, the Congress, and the administration. The Federal Reserve created a set of entirely new facilities to aid stricken financial markets. The earliest of these facilities, such as the Term Auction Facility, were intended to provide banks with cash and prevent fire sales of assets, by allowing banks to use illiquid

assets as collateral for medium term loans. But as the financial crisis deepened, the Federal Reserve was forced to take more dramatic action, for example offering support to the commercial paper market by lending directly to nonfinancial firms through the Commercial Paper Funding Facility.

The Congress came to the aid of the financial system through the Troubled Asset Relief Program. This program allocated $700 billion to the Treasury to prevent the failure of the financial system. Treasury's initial intent was to use the funds to purchase nonprime assets from the banks, but the funds were ultimately used to provide banks with direct injections of capital, and to help fund the rescue of firms as diverse as AIG, GM, and Chrysler.

Although the actions of the Federal Reserve and the Congress managed to prevent the collapse of the financial system, the disruption of credit flows produced the worst recession since World War II. Millions of jobs have been lost, and there is widespread anticipation that an economic recovery will take time and may be weak.

The scope of the damage to both the real economy and the financial sector leads naturally to the subject of Chapter four, "Who Caused This Disaster?" The answer is that the crisis had multiple but clearly identifiable causes. The most important is the behavior of the financial firms who were involved in nonprime lending, and the creation of securities and derivatives based on nonprime mortages. The chapter includes evidence that these firms knew, or had excellent reason to know, that nonprime mortgages were inherently high-risk assets that were performing well because house prices were rising. The large firms that failed or were rescued were all important originators of nonprime loans, and therefore had access to detailed loan-level data. Information about loans and borrowers was at hand, and could easily have been used to understand the role of house price appreciation in supporting loan performance. The fact that these firms paid no attention to this information is prima facie evidence of recklessness.

Examination of securities filings, internal documents produced to Congressional committees, and investigations by

regulatory inspectors general only reinforces this conclusion. Mortgage banks, investment banks, commercial banks, Fannie Mae and Freddie Mac, and AIG accumulated exposures to nonprime assets while paying almost no attention to the associated risks, and in some cases deliberately ignoring internal warnings of problems to come. Because the short-term returns on these assets were high, and the returns to traders and managers were outlandish, executives were happy to put the long term existence of their firms in harm's way.

Although the damage to financial firms was self-inflicted, industry gatekeepers and regulators missed many opportunities to prevent the crisis, or at least reduce its scope. The Federal Reserve, given the substantial power to regulate mortgage lending in 1994, refused to use that power until it was far too late. The Federal Reserve and the Comptroller of the Currency ignored the potential threat from off-balance-sheet entities such as SIVs; and both used credit agency ratings of mortgage-backed and CDO securities to determine bank capital requirements, even though the credit rating agencies had obvious conflicts of interest when they issued those ratings. The Treasury's Office of Thrift Supervision allowed Washington Mutual, Indymac, and Downey Financial to accumulate the huge exposures to nonprime assets that led to their demise.

The Office of Thrift Supervision, which had responsibility to oversee AIG as a thrift holding company, also failed to notice that this huge insurer was exposed to potentially crippling nonprime losses through its derivative business. The AIG Financial Products subsidiary managed to write credit default swaps on billions of dollars of nonprime CDO securities. These contracts required AIG to make up losses caused by defaults, but AIG did not reserve capital to cover potential losses on these swaps. So when defaults by nonprime borrowers caused the value of the insured CDO securities to crater, losses on AIG's swap contracts made the entire company insolvent.

The Office of Federal Housing Enterprise Oversight, charged with the supervision of Fannie Mae and Freddie Mac, apparently did not notice that both these government sponsored

enterprises had developed heavy exposures to nonprime assets. Both firms bought substantial volumes of privately issued, near prime mortgage-backed securities, hoping to earn high returns on these high risk assets. Both also securitized and issued guarantees for large volumes of loans that, while nominally conforming to high underwriting standards, were actually subprime loans.

In addition to regulatory failure, there were significant gaps in regulatory legislation. The Securities and Exchange Commission, nominally the supervisor of the five largest investment banks, failed to understand the risks many of the firms were accumulating. This failure, however, is explained by the fact that the SEC lacked the statutory authority and staff necessary for the task of supervising such complex entities. Over-the-counter derivatives, such as credit default swaps, had been deliberately excluded from commodity Futures Moderation Act. Hence firms such as AIG were free to write swap contracts without putting up the margin that is required in regulated futures markets, a situation which made their huge one-way bets costless in the short run. Moreover, no disinterested party was in a position to observe developments or limit systemically dangerous risk-taking by individual firms.

The most important gap, however, concerns the evolution of financial firms into entities that are "too big to fail." Changes in bank regulation made during the 1980s and 1990s made it easier to form large and complex financial holding companies. There are now several firms that are so large, complex and interconnected with financial markets that their failure has the potential to cause panic and threaten the stability of the financial system. The reaction to the failure of Lehman Brothers is a demonstration of this. The potential to threaten overall stability gives firms that are too big to fail a license to take on extra risk, since regulators will be compelled to rescue them. It also provides encouragement for smaller firms to bulk up until they cross the too big to fail threshold.

Chapter five, "Implications and Solutions," attempts to summarize some of the lessons from this crisis. Events have

demonstrated once again that financial markets, often praised as the exemplars of allocative efficiency and economic rationality, can easily deliver gross inefficiency and misallocation of resources. The billions lost in nonprime lending are a measure of this failure. In addition, the massive recession triggered by these losses illustrates that financial firms can easily generate huge negative economic "externalities." The reckless behaviour of financial firms caused millions of people to lose their jobs, and reduced GDP by trillions of dollars. But the firms that produced these costs do not bear them. It is also clear that government efforts to limit the scope and effects of the financial crisis, while absolutely necessary, had the undesirable consequence of amplifying moral hazard. Any uncertainty that too big to fail firms will be rescued by a government desperate to avoid a complete economic collapse has been eliminated.

The chapter concludes with suggestions of how matters might be improved. Chief among them is the idea that financial regulation must directly confront the problem of firms that are too big to fail by forcing them to bear the costs of the externalities they generate. It is only by raising the costs of being very large or interconnected—that is, by imposing charges related to size, complexity of operation, and interconnection to markets—that the likelihood of future crises can be reduced. The alternative is to allow large financial holding companies to make private profit while socializing their losses. Other improvements, such as regulation of over-the-counter derivatives transactions and changes to consumer financial protection, are also discussed.

The reader will recognize that the chapters that follow deal with complex and sometimes obscure issues. There is a need to consider a wide variety of evidence to understand the events that produced this crisis. But the results are worth it. Careful attention to the facts provides a clear idea of why things went wrong. This is a necessary step in determining how we might avoid, or at least mitigate, this kind of disaster in the future.

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CHAPTER ONE

The Building Blocks of the Financial Crisis

1.1 Introduction

As the world is now painfully aware, huge losses at major financial institutions have precipitated the worst global financial crisis since World War II. Because of losses created by large exposures to toxic subprime and "near prime" mortgage assets, major investment banks, commercial banks and other firms have failed or been severely weakened. The resulting disruption to financial markets has caused the United States to experience the deepest recession in the postwar period. There have been massive job losses and a severe contraction in output. There is widespread belief that matters could have been worse, and apprehension about the strength of the economic recovery.

To understand these important economic events, we need to answer several basic questions. We need to know how and by whom all those nonprime mortgages and derivatives were created, why their value began a nosedive in mid-2007, and why these losses were sufficient to cause a financial panic in the world's most advanced economy. We also need to know why sophisticated financial firms were so deeply involved in creating these assets, and why financial regulators failed to restrain them. In addition, we need to know what this crisis has taught us about how advanced market economies work, and what must be done to prevent such crises in the future.

The plan of this book is to take each of these questions in turn. This chapter will be directed to understanding the building blocks of the financial crisis—how trillions of dollars of loss-producing nonprime mortgage loans and derivatives were created in the course of a few years, and who created them. We will show that high-risk and high-cost mortgage lending, which was an established part of the market by the mid-1990s, exploded during 2001–2006. Both the dollar value of nonprime mortgage originations, and their share of total mortgage lending, increased remarkably. At the same time, the riskiness of these loans—in terms of measures such as loan-to-value ratios and the credit scores of borrowers—rose dramatically.

The rapid expansion of nonprime lending occurred in the middle of a house price bubble that began in 1997 and did not end until 2006. As nominal and real house prices rose during this period, there were two important effects. First, the continuing rise in prices gave a temporary validation to nonprime borrowers and lenders. As prices climbed, even weak borrowers, who had little or no equity in their homes when they bought them, saw their position improve. If they found themselves near default on their loans, many had the option of refinancing or selling the house and repaying the loan. This reduced foreclosure rates and the losses taken on houses that were foreclosed. Second, the expectations of households began to change. Many people concluded that house prices would always increase. This created a self-reinforcing willingness to pay ever higher prices for houses, and to take out the mortgages to pay for them. This environment helped create demand for even the most exotic and high-cost mortgages.

We will also show that the flood of nonprime mortgages was financed in large measure through a distinct and lightly regulated channel in the capital markets, whose participants were untroubled by the increasing riskiness of nonprime assets. Many nonprime loans were originated by mortgage brokers and mortgage banks that funded their operations through capital market borrowings. Large volumes of loans

were then pooled and used to create securities. These residential mortgage-backed securities (RMBS) were sold to investors, and found their way into the portfolios of financial institutions throughout the world.

Financial engineering increased the flow of funding to nonprime lenders by creating additional demand for RMBS. Large volumes of nonprime securities—usually those with lower ratings and higher returns—were used to construct "structured financial products." These collateralized debt obligations (CDOs) and structured investment vehicles (SIVs) used pools of RMBS and other assets to create new securities that were rated and sold to investors. Important commercial and investment banks were involved in creating these structured securities.

During these happy times there were plenty of buyers for nonprime RMBS and structured securities. Although there was much talk about securitization and financial engineering as tools for managing and spreading risk, some of the firms using these tools—including large investment banks, commercial banks, and the government-sponsored Fannie Mae and Freddie Mac—had very large exposures to these assets. The elements of a financial disaster were all in place.

1.2 Nonprime Lending Expands and Lending Standards Plummet

1.2.1 Characteristics of Nonprime Mortgage Loans

Subprime mortgages, as the name implies, are issued to borrowers who are perceived to pose a higher than normal risk of default.[1] Typically they have impaired credit histories, reflected in lower FICO credit scores, and other characteristics, such as high debt-to-income ratios, that make them more likely candidates for default.[2] Subprime mortgage loans have substantially higher interest rates than prime mortgages, and are more likely to include costly terms such as prepayment penalties. Near prime (or Alt-A) mortgages are issued to borrowers who

Figure 1.1 FICO score and sector: 2005 originations

Sector	*Original Balance (millions of dollars)*	*Initial GWAC*	*Average Loan Size (thousands of dollars)*	*FICO*	*Comb. LTV*	*% Full Doc*	*% Cash-Out*	*% Investor*	*% IO*	*% Prepay Penalty*	*% Option ARM*	*Gross Margin*
Prime ARM	123,575	4.25	453	732	73.9	44.3	26.4	4.5	55.1	15.4	24.4	256.2
Near Prime ARM	189,195	3.88	321	711	80.0	24.9	34.9	14.2	45.1	52.6	43.9	282.4
Subprime ARM	290,601	7.10	200	624	85.9	56.9	51.2	5.5	30.4	72.4	1.1	582.6
Prime Fixed	47,114	5.86	499	742	70.6	54.7	27.6	1.0	15.2	1.7	NA	NA
Near Prime Fixed	94,944	6.21	215	717	76.2	40.0	38.3	15.7	28.9	15.6	NA	NA
Subprime Fixed	66,446	7.48	128	636	81.2	70.2	68.4	4.0	5.5	76.6	NA	NA

Note: GWAC is the average interest rate of a pool of mortgages, weighted by the outstanding principal balances, gross of servicing and guarantee fees; Comb. LTV is the combined loan-to-value ratio, the ratio of the sum of first and second liens to the value of the home; % Full Doc is the percentage of mortgages with complete documentation on standard underwriting information such as borrower employment, income and assets and appraised value of the house purchased; % IO is the percentage of loans that are interest-only, i.e. with no payments going to loan amortization; % Option ARM is the percentage of mortgages that have adjustable rates and for which borrowers can pay less than the interest accruing on the loan, which adds to the unpaid principal balance; Gross Margin is the amount in basis points that is added to an interest rate index, such as LIBOR, to determine the adjustable interest rate for the mortgage.

Sources: MBA Data Notes, January 2007.

typically have good credit histories, but who are self-employed, lack income or asset verification, or otherwise cannot qualify as prime borrowers.

The correlation of risk indicators and loan costs can be clearly seen in the data in figure 1.1. As we go down the spectrum from prime to subprime, we can see that average FICO scores decline and loan-to-value ratios rise, while interest rates rise substantially and the share of loans with prepayment penalties increases.[3] And in fact nonprime lending is riskier than prime lending. Foreclosure rates for subprime loans, whether fixed or adjustable rate, have always been much higher than those for prime loans (see figure 1.2).

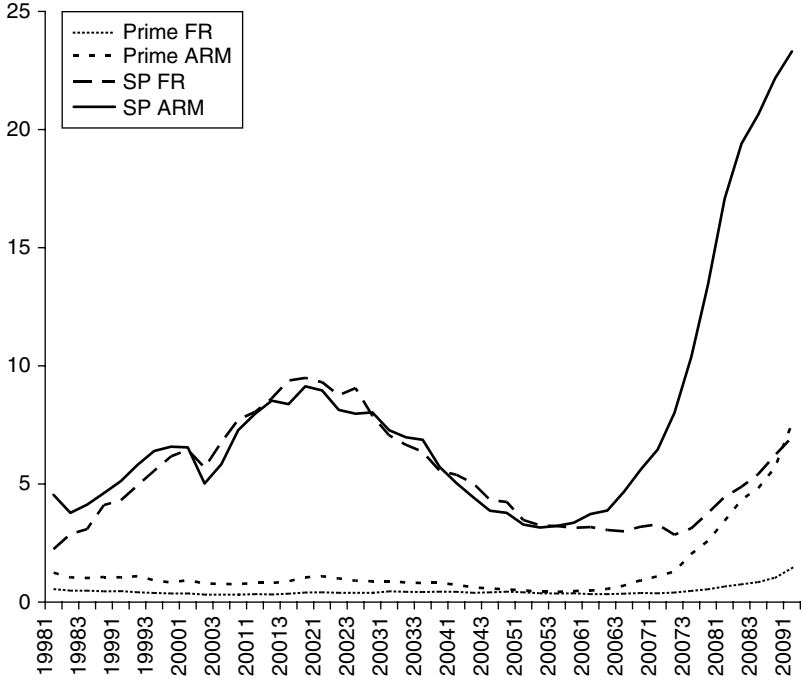


Figure 1.2 Foreclosure rates 1998Q1-2009Q1

Source: Mortage Bankers Association

1.2.2 Nonprime Lending Exploded during 2001–2006

Given the characteristics of nonprime loans, we might expect them to be a niche product. Most borrowers would like cheaper loans, and not all lenders or investors want to acquire higher-risk assets. From the 1980s, when subprime loans were introduced, until 2001, that is exactly what they were. For example, from the mid-1990s to 2001 subprime originations ranged from $125 to $160 billion per year, and accounted for 10 to 15 percent of total loans.

From 2001 to 2006, however, nonprime lending took on a new importance. The value of nonprime originations began to climb rapidly, and by 2006 subprime and near prime loans together accounted for more than a third of all mortgage lending. During this short period lenders originated $2.4 trillion subprime and $1.6 trillion in near prime mortgages (see figure 1.2).

Part of the increased share of nonprime lending came at the expense of Federal Housing Authority (FHA) or the Veterans Administration (VA) lending. Borrowers who cannot qualify for prime loans, because of their credit history, income or debt-to-income levels, are sometimes able to obtain mortgages

Figure 1.3 Mortgage originations by product (in billions of dollars unless otherwise noted)

	Agency		*Alt-A*		*Subprime*		
Year	*Originations*	*% Total*	*Originations*	*% Total*	*Originations*	*% Total*	*Total*
2001	1,440	65.0	55	2.5	160	7.2	2,215
2002	1,882	65.2	67	2.3	200	6.9	2,885
2003	2,680	67.9	85	2.2	310	7.9	3,945
2004	1,345	46.1	190	6.5	540	18.5	2,920
2005	1,180	37.8	380	12.2	625	20.0	3,120
2006	1,070	35.9	400	13.4	600	20.1	2,980
2007Q1	292	42.9	98	14.4	93	13.7	680
2007Q2	353	48.4	96	13.2	56	7.7	730
2007Q3	312	54.7	54	9.5	28	4.9	570
2007Q4	306	68.0	27	6.0	14	3.1	450

Data Source: 2008 Mortgage Finance Statistical Annual published by Inside Mortgage Finance Publications, Inc. Copyright 2008. Data reprinted with permission.

through these two sources. The FHA and VA reduce the risk to lenders by insuring the loan, and they also screen the borrowers they insure very carefully. The rates of default and foreclosure for FHA and VA loans were and remain much lower than those of privately funded subprime loans. There are, however, limits to the amount that these agencies will guarantee. As the house price bubble put home prices above the FHA and VA lending maximum—and as subprime lenders offered loans with low initial payments—many borrowers opted for subprime mortgages. The share of FHA and VA mortgages in total lending declined from 11.8 percent in 1997 to 2.6 percent in 2006.[4]

Prime lending was also displaced. The market share of "conforming" loans that are guaranteed by the government sponsored enterprises (GSEs) Fannie Mae and Freddie Mac was reduced by the rise of nonprime lending.[5] The decline in the aggregate share of FHA, VA, and GSE lending—collectively known as "agency" lending—was remarkable during the nonprime boom. Between 2001 and 2006 the agency share fell from 65 to 35.9 percent (see figure 1.3).

1.2.3 Subprime Lending Standards Plummeted during 2001–2006

The rapid expansion of nonprime lending was accompanied by lender willingness to abandon normal mortgage lending standards. Measures of credit risk increased, denial rates for loan applicants fell, and loans were structured to make them affordable in the short run.

Lenders normally make decisions about mortgage loans and their terms by evaluating both the borrower and the house that secures the loan. Borrowers are asked to document their employment, income, assets, and debt. Consumer credit scores and histories are collected. Houses are appraised for market value and titles are searched to detect the presence of liens. And borrowers are usually asked to make down payments, which put them in a "first loss" position if they default and the loan goes into foreclosure. The collection and

evaluation of this information makes up the practice of mortgage underwriting.

The decline in underwriting during 2001–2006 is reflected in several measures. The share of subprime loans having incomplete documentation of borrower income or assets increased from around 20 percent in 2001 to more than 35 percent in 2006. There are two ways to view this change. The more benign interpretation is that that during the boom, subprime lenders were so eager to originate subprime loans that they paid decreasing attention to basic information gathering. A less sanguine view is that incomplete documentation was a device to evade state predatory lending statutes. Those laws forbid making unfair or unaffordable loans. But with an absence of documentation the lender can assert that, given the borrower's "stated income," the loan was affordable.

Subprime lenders also dramatically lowered the down payment requirements for borrowers, thereby increasing loan-to-value ratios (LTV). The share of loans at origination with a LTV greater than or equal to 90 percent or with a second lien increased dramatically during the boom, reaching a peak value of nearly 30 percent in 2006. The presence of a second lien usually meant that the borrower took out a second loan to help cover the down payment. More importantly, it often meant that the borrower at origination had no equity in his home. In fact, 80 percent of borrowers with second liens at origination had an LTV of 100 percent or more.[6]

Loans with high LTVs at origination are extraordinarily risky. A mortgage borrower with positive equity—i.e., with an outstanding loan balance less than the market value of the house—is unlikely to default on the mortgage. If he is unable to make his mortgage payments, he can always sell the home to pay off the mortgage, or refinance the home and use some of the equity to help make future payments.[7]

Borrowers with negative equity, on the other hand, cannot sell or refinance unless they make a cash outlay. Hence borrowers with negative equity have a strong incentive to default if it becomes difficult to maintain mortgage payments. Given that

mortgages are often non-recourse loans, the costs of default are limited to credit rating damage and the transactions costs of finding and moving to another dwelling.

So if a borrower starts out with little or zero equity, a decline in the price of his house will put him into the category of more likely to default. If the loan has a prepayment penalty, he may be in that category even if prices do not decline. Clearly the lenders making these loans were rolling the dice, anticipating increasing house prices.

During the boom lenders increased the proportion of loans that took more than 30 years to pay off the loan principal. Some of these loans allowed payment of interest only for some period of time; some had balloon payments due at the end of 30 years. The effect of these "nontraditional amortization schedules" was to delay the accumulation of borrower equity, make the loan more vulnerable to house price declines, and increase the impact of prepayment penalties. The share of subprime loans with nontraditional amortization rose dramatically during the boom period, especially after 2004.

A careful statistical study of a million individual subprime loans originated during 2001–2006 found that several of the risk factors discussed above were significantly related to observed foreclosures. Lower FICO scores, higher LTV ratios, and missing documentation all raised the probability that a loan would go into foreclosure. The study also found that house price appreciation reduced the likelihood of foreclosure. These results confirm the common sense of underwriting.[8]

The study also points out that prediction errors for the statistical model increase across vintages. That is, actual rates exceed predicted rates, and the difference increases with the year of origination. Loans made in 2002 have bigger errors than loans in 2001 and so on. The authors attribute this progressive deterioration in predictive power to a decline in "loan quality." This may mean that the observed variables do not fully capture the actual risks in the loans. It may also mean that the reporting of inaccurate or fraudulent data became more common as the lending boom continued.[9]

Changed lender behavior is also visible when we look at the evolution of loan denial rates. Many people apply for mortgages, but a substantial number of applications are denied. However, empirical research shows that denial rates for subprime loan applications declined as loan volume increased, especially in geographic markets where denial rates had previously been relatively high. Two empirical studies have examined the evolution of subprime loan denial rates during 2001–2006. Although these researchers did not have access to loan-level data, they were able to study denial rates in geographic markets at the MSA and zip code level. They observe that denial rates declined significantly during this period, and find that the decline cannot be explained by improved economic conditions within the market areas (such as increased employment) or improved borrower characteristics (such as increased average incomes or average credit scores). Both studies conclude that lending standards deteriorated during this period.[10]

During the nonprime boom a very large share of subprime loans were in the form of so-called 2/28 and 3/27 "hybrid" adjustable rate mortgages (ARM) (see figure 1.4). These loans offered interest rates that were initially fixed, but at the end of the initial two- or three-year period the loan interest rate reset, potentially to a significantly higher level.[11] Other subprime loans were "interest only," which allowed the borrower to pay

Figure 1.4 Subprime mortgage-backed security composition: An analysis of private label securitization data

	Interest-Only Share	*Negative Amortization Share*	*2- and 3-Year Hybrid Adjustable Rate*	*5-, 7-, and 10-Year Hybrid Adjustable Rate*
2001	0.0%	0.0%	59.5%	0.8%
2002	1.2%	0.0%	65.4%	1.4%
2003	4.1%	0.0%	63.1%	1.4%
2004	16.2%	0.0%	73.5%	1.5%
2005	27.2%	0.0%	72.2%	1.5%
2006	17.0%	0.0%	50.3%	2.0%

Source: Statement of Sandra L. Thompson, Director of Supervision and Consumer Protection, FDIC, before the Committee on Banking, Housing and Urban Affairs, U.S. Senate, March 22, 2007. Data from LoanPerformance.

interest on the loan for a fixed number of years, after which payment of principal was required.

Contrary to generally accepted ideas, the initial interest rate on hybrid loans was quite high. Calculations by economists at the Federal Reserve Bank of Boston show that the initial hybrid rate during 2004–2007 ranged between 7.3 and 8.6 percent. These rates were about 3 percent higher than lenders charged for one-year prime ARMS. The fully indexed rates during this period were higher than the initial rates. So a 2/28 loan originated in 2004 or 2005 faced an interest rate increase of 3 to 4 percentage points in 2006 or 2007.[12]

For hybrids that survived until reset, the payment jump did have an impact on outcomes. A statistical analysis of subprime loans originated between 1998 and 2005 showed that when the borrower did not have enough equity to allow refinance or sale, a reset to a higher interest rate could act as a default trigger. The outcome depended on the size of the payment shock experienced by the borrower at reset. When payment shock was larger than 5 percent and the LTV was greater than 90 percent, the probability of default increased by 83.5 percent.[13]

The structure and effects of hybrid lending have led to a successful court case brought by the Massachusetts Attorney General against subprime lender Fremont.[14] The court recognized that the hybrid subprime loans originated by Fremont, because they typically qualified borrowers on their ability to make initial payments, allowed borrower to refinance or otherwise avoid foreclosure only if house prices continued to appreciate. The court held that if a mortgage loan had four characteristics—an introductory adjustable rate period of three years or less, an introductory interest rate at least 3 percent below the fully indexed rate, a borrower debt-to-income ratio greater than 50 percent at the fully indexed rate, and a LTV of 100 percent or a substantial prepayment penalty, or a prepayment penalty that existed past the introductory rate period—it violated the Massachusetts statute forbidding unfair or deceptive acts and practices.[15]

1.3 The House Price Bubble Supported the Performance of Nonprime Lending, While Altering Household Expectations and Behavior

Nonprime lenders did manage to live a charmed existence for many years. The house price bubble which began in 1997 continued to inflate, reaching double digits nationally during 2003–2006. The rapid creation of borrower equity masked the underlying weakness of the loans that were being made.

At the same time the bubble changed the expectations of many households. Individual expectations about the future course of house prices were revised dramatically upward, justifying decisions to take on increased levels of mortgage debt. Many households saw their houses as assets that would continue to appreciate, and used their newfound housing wealth to finance an increasing fraction of their consumption. For an extended period of time, demand for houses became self-reinforcing, and high-cost mortgages began to seem normal and reasonable.

1.3.1 Development of the House Price Bubble

The era of rapid national house price appreciation began around 1997. From 1997 until the middle of 2006, house prices in many geographic markets began to increase much more rapidly than building costs or the general price level. From 1997 to 2006, nominal house prices increased at an annual rate of 9.3 percent, while building costs increased at an annual rate of 2.9 percent and the consumer price index increased at an annual rate of 2.5 percent.

This sustained increase in house prices across diverse geographic markets was extraordinary. Data compiled by Robert Shiller indicate that the increase is an historical anomaly.[16] For the forty-five years ending in 1997, the real value of home prices was essentially unchanged. Between 1953—when the post–World War II increase in house prices came to an end—and 1997 the price of a house adjusted for increases in the consumer price index declined by 4.4 percent. But between 1997

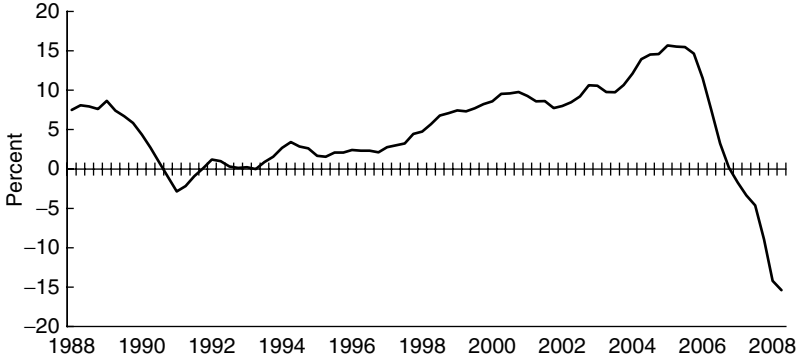


Figure 1.5 Percent change in Case-Shiller national home price index, year-on-year
Source: Standard & Poor's.

and 2006 real house prices increased at a compound rate of 6.8 percent, for a total real increase of 85 percent.

It is also notable that nominal house price appreciation began to accelerate at the end of 2002. Year-on-year growth rates between 1997 and 2002 ranged between 3.37 and 9.38 percent. But in 2003 the pace of price appreciation picked up dramatically, rising to a maximum of 15.68 percent in the 2005Q1 (see figure 1.5).

Of course house prices did not increase uniformly in every geographic region during this period. Some cities, such as Tampa, witnessed remarkable price increases, while others, such as Cleveland, saw much more modest price changes. Nonetheless, unusually large price increases occurred widely enough to move weighted national price measures.

1.3.2 Price Increases Disguised the Weakness of Nonprime Lending

The sustained and ultimately accelerating increase in house prices provided a protective environment for nonprime lending. Although nonprime loans became objectively riskier during 2001–2006, loan performance actually improved. As can be seen from figure 1.2, subprime foreclosure rates began to

drop in 2001, and did not begin to rise until 2007. Detailed statistical analysis shows that house price appreciation was temporarily disguising the effects of bad underwriting. The automatic accumulation of equity was allowing weak borrowers to sell or refinance, and lenders to reap short-term profits.[17]

1.3.3 Household Expectations, Behavior, and Risk Profiles Were Changed by the Price Bubble

The period of sustained price increases changed consumer expectations about the course of future home prices. Survey data show that the anomalous increases came to be widely viewed as normal and sustainable. Residents surveyed in some cities said they expected double digit house price appreciation to last for a decade. In 2003 survey results for Los Angeles, San Francisco, Boston, and Milwaukee produced average expected increases ranging from 11.7 to 15.7 percent.[18] That is to say, those surveyed were expecting real house price appreciation to equal or exceed the observed national rate, assuming overall price inflation of around 5 percent.

These expectations were unreasonable on their face. An annual real house price increase of 6.8 percent would double the real cost of housing about every 10 years. That would quickly outstrip real household income growth and make houses unaffordable for most households.[19]

As house prices appreciated and household expectations changed, so did the ability and willingness of households to realize some of the increased asset value of their houses. Because rising home values make it easier to sell a home, refinance a mortgage, or to take out a second lien mortgage in the form of a home equity loan, households were presented with a new source of personal finance. This made home ownership seem more attractive, and helped to reinforce the apparent reasonableness of paying ever higher prices for houses.

A Federal Reserve study shows that during 2001–2005 the free cash flow from the sale of existing homes—i.e., sales proceeds net of mortgage and home equity loan repayments and

closing costs—averaged $997.4 billion per year, up considerably from the average of 299.6 billion during 1991–2000.[20]

Although households used substantial amounts of their free cash flow to purchase another home after selling one, about 69 percent was used for other purposes. During 2001–2005, households annually spent an average of $232.3 billion of their free cash flow—about 23.3 percent of the annual total—on personal consumption expenditure or non-mortgage debt repayment. This amounted to 2.9 percent of total personal consumption expenditure during the period, up from 1.1 percent during 1991–2000.[21]

As can be seen from figure 1.6, the contribution of mortgage equity withdrawals to personal consumption expenditures moved in step with house price appreciation. As house prices rose, the share of consumption supported by equity withdrawals increased.

However, after the housing bubble began to deflate in 2006, this source of support for consumption also began to decline. House equity can be realized only so long as it exists, and if the house can be sold, refinanced, or used as security for a home

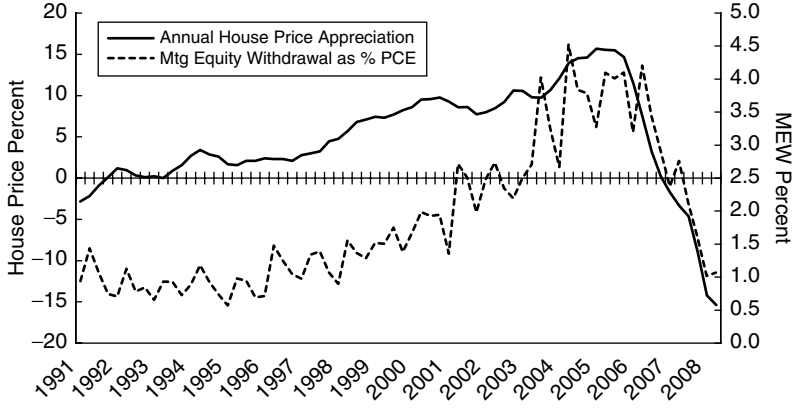


Figure 1.6 Share of purchases financed by mortgage equity rises with house prices

Source: Federal Reserve, Standard & Poor's

equity loan. Declining house prices have constricted all these possibilities.

In addition to providing new sources of finance to households, rising house prices also contributed to overall household indebtedness. Available data show that household debt-to-income ratios have increased since the 1980s, more for homeowners than for renters. Using data from the triennial Survey of Consumer Finances, Federal Reserve economists have estimated that the aggregate household debt-to-income ratio increased from .6 in 1983 to 1 in 2004. Controlling for demographic changes, such as increased education which affects lifetime income, and other variables, they estimate that about 20 percent of the increase in the debt-to-income ratio is attributable to increased house prices.[22]

The increase in the debt-to-income ratio is reflected in the increased burden of mortgage debt service. The Federal Reserve calculates an average homeowner financial obligations ratio (FOR), which is the sum of mortgage payments, homeowner insurance payments, and property tax payments, divided by disposable personal income.[23] The value of the FOR has trended upward since 2000, rising from 9.07 percent in 2000Q1 to 11.55 percent in 2008Q1. Increases in mortgage debt payments are the principal reason for this increase. The contrast with the FOR of renters, which declined over this period, is striking.

Increased mortgage debt accumulation has made some households more vulnerable to negative economic events. With a higher share of income devoted to fixed payments, a household may find it more difficult to meet required debt payments if a member of the household loses a job, or faces large medical expenses.

Of course a solvent household can, if necessary, sell assets to meet debt commitments. But houses are a large part of asset portfolios for many households, and declining home prices may make highly indebted households insolvent. Moreover, in a declining market, in which buyers have difficulty obtaining credit, it may be very difficult to sell a house either to pay off mortgage debt or realize positive equity.

1.4 Nonprime Lending Was Financed through a Distinct, Lightly Regulated Channel that Relied on "Securitization" and "Structured Finance"

1.4.1 Subprime and Near Prime Mortgages Were Funded by Capital Market Investors, Operating through a Distinct Mortgage Market Channel

Subprime mortgages are a relatively new category of home lending. As former Federal Reserve governor Edward Gramlich pointed out, they were made possible by two complementary developments: changes to federal law, dating from the 1980s, which eliminated the interest rate ceilings imposed by state usury laws, and the expansion of a secondary mortgage market that gave subprime mortgage originators access to funding from capital markets.[24] Higher interest rates gave lenders a reason to make riskier loans, and capital market access allowed them to originate loans far in excess of what they could support on their own balance sheets.

The rapid expansion of subprime lending was funded through a distinct and rapidly expanding channel of financial intermediaries. Independent mortgage brokers sold the majority of subprime loans to households. Most subprime mortgages were originated by mortgage companies, sometimes independent and sometimes affiliates of commercial or savings banks. The mortgage companies used most of the mortgages they originated as the underlying assets for mortgage-backed securities. These securities were sold to investors via the capital markets. This process shifted the future losses from mortgage originators and their financiers to the purchasers of mortgage-backed securities.

The entire nonprime finance channel was very lightly regulated. Although mortgage brokers sell complicated financial contracts to households, they face few licensing or performance requirements. Mortgage banks, because they are not depository institutions, received little scrutiny from bank regulators even when they were affiliates of regulated institutions. Issuers

of mortgage back securities were subject to the registration and disclosure requirements of the Securities and Exchange Commission, but capital market investors were otherwise left to their own devices.

1.4.1.1 The Overall Structure of the Mortgage Market

Mortgages are originated by many different agents. Depository institutions (commercial banks, thrifts and credit unions) and mortgage companies (some of which are affiliates of depository institutions) both originate mortgages. The majority of mortgages are originated by depository institutions. During 2004–2006, depositories and their subsidiaries and affiliates originated approximately 70 percent of all mortgages. The remainder was originated by independent mortgage companies, or the affiliates of investment banks or other financial firms.

Mortgage originators can hold the loans in their investment portfolio, or they can sell them to others. It is standard industry practice for intermediaries, called sponsors or issuers, to buy pools of mortgages from originators.[25] The sponsor creates a trust, which issues securities backed by that pool of mortgages. These residential mortgage backed securities are then sold to investors. Day-to-day administration of the underlying pool of mortgages is handled by a servicer, which collects principal and interest payments, handles delinquencies, foreclosures and loan payoffs, and pays income to the trust. Of course the loan originator can act as the securitization sponsor (See box 1.1—Subprime mortgage securitization).

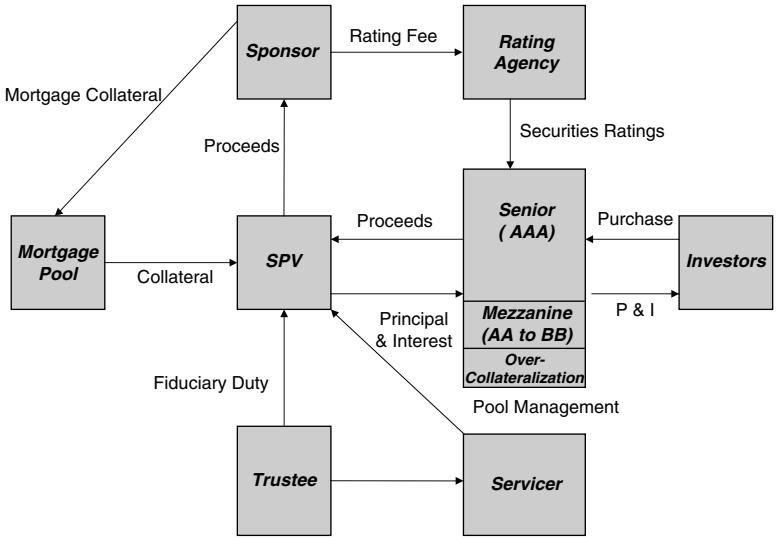
The share of mortgages securitized has risen significantly over the past twenty years. In 2007, more than 75 percent of all mortgage originations were securitized, compared to only 47.2 percent in 1989.[26]

An RMBS investor is buying a financial asset with a return that depends on the performance of the underlying mortgage collateral. The risk characteristics of RMBS are therefore a function of the risk characteristics of the mortgages in the pool. Mortgage industry participants recognize several general risk

categories for RMBS. RMBS that have been issued by Fannie Mae, Freddie Mac, or Ginnie Mae are referred to as "agency" securities.[27] The loans backing Fannie and Freddie securities are called "conforming" because they must have been made to borrowers who meet credit underwriting standards, and are within size limits.[28]

Fannie and Freddie guarantee timely payment of principal and interest on the underlying loans in exchange for an insurance fee. Since the GSEs have now explicit (until August 2008 implicit) federal government support in the event of financial losses, agency RMBS are regarded as less risky than those with equivalent underlying mortgages.

Box 1.1 Residential Mortgage Securitization



Notes: Mortgage securitization is a process by which a pool of mortgages loans—containing thousands of individual loans—is turned into rated securities which are sold to investors.

continued

The process is initiated by a sponsor, who originates or buys the loans. The sponsor places the loans into a special purpose vehicle (SPV) and appoints a trustee to oversee it as a fiduciary. The SPV uses the flow of principal and interest from the mortgages as the basis for a set of RMBS. These securities have varying risk and return characteristics.

Securities in the "senior" tranche pay buyers a relatively lower return in exchange for a contractual guarantee that defaults in the underlying mortgage portfolio will be borne first by lower tranche security holders. Buyers of lower tranche or "mezzanine" securities are paid higher returns to compensate them for bearing more of the risk of loss. The lowest tranche in the structure is called the "overcollateralization" tranche, which provides a credit enhancement to the senior and mezzanine securities. It absorbs the first losses experienced by the trust. Overcollateralization means that the SPV contains mortgages with an initial value exceeding the face value of the securities it issues.

Pricing the various tranches of an RMBS pool when they are issued requires making some fairly complex calculations. The issuer needs to estimate defaults and prepayments for a large volume of individual mortgage contracts in order to determine the payouts that can be supported. But buyers do not rely entirely on the projections of the issuer.

In order to sell RMBS to investors, issuers also need to have the tranches rated by third parties. These ratings are assigned by credit rating agencies—usually Moody's, Standard and Poor's, and Fitch—and are intended to allow buyers to compare the default risk to that of other fixed income assets, such as corporate bonds. The ratings are paid for the by the sponsor of the SPV.

Typically, securities in the senior tranche will be rated (using Standard & Poor's notation) AAA, those in the mezzanine from AA+ to BB. Of course the higher the ratings given to a pool's securities, the lower the rates the

issuer must offer to buyers and the more profitable the issuance.

The capital structure of a typical subprime RMBS pool is heavily weighted toward more highly rated securities. On one estimate, the average structure is 79.3 percent AAA, 6.6 percent AA, 5.4 percent A, 4.3 percent BBB, 2.6 percent BB, and the rest given over to "overcollateralization."

In effect, the securitizers and the rating agencies claimed that subprime dross could be spun into low-risk gold. Senior subprime securities were sold as if they had the same likelihood of default as the bond issued by a sound corporation.

Source: A. Ashcraft and T. Schuermann (2007). Understanding the Securitization of Subprime Mortgage Credit, Federal Reserve Bank of New York, Working Paper.

RMBS issued by other market participants are referred to as "private label." They can be prime, near prime, or subprime, depending on the mortgages backing them. The mortgages backing private label RMBS lack the implicit government guarantee of their principal and interest payment that investors get with Freddie and Fannie RMBS.

1.4.1.2 The Structure of the Subprime Mortgage Channel

Subprime lending was conducted, in large measure, through a distinct channel in the mortgage market. The majority of subprime borrowers found their mortgages through independent mortgage brokers. These brokers arrange loans through business relationships with lenders, but do not themselves fund the loans. In 2006, 63.3 percent of all subprime loans were initiated through brokers, while for the mortgage market in total, the broker share was 29.5 percent.[29] Mortgage brokers are lightly supervised. Under state law they are not fiduciaries, and, unlike securities brokers, they are not obligated to sell borrowers financial products that are suitable to them.

As a consequence mortgage brokers were free to maximize their income at the expense of subprime borrowers. Mortgage originators in fact gave brokers strong incentives to do just that. Many subprime lenders offered brokers a "yield-spread premium"—a bonus for selling a mortgage with an interest rate higher than the rate for which the borrower could qualify. The yield-spread premium generally increased when the loan included a prepayment penalty, a feature which guaranteed the lender that the premium would be recouped if the borrower paid off the mortgage. As a consequence subprime borrowers who went through brokers paid significantly more than borrowers who obtained their loans from retail sources, such as banks or thrifts.[30]

Most subprime loans were originated by companies that specialized in mortgage lending, which are also lightly supervised. It has been estimated that affiliates of commercial banks or thrifts, which are less closely supervised than depositories, made about 30 percent of all subprime loans in 2004. Independent mortgage companies, which are state supervised, made about 50 percent of subprime loans.[31] Lending was highly concentrated within the independent mortgage companies. Another study found that "... 905 lenders specialized in higher priced [subprime] lending, meaning that higher-priced loans accounted for more than 50 percent of their overall lending activity in 2004. Of these, 17 large independent mortgage companies collectively originated 506 thousand loans, or 39 percent of all higher-priced loans originated that year."[32]

Although independent mortgage banks played a very large role in subprime originations, it needs to be remembered that many large and important financial institutions were deeply involved. A glance at the top ten subprime originators for 2006 illustrates this point (see figure 1.7). The independent mortgage banks—New Century, Fremont, Ameriquest, Option One—are represented. But so are major banks and thrifts, including HSBC, Countrywide, Citigroup, and Wells Fargo. First Franklin was a subsidiary of Merrill Lynch, and WMC was a subsidiary of General Electric, so investment banks and industrial conglomerates were also part of the process. The concentration of firms

Figure 1.7 Top subprime mortgage originators

		2006	
Rank	*Lender*	*Volume ($ billions)*	*Market Share (%)*
1	HSBC	52.8	8.8
2	New Century Financial	51.6	8.6
3	Countrywide	40.6	6.8
4	CitiGroup	38	6.3
5	WMC Mortgage	33.2	5.5
6	Fremont	32.3	5.4
7	Ameriquest Mortgage	29.5	4.9
8	Option One	28.8	4.8
9	Wells Fargo	27.9	4.7
10	First Franklin	27.7	4.6
	Top 10	362.4	60.4
	Total	600	100.0

Data Source: 2008 Mortgage Market Statistical Annual published by Inside Mortgage Finance Publications, Inc.Copyright 2008.Data reprinted with permission.

originating subprimes is also apparent from these data. The ten largest originators made more than 60 percent of the subprime loans in 2006.

Many of the largest subprime originators were also important issuers of subprime securities. Many of the top ten subprime originators in 2006 were also among the top ten issuers of subprime securities (see figure 1.8).

As the subprime market expanded during 2001–2006, loan originators financed an increasing fraction of their business through securitization. In 2001, 60 percent of subprime loans were securitized, but by 2006 the securitization rate had risen to 80 percent, reflecting the intense demand of investors for securities based on high-risk and high-cost mortgages.

1.4.1.3 Near Prime Mortgages

Near prime mortgages are funded in the same fashion as subprime mortgages. In 2006, 8 of the top 10 lenders were independent mortgage banks or subsidiaries of investment banks.

Figure 1.8 Top subprime mortgage-backed securities issuers

		2006	
Rank	*Lender*	*Volume ($ billions)*	*Market Share (%)*
1	Countrywide	38.5	8.6
2	New Century	33.9	7.6
3	Option One	31.3	7.0
4	Fremont	29.8	6.6
5	Washington Mutual	28.8	6.4
6	First Franklin	28.3	6.3
7	Residential Funding Corp	25.9	5.8
8	Lehman Brothers	24.4	5.4
9	WMC Mortgage	21.6	4.8
10	Ameriquest	21.4	4.8
	Top 10	283.9	63.3
	Total	448.6	100.0

Data Source: 2008 Mortgage Market Statistical Annual published by Inside Mortgage Finance Publications, Inc.Copyright 2008.Data reprinted with permission.

The remaining two—IndyMac and Washington Mutual—were thrifts, each with a very large mortgage business.[33] Lending was highly concentrated in these ten firms. They accounted for about 79 percent of near prime lending in 2006 (see figure 1.9).[34] Near prime lending also depended heavily on capital markets for funding. Securitization rates rose from 85 percent in 2004 to 91 percent in 2007.[35]

1.4.2 *"Structured Finance" Boosted Investor Demand for Subprime Securities*

The rapid expansion of nonprime lending received a significant boost from firms engaged in "structured finance." These banks and investment banks used nonprime mortgage-backed securities and other assets to create new securities. The flows of income from the underlying assets were assigned to new securities. It was believed that, even though the underlying assets were high risk and high return, some of the new securities would have the properties of highly rated corporate securities, and

Figure 1.9 Top Alt-A mortgage originators

		2006	
Rank	*Lender*	*Volume ($ billions)*	*Market Share (%)*
1	IndyMac	70.15	17.5
2	Countrywide	68	17.0
3	Residential Capital Group	44	11.0
4	Bear Stearns (EMC Mortgage)	28.27	7.1
5	Washington Mutual	25.3	6.3
6	Lehman Brothers (Aurora Loan Services)	19.4	4.9
7	GreenPoint Mortgage Funding Inc	18.3	4.6
8	WMC Mortgage Corp	17.7	4.4
9	First Magnus Financial	13.32	3.3
10	Impac Mortgage Holdings	11.57	2.9
	Top 10	316.01	79.0
	Total	400	100.0

Data Source: 2008 Mortgage Market Statistical Annual published by Inside Mortgage Finance Publications, Inc.Copyright 2008.Data reprinted with permission.

could therefore be sold at corresponding prices. Because these structured securities were in themselves very popular, they created a new source of demand for subprime mortgage securities, and therefore a new source of finance for subprime lending.

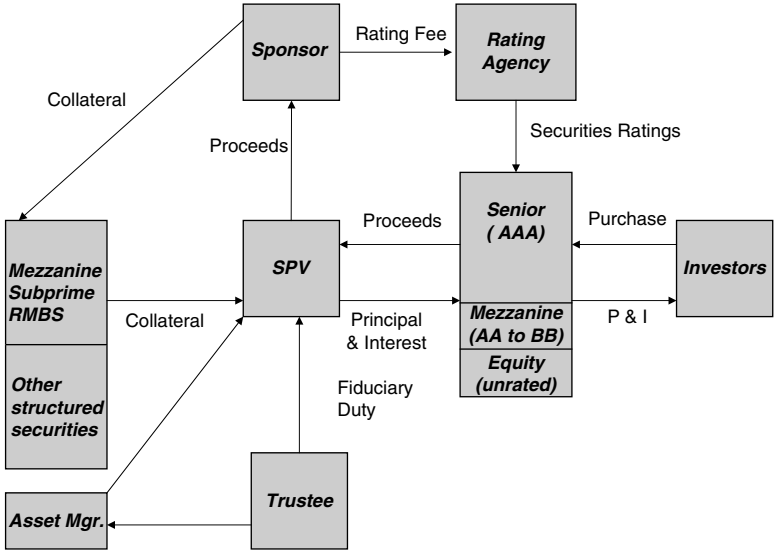
1.4.2.1 Collateralized Debt Obligations

Subprime mortgage-backed securities were purchased by a wide variety of investors, but one important source of demand, especially in the latter years of the subprime credit boom, were the issuers of collateralized debt obligations (CDOs). CDO securities are synthesized from other securities: issuers take a collection of debt instruments, pool them, and use them as the basis for a new set of securities. Those CDOs that use previously structured products—such as RMBS or commercial mortgage-backed securities as collateral are called "structured finance" CDOs (See box 1.2—Structured finance CDOs).

Structured finance CDOs securitize collateral that has already been securitized. This adds complexity to the problems

of estimating payment streams and defaults, since both the characteristics of the underlying collateral and the effects of the contractual terms of the first order securitizations must be taken into account. Moreover, while CDO securities do trade in secondary markets, the prices at which trades are made provide limited information about the value of other CDO securities. Because underlying asset pools, deal structures, and deal managers all differ, the price that applies to one security need not apply to another. This means that valuation of these securities relies heavily on mathematical and statistical models.[36] Rating agencies also face these additional complexities when providing third-party evaluations of default probabilities via credit ratings.

Box 1.2 Subprime Structured Finance CDOs



Notes: Collateralized debt obligations (CDOs) are vehicles that take pools of debt instruments and use them as the collateral for newly created securities. Collateral for "structured finance"

continued

CDOs primarily includes RMBS, asset-backed securities, commercial mortgage-backed securities, debt from real estate investment trusts, and securities issued by other CDOs. Hence structured finance CDOs securitize assets that were themselves created by securitization.

CDO structures have a family resemblance to mortgage securitizations. A sponsor puts the collateral pool into a special purpose vehicle to be overseen by a trustee. The SPV issues securities, which the sponsor pays a credit rating agency to rate. Super senior and senior debt securities are rated AAA to AA, and mezzanine debt securities are rated A to BB. Unrated equity securities are also issued. The equity securities absorb the first losses on the collateral, and are paid the highest returns.

Losses not covered by the equity tranche are absorbed by the debt holders. The lower-rated debt tranches absorb losses before the higher-rated, and contractual rates of return decline as ratings rise.

The collateral pool is sometimes static, but often an asset manager has authority to reinvest proceeds and trade assets for some fixed period of time. The CDO structure will have asset quality and cash flow tests. If the asset quality tests—related to such factors as ratings of the underlying collateral and the concentration of assets by obligor—are not met, the CDO securities are subject to ratings downgrades. If the cash flow tests are not met, then cash flows are directed to the more senior tranches first, and lower tranches are paid off to the extent possible.

Structured finance CDO securities are therefore complex financial instruments. When subprime mortgage-backed securities are part of the CDO collateral, the value of the CDO securities depends on the performance of the subprime mortgage pool; the rules which allocate losses in that pool to the mortgage-backed securities it supports; the rules of the CDO that allocate losses among tranches; and the performance of the CDO asset manager.

continued

The structured finance CDO market grew rapidly during the subprime boom years, and in the process added to the demand for subprime RMBS. Data from the Securities Industry and Financial Market Association show that CDO issuance more than tripled between 2004 and 2006, with structured finance CDOs accounting for 65 percent of issuance in 2005 and 57 percent of issuance in 2006.

Source: The Bond Market Association (2004). CDO Primer.

Much of the collateral backing structured finance CDOs issued during the subprime lending boom consisted of subprime RMBS. Moody's has estimated that, for the CDOs it rated during 2003–2006, the percentage share of subprime collateral in CDOs ranged between 41 and 49 percent.[37] If we assume that the Moody's data are representative of CDOs issued during this period, we can get a rough idea of how CDO issuance affected the demand for subprime securities. In 2005 issuance of nonsynthetic structured finance CDOs totaled $134 billion.[38] Moody's estimates that 47 percent of the collateral in the deals it rated in 2005 consisted of subprime securities. So the subprime collateral in 2005 CDOs amounted to about $43 billion. This is 13 percent of the total issue of subprime RMBS issued during the year. In 2006 the Moody's CDOs contained 45 percent subprime collateral, and $266 billion of structured CDOs were issued. Hence they contained about $73 billion in subprime collateral, which was 23 percent of all subprime securities issued.[39]

CDO issuers favored lower rated-higher return tranches of RMBS. Moody's has estimated that the share of structured finance collateral composed of RMBS tranches rated Baa or lower ranged between 22 and 24 percent during 2003–2006.[40] That is to say, about half of the subprime RMBS used as collateral for structured finance CDOs was of the high risk–high return variety.

The strong demand for lower rated RMBS tranches is confirmed by estimates made by the Federal Reserve. According to their calculations, structured finance CDOs that invest in collateral that is predominantly rated BBB (so-called "mezzanine CDOs") took on substantial exposure to BBB tranches of subprime RMBS. During 2005 and 2006, their exposure exceeded the new issuance of these risky tranches.[41] Issuers compensated for the supply shortage by using credit default swaps (or CDS, which are contracts that insure against loss on a credit instrument) referenced to subprime RMBS in place of actual subprime bonds.

In summary, not only were structured finance CDOs a source of demand for subprime RMBS generally, they made heavy use of the lower-rated subprime tranches as collateral, especially toward the end of the subprime lending boom. Hence these CDOs were constructed in large part from collateral that bore much of the default risk in subprime RMBS. The highly rated tranches of these CDOs were supposed to be insulated from loss by the lower tranches. But the AAA ratings for the upper tranches of CDOs depended crucially on the assumption that significant, simultaneous losses in subprime mortgages would not wipe out the lower tranches of RMBS. That assumption turned out to be spectacularly wrong.

1.4.2.2 Conduits and SIVs

CDOs were not the only structured financial products to use subprime RMBS as collateral. Conduits and structured investment vehicles (SIVs) created by commercial or investment banks used these securities as collateral.

Both conduits and SIVs are special purpose entities set up to fund long-term assets using short-term debt that is sold in the asset-backed commercial paper markets. They are designed to make profit on the arbitrage between short and long interest rates.

Conduits include liquidity support agreements, provided either by the sponsor or by some third party. These agreements guarantee the buyers of the conduit's commercial paper that these debts will be redeemed, even if the conduit is unable to roll over its borrowing when it comes due.

SIVs have partial liquidity support and a capital cushion raised from third parties in the form of senior securities. SIVs also have trigger mechanisms built into their structure. These triggers require, for example, that the market value of the SIV assets can redeem the senior securities. If this requirement cannot be met, then the SIV assets must be sold and the results distributed to the senior note holders. Both conduits and SIVs require continued access to short-term borrowing. When that borrowing is disrupted, the entity can fail.[42]

1.5 Securitization and Structured Finance Made Many Important Institutions Vulnerable to Losses on Nonprime Lending.

CDOs, conduits, SIVs, and associated securitization platforms left banks and investment banks with large exposures to nonprime assets.

Through their creation of conduits, commercial and investment banks retained significant exposure to subprime mortgages. At least toward the end of the nonprime lending boom CDO issuers funded much of the senior tranches from their own balance sheets and from the creation of conduits. It has been estimated that during 2006 and 2007, 68 percent of the AAA tranches of CDO issued were funded by conduits or by banks.[43] Hence when they originated CDOs with subprime collateral, banks often retained a large amount of the senior tranches, or stood behind them via liquidity guarantees.

Although as SIV sponsors banks had limited liability, they had far more de facto exposure to the subprime assets held by SIVs that they sponsored. That de facto exposure derived from a need to preserve their reputations as reliable financial counterparties. Allowing substantial SIV failures, when senior note holders anticipated little risk to their investments, would have opened the possibility of legal claims, and would likely threaten future SIV business and perhaps other business relationships.

Participation in the CDO and SIV markets exposed banks and investment banks to subprime RMBS through an additional channel. As was noted earlier, affiliates of commercial banks and investment banks were often engaged in originating subprime mortgages. Thus they were often holding, directly or indirectly, substantial inventories of subprime mortgages which were destined to underlie RMBS, CDOs, or SIVs.

Determining the exact degree of bank or investment bank exposure to subprime mortgages through their RMBS, CDO, or SIV businesses is not an easy matter. But the substantial concentration of bank and investment bank holdings of these assets has become clearer as associated losses have been recognized.

1.5.1 Several Thrifts Built Large Concentrations of Nonprime Risk

Although their business structure is typically much less complex than large commercial banks, several thrift institutions—banks chartered and regulated by the Office of Thrift Supervision, and with deposits insured by the Federal Deposit Insurance Corporation—also accumulated significant quantities of subprime and Alt-A assets.[44]

These banks, including IndyMac, Downey Financial, and Washington Mutual, operated large mortgage lending programs. Using funds provided by depositors, the Federal Home Loan Banks, and the capital markets, they originated large volumes of mortgages, held them temporarily on their balance sheets, and then pooled them and issued RMBS, or sold them to other firms issuing RMBS. The time needed to form pools and issue RMBS meant that at any moment these banks had large inventories of mortgages on their hands.[45]

1.5.2 Fannie Mae and Freddie Mac Accumulated Substantial Nonprime Exposure

Fannie Mae and Freddie Mac, the two GSEs now in Treasury conservatorship, played a significant role in the lending boom.

Although the principal business of Fannie and Freddie is the securitization and guarantee of prime mortgage loans, both companies chose to buy or guarantee substantial quantities of subprime and Alt-A mortgages over several years. As a consequence of their investment decisions, the two firms collectively accumulated exposure to losses in both loan classes.

The mid-2008 financial statements of Fannie and Freddie indicated that they held $114.3 billion in privately issued subprime MBS in their investment portfolios. The two GSEs also extended guarantees on subprime MBS and held subprime loans for investment. The total of unpaid balances of these MBS and loans in mid-2008 was $204.1 billion.[46] The total unpaid balance of outstanding subprime mortgages was approximately $1.14 trillion in August 2008. Hence Fannie and Freddie are exposed to losses on subprime securities and loans that in mid-2008 represented approximately 28 percent of the total unpaid balances of outstanding subprime mortgages.[47]

Fannie and Freddie also accumulated substantial exposure to Alt-A mortgages. In mid-2008 they held $77.5 billion in privately issued Alt-A mortgage-backed securities (MBS) in their investment portfolios. The total unpaid balances of guaranteed Alt-A MBS and Alt-A mortgages owned was $500 billion. Since the total unpaid balance of outstanding Alt-A mortgages was approximately $807 billion in August 2008, the two GSEs were exposed to losses on about 72 percent of the outstanding pool of Alt-A mortgages.

CHAPTER TWO

The House Price Bubble Ends, the Foreclosure Wave Begins

Things that cannot last come to an end, and so the sustained increase in housing prices came to a halt in the third quarter of 2006. The end of the bubble was caused by trends in economic fundamentals. By 2006 there was a significant excess supply of single family houses. Inventories of vacant homes for sale, both new and existing, were rising. The number of buyers willing to bet on continued house price increases proved insufficient to absorb the inventories. And so price increases ceased.

The end to rapid home price appreciation sparked the subprime and Alt-A foreclosure wave. During the price run-up between 1997 and 2006, weak nonprime borrowers who would otherwise have defaulted on their loans were rescued by a deus ex machina. Rising prices created home equity where there had been none. That equity allowed them to pay off their mortgage, or to refinance into a new one. However, once price increases came to an end, equity creation ceased and foreclosure rates among nonprime borrowers had to rise.

Price declines and increasing foreclosure rates have set up a negative, self-reinforcing cycle that now affects all mortgage borrowers. Foreclosures increase the stock of existing homes that are vacant and for sale. The increase in inventories causes additional declines in prices. The declines in prices reduce

borrower equity. This is an obvious disaster for nonprime borrowers who typically had little home equity when their loans were originated, and were likely to have few financial resources on which to fall back. But it also has affected prime borrowers, many of whom now have mortgage loans that exceed the market value of their houses. When these better-off households face economic reversals that make it impossible to support their mortgages, they are also forced to default.

Available data show that this self-reinforcing process could easily continue in the near term. Inventories of new and existing homes remain high relative to demand, and the number of vacant and for sale homes is markedly elevated. Foreclosures among prime and nonprime borrowers—who are being affected by declining home equity and income loss associated with the recession—are likely to add significantly to the inventories of vacant, distressed properties over the next two years.

This dynamic could be moderated by government policy actions. The Federal Reserve has taken action to lower mortgage rates by purchasing securities and debt issued by Fannie Mae and Freddie Mac. There has also been administration and Congressional action to encourage loan modifications by lenders, and to give tax breaks to home buyers. The longer term outcome for foreclosures, house prices, and the value of outstanding nonprime financial assets will rest in part on the success of these policies.

2.1 Excess Supply Brought an End to House Price Appreciation

2.1.1 What Standard Economic Models Had to Say about the House Price Bubble

Because of the size of the U.S. housing market, economists have devoted substantial effort to understanding how it works. And for normal, non-bubble time periods, there is a more or less common vision of its operation. The demand for housing

generally increases along with increases in per capita income and population growth, and declines as the relative price of houses increases. The price at which houses are offered for sale increases with the costs of construction of new houses, and with the price of land. The interaction of supply and demand determines the prices at which houses are sold.

Economists have also recognized that, while house prices usually respond to changes in the economic "fundamentals" that determine supply or demand, the process of adjustment is far from instantaneous. That is to say, there is a great deal of inertia in house prices. Prices that have been increasing tend to continue increasing for some time after changes in fundamentals—leading to decreased demand or increased supply—exert pressure for price declines.

The explanations offered for the slow adjustment of prices are several. Because both new and existing houses are substantial purchases, and houses have idiosyncratic differences in design, construction, and location, it takes time to match a house for sale with a willing buyer at any particular price. Moreover, there is evidence that buyers and sellers tend to form their expectations about the appropriate price for a home by looking at past prices, which slows down the effect of changed market conditions.

However, even though standard analyses of housing markets try to take account of the realities of housing market operation, they were unable to explain house price movements during the 1997–2006 bubble period in a convincing fashion. There was some research that attempted to show that house prices in some geographical areas—e.g., in "superstar cities"—were explicable in terms of fundamentals, and there were those who asserted that houses in general were not overvalued at all.[1] But more astute observers realized that in many areas of the country prices could no longer be understood using standard approaches. By their nature bubble prices are not determined by economic fundamentals, but by the (unsustainable) belief that the price of some asset or commodity will rise forever.

This did not make conventional approaches completely useless. Fundamentals-based statistical models could instead be used

to measure the extent by which house prices deviated from the values that would exist under non-bubble conditions.[2] When used for this purpose, these statistical models show that prices in many parts of the country were moving substantially away from values consistent with economic fundamentals, beginning in the period 1997–2000.

2.1.2 What Can Be Learned by Looking at Inventories of Houses for Sale

The limitations of standard housing market models does not mean that economic fundamentals are completely useless for understanding the course of the house price bubble. Although the rapid rise in prices was not determined by fundamental factors, there is good reason to believe that the end to the bubble and the subsequent rapid decline in housing prices are related to growing inventories of unsold houses.

It is generally recognized that the market for housing typically does not produce a state in which the flow of houses offered for sale is exactly equal to demand. The explanation for this is fairly straightforward. House prices, as we have seen, have significant inertia, and therefore do not immediately decline when demand decreases. Moreover, since it takes considerable time to acquire land and construct a house, home builders must build them in advance of purchase. For those reasons, in a normally functioning housing market there is usually a substantial inventory of houses for sale.

However, well before house prices reached their peak, several measures of the inventory of unsold houses began to rise to historically high levels. The spikes in these measures can be illustrated graphically. Figure 2.1 traces the stock of new single family homes for sale since 1963. These values fluctuate substantially over time, usually declining after a recession and then recovering. However, for the two decades prior to 2006, the inventory levels have stayed within a relatively restricted range. Between 1980 and 2005, the average number of new homes for sale was 320,000. However, in 2003 the inventory began to rise, reaching a peak value of 570,000 in 2006Q2.

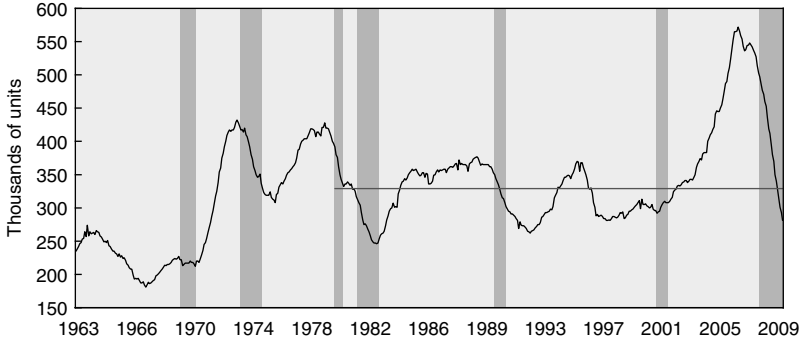


Figure 2.1 New single-family homes for sale, 1963–2009

Note: The gray areas indicate periods of recession as defined by the National Bureau of Economic Research.
Sources: U.S. Department of Commerce and the National Bureau of Economic Research.

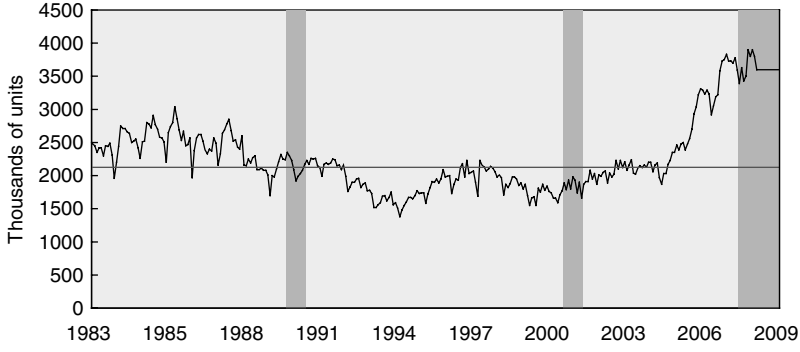


Figure 2.2 Existing single-family houses for sale, 1983–2009

Note: The gray areas indicate periods of recession as defined by the National Bureau of Economic Research.
Sources: National Association of Realtors and the National Bureau of Economic Research.

The number of existing homes for sale shows a similar pattern. Between 1983 and 2000, the average number of existing homes for sale was 2.1 million. Beginning in 2005, the number of existing homes for sale began to rise, reaching 3.3 million in June 2006 (see figure 2.2).

The homeowner vacancy rate reflects the same trends as data on unsold inventories of new and existing houses. The Census Bureau records the homeowner vacancy rate for one-unit

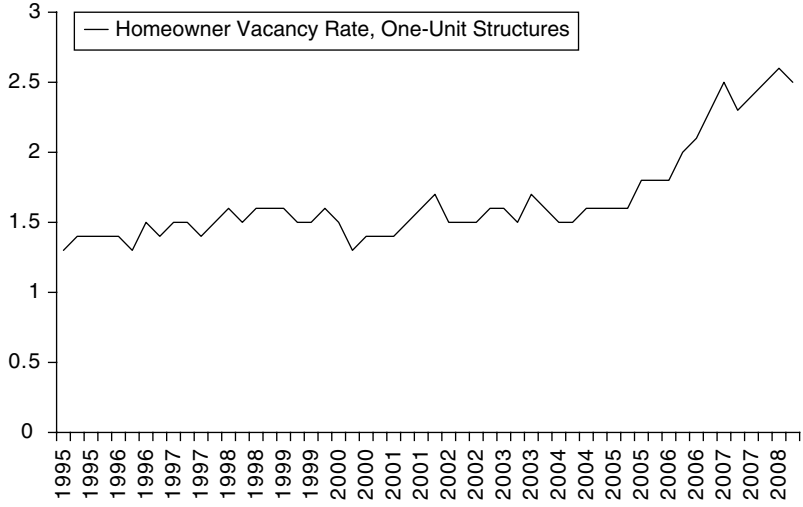


Figure 2.3 Homeowner vacancy rate, one-unit structures 1995Q1-2008Q2, percent
Data source: U.S. Census Bureau

structures, which is the proportion of year-round homeowner one-unit housing units that are vacant and for sale only.[3] For the period 1985–1995, the average of this vacancy rate was 1.3 percent. By 2006Q3 this rate had jumped to 2.5 and continued to rise to a peak value of 2.6 percent (see figure 2.3).[4]

It seems intuitively plausible to say that the large and growing inventories of unsold homes—especially those standing vacant—help explain why house price appreciation came to an end in 2006. By 2006 unsold inventories were so large that price increases could no longer be sustained. Even in a speculative market the level of demand is limited. As supply rises relative to demand, buyers have more choices and more latitude to make lower bids, and sellers who do not cut their prices experience the costs of holding onto their property, especially if they are vacant. When offers to sell multiply much more rapidly than offers to buy, there is a negative effect on price, even when prices exhibit lots of inertia.

There is some statistical analysis to back up these intuitions. A recent paper issued by the International Monetary Fund tries

to take explicit consideration of the effects of inventories on prices, while accounting for price inertia. Regression analysis shows that the inventory-to-sales ratio (for existing single family homes) has a significant negative impact on house price changes, although the statistical significance of the inventory measure depends on the end point of the sample.[5]

2.2 The Foreclosure Crisis Began in 2006, but Was Not Widely Recognized until 2007

The end to rapid house price appreciation marked the beginning of both a housing and financial crisis, but the connection was not immediately recognized. The Federal Reserve remained relatively optimistic about the potential impact of the subprime defaults. In testimony before the congressional Joint Economic Committee in March 2007, Federal Reserve Chairman Ben Bernanke reflected a belief the problems associated with subprime mortgages would be limited:

> Although the turmoil in the subprime mortgage market has created severe financial problems for many individuals and families, the implications of these developments for the housing market as a whole are less clear. The ongoing tightening of lending standards, although an appropriate market response, will reduce somewhat the effective demand for housing, and foreclosed properties will add to the inventories of unsold homes. At this juncture, however, the impact on the broader economy and financial markets of the problems in the subprime market seems likely to be contained. In particular, mortgages to prime borrowers and fixed-rate mortgages to all classes of borrowers continue.[6]

But by July 2007 there were impossible-to-ignore signs that something really dreadful was underway. On July 11 two of three principal credit rating agencies—Moody's, Standard

& Poor's—announced a collective downgrade of the credit ratings for 1043 tranches of RMBS backed by subprime mortgages.[7] More downgrades of subprime securities followed.

The reason for the downgrades was distressingly simple. The pools of mortgages backing the RMBS were not performing as investors or the ratings agencies had anticipated. Higher than expected defaults and foreclosures on mortgages meant that the revenues to RMBS bondholders could easily fall below the levels promised. That meant that the ratings of those bonds, which reflect the likelihood of loss to the bondholder, had to be adjusted downward.

While the credit downgrades came as a shock to financial markets in general, they were not a surprise to those who were following events in the mortgage markets. Well before the credit downgrades, the performance of subprime loans had been deteriorating. Beginning in mid-2006, the default and foreclosure rates for subprime ARM mortgages began to rise. The deterioration intensified during 2006–2007, and by mid-2007 the foreclosure rate had risen above the high previously reached in 2001. At the end of 2009Q1 it was over 23 percent (see figure 1.2).

At first it was suggested that subprime problems were the result of bad decisions by a few lenders. Moody's, for example, after downgrading 703 subprime RMBS transactions originated in 2006, focused on the performance of subprime loans originated by particular mortgage banks:

> . . . the first-lien and second-lien subprime mortgage loans securitized in 2006 were originated in an environment of aggressive underwriting. This aggressive underwriting combined with prolonged, slowing home price appreciation has caused significant loan performance deterioration and is the primary factor in our recent rating actions. In addition, Moody's analysis shows that certain transactions backed by collateral originated by Fremont Investment & Loan, Long Beach Mortgage Company, New Century Mortgage Corporation and WMC Mortgage Corp. have

been performing below the average of the 2006 vintage and represent about 60% of the first-lien actions taken on July 10.[8]

That sanguine view was abandoned relatively quickly, as it became clear that problem subprime loans could not be explained as the handiwork of a few bad lenders. And it was soon clear that the effects of the decline in subprime mortgage performance would be felt in a variety of places. Financial market participants recognized that subprime securities had found their way into many hands, including investors in SIVs and CDOs. But at the early stages of the crisis there was no panic.

2.3 The End to House Price Appreciation Caused the Subprime Foreclosure Wave

The correlation of the end to home price appreciation and the onset of accelerating subprime defaults and foreclosures was no accident. As we have seen in chapter one, subprime and Alt-A mortgages have always been high-risk and high-cost loans. The underwriting standards for subprime and Alt-A loans during 2001–2006 made them increasingly risky.

For a time, however, even the weakest of borrowers could avoid default if they lived in the right place. If their homes were located in areas with rapidly increased prices, the increased value of their home allowed them to sell their homes and pay off the mortgage and any prepayment penalty, or refinance into a new mortgage.

When price appreciation diminished and then vanished, many borrowers were left without sufficient equity in their homes to support a refinanced mortgage or a loss-free sale. This meant that with the end to sustained house price appreciation, defaults and foreclosures had to rise.

The close connection of house price appreciation and foreclosures can be illustrated with some straightforward statistical analysis. Using quarterly state-level data for the period 1999Q1–2008Q4,

foreclosure rates for subprime and prime borrowers were regressed on cumulative two-year house price appreciation and one-year percentage changes in employment. The house price appreciation measure is a proxy for changes in homeowner equity. The more rapid the increase in prices over the recent past, the greater the amount of equity that a borrower is likely to have in his house. The change in employment is included to control for changes in the economic status of borrowers. Borrowers with little or no equity in their homes may still choose to make payments on their mortgage. But a disruption in household income caused by job loss may make it impossible for them to do so. This is especially important given the extent of job losses during the current recession. The regression estimates are presented in figure 2.4, and descriptions of the data used are included in the appendix.

The regressions show that state-level foreclosure rates are negatively and significantly correlated with house price increases, and positively and significantly correlated with changes in employment. They also show that both house price appreciation and

Figure 2.4 State-level foreclosure rate regressions

	Subprime Foreclosure Rates		*Prime Foreclosure Rates*	
	Dependent Variable		*Dependent Variable*	
Independent Variables	*Foreclosure Rate ARM*	*Foreclosure Rate FRM*	*Foreclosure Rate ARM*	*Foreclosure Rate FRM*
House Price Appreciation (over previous 2 years)	−0.31 ** (−35.80)	−0.05 ** (−7.23)	−0.08 ** (−30.12)	−0.02 ** (−28.25)
Employment Growth (over previous year)	−1.09 ** (−24.33)	−0.69 ** (−19.83)	−0.21 (−16.31)	−0.03 ** (−9.40)
Constant	12.11 ** (104.78)	6.28 ** (69.85)	2.42 ** (72.49)	0.61 ** (25.59)
Observations	2200	2200	2200	2200
R^2	0.55	0.21	0.42	0.34

Note: t-statistics in parentheses, ** significant at 99% level

Data sources: Foreclosure rates are Mortgage Bankers Association "foreclosure inventory"; House price appreciation is calculated from FHFA house price index; Employment growth is calculated from Bureau of Labor Statistics "employees on non-farm payrolls," seasonally adjusted.Sample period 1999Q1-2008Q4.

changes in employment have a smaller quantitative effect on prime borrowers. That is to be expected, since prime borrowers in general have more financial resources than subprime borrowers, and are therefore better positioned to weather economic shocks. It is also the case that a prime borrower who defaults and enters foreclosure may be able to exit foreclosure, while there is little probability that subprime borrowers can make that transition.

Several researchers, using loan-level data, have examined the effect of house price appreciation on foreclosure rates for subprime loans. Their results also confirm its importance in determining subprime foreclosure rates.[9]

2.4 Conditions in the Housing Market Deteriorated Sharply from 2006 and Remain Weak

2.4.1 House Prices Declines Have Left Many Homeowners with Negative Equity

Measures of nominal house prices reached their peak in 2006, and have been declining ever since. One widely watched measure of national housing prices, the S&P/Case-Shiller 20-city Home Price Index, shows that nominal house prices peaked in 2006Q2. By 2009Q1 the value of this index had declined 32.2 percent from its peak value. Moreover, the decline in the index accelerated over time. The year-on-year percentage decline in this index accelerated between 2006Q3 and 2009Q1, going from –.28 percent to –19.07 percent.[10]

The continuing decline in house prices means that many home owners find that they have negative equity in their homes. At the end of second quarter of 2009 more than 32 percent of all mortgages in 33 states and the District of Columbia were in negative territory. In five states the share of mortgages under water was 42 percent or greater (see figure 2.5).

The widespread appearance of negative equity adds a new element to the dynamics of borrower default and foreclosure. Prior to the widespread decline of house prices and the appearance of negative equity, subprime, and Alt-A defaults were tied

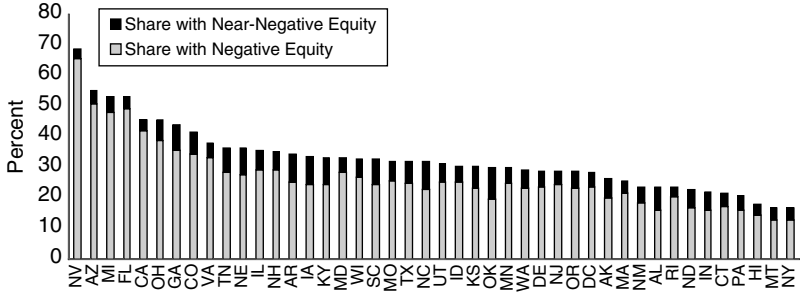


Figure 2.5 Share of households with negative or near-negative home mortgage equity, second quarter 2009, end of period

Note: Data unavailable for LA, ME, MS, SD, VT, WV, and WY. Near-negative equity means the household is within 5 percent of negative equity.
Data source: FirstAmerican Core Logic.

to the ability of house price appreciation to rescue weak borrowers. Defaults by prime borrowers were, in large measure, precipitated by other factors, such as job loss or serious illness.

Now, however, a much broader fraction of mortgage borrowers are faced with a fairly complicated financial decision. If their home has negative equity, they are overpaying for their home. Since most mortgages are non-recourse loans, these borrowers have an incentive to default: they may find it irrational to pay more for their home than it is currently worth. There are, of course, some deterrents to the exercise of that option, including the damage that default will do to credit ratings and the high transactions costs to finding a suitable new home. But if house price declines continue and more mortgages go underwater, these developments are likely to add to the rate of default and foreclosure.

2.4.2 Mortgage Credit Markets Remain Distressed, but Rates on Conforming Loans Have Declined Significantly

2.4.2.1 Sources of Mortgage Finance Have Declined

Because of rising default and foreclosure rates, funding for mortgages that are not supported directly or indirectly by the

federal government has decreased dramatically. This can be seen by looking at the share of mortgage originations that were funded by the two mortgage GSEs, Fannie Mae and Freddie Mac, or were insured either by the Veterans Administration or the Federal Housing Administration. In 2006, these four federal or government sponsored entities provided guarantees for 41.7 percent of all mortgages originated, by value. By 2007Q4, these agencies were providing guarantees for 81.7 percent of all mortgages issued.

As can be seen from the data, this increasing share is not a result of rapidly rising volumes of loans issued by or supported by the federal government. Rather, funding for mortgages that cannot be guaranteed under GSE standards—such as "jumbo" loans that exceed maximum limits or Alt-A loans—has diminished sharply. Without the support of these federal agencies and GSEs, it appears likely that the supply of funding for home mortgages would shrink further.

2.4.2.2 Bank Mortgage Lending Standards Remain Tight

As the mortgage crisis has morphed into a severe financial crisis, banks became much more conservative about mortgage lending. The Federal Reserve Senior Loan Office Survey routinely asks whether banks have tightened mortgage lending standards during the previous three months. Data from these surveys show that the net percentage of banks tightening standards for subprime borrowers was over 50 percent throughout 2007, reached 100 percent in 2008Q4, and declined to 50 percent in 2009Q1. A majority of banks tightened prime standards throughout 2008. Both measures are high relative to bank behavior in the previous decade (see figure 2.6).

2.4.2.3 Mortgage Rates for GSE Sponsored Loans Have Declined Significantly

If a borrower can secure a mortgage that conforms to the standards set by Fannie Mae or Freddie Mac, then the terms of that mortgage are relatively good. The interest rates on conforming 30-year fixed rate and one-year ARMs have recently reached

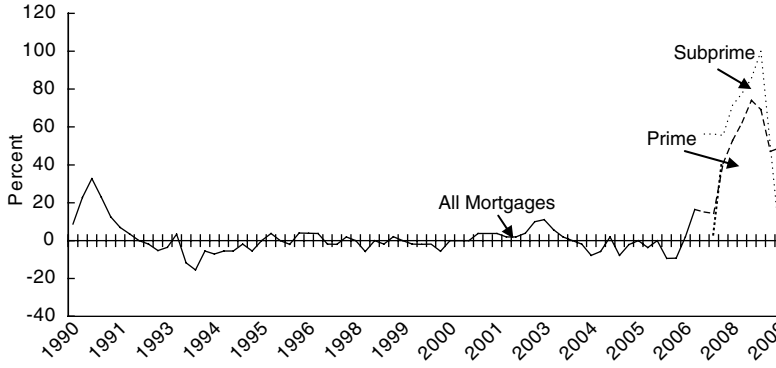


Figure 2.6 Net percentage of banks reporting tightening standards on home mortgage loans
Source: Federal Reserve Board.

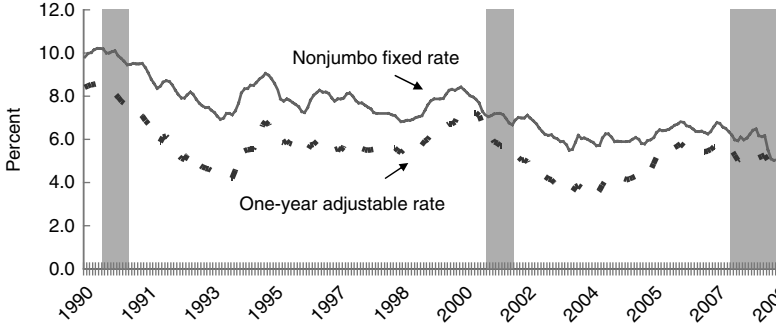


Figure 2.7 Contract Interest Rates for Nonjumbo Fixed 30-Year Mortgage Rate vs. One-Year Adjustable Rate Mortgage

Note: The gray areas indicate periods of recession as defined by the National Bureau of Economic Research.
Data sources: The Federal Housing Finance Board, the Federal Home Loan Mortgage Corporation and the National Bureau of Economic Research.

levels that are quite low by historical standards. Federal Reserve purchases of GSE-issued securities and debt have reduced the costs of loans that they guarantee (see figure 2.7).

However, the rates for mortgages that the GSEs cannot guarantee or purchase have not declined. The rates on 30-year fixed

rate conforming loans is now slightly below its level in mid-July 2007, while the rate on 30-year fixed rate "jumbo" loans, which are not GSE-eligible, have risen. The growing spread between these two rates is likely to reflect an increased risk premium for non-guaranteed loans. There is also an interest rate spread between "jumbo" mortgages that are not eligible for GSE funding, and the newly created class of "conforming jumbo" mortgages that are.

2.4.3 Inventories of Vacant Houses Remain at Elevated Levels, Indicating Continued Excess Supply

Inventories of new single-family homes are very high relative to demand, and the share of existing houses that are vacant and for sale remains near its historic post-bubble high. These two measures indicate that there is a large excess supply of single family homes that are generating carrying costs for the parties that own it. Supply conditions of this sort can be expected to put continuing downward pressure on home prices.

Although the stock of new homes for sale in 2006 was larger than it now is, homes were selling then at a rapid rate. Sales of new homes during 2006Q2 were 300,000 at an annual rate, and existing inventory during that quarter would have covered 6.3 months of sales on a seasonally adjusted basis. But houses are no longer selling so rapidly. In 2009Q1 only 11,800 new single family homes were sold, and the existing, smaller inventory translated into 9 months of sales seasonally adjusted. While market conditions have improved somewhat—the 11.2 months' supply reached in 2008Q4 was an historical record—the supply of new homes is high even for a recession.

Homebuilders have responded by reducing the rate of new home construction. Housing starts have fallen dramatically. Housing starts fell to an historic low of 358,000 at a seasonally adjusted annual rate in 2009Q1, recovering slightly in the second quarter. However, because there are significant carrying costs to house inventories, builders have strong incentive to sell. This of course exerts continuing downward pressure on housing prices.

Homeowner vacancy rates reflect the same trend as the data on unsold new houses. For the period 1985–2005, the average percentage of existing houses that were vacant and for sale was 1.68 percent. This vacancy rate began to spike upward in 2005, and peaked at an historic high of 2.9 percent in 2008. By 2009Q2 it had declined slightly to 2.5 percent, but was still remarkably high.

Compared to its long run average, the vacancy rate was 49 percent above normal. With that deviation in mind we can estimate the "excess inventory" of vacant homes. In 2009Q2 there were approximately 1.78 million vacant and for sale. If this inventory were at historical levels—that is if it were 49 percent lower—then it would equal only 908,000. That is, there was excess inventory of approximately 872,000 vacant houses waiting for sale in mid-2009.[11]

This "excess inventory" of vacant houses for sale, which is being constantly augmented by foreclosures, will need to be eliminated if house prices are to stabilize. That will clearly depend how foreclosure numbers evolve.

2.4.4 Foreclosures Rates Continue to Rise

The wave of foreclosures began in earnest in 2006 for subprime borrowers with adjustable rate mortgages (ARMs), which went to the weakest borrowers and included the most onerous financial terms. By 2008Q4, 23.3 percent of subprime ARM borrowers were in foreclosure. Foreclosure rates for fixed rate subprime borrowers are not as high, and began to rise at a later date, but they also have increased from their lows in 2006 (see figure 1.3).

The number of subprime ARMs in foreclosure in 2008Q4 was approximately 665,000, and the number of fixed rate subprime loans in foreclosure was approximately 237,000. As house price declines have continued, and the economy has slowed, foreclosure rates have risen among prime borrowers. Rates for both fixed rate mortgages and ARMs have risen significantly since 2006. While these rates are well below those for subprime

borrowers, their effect is nonetheless significant. In 2008Q4 there were approximately 548,000 prime ARM mortgages in foreclosure, and approximately 510,000 prime fixed mortgages in foreclosure.

The rising stream of foreclosures acts to increase the supply of vacant homes for sale. A lender taking possession of a foreclosed property has carrying costs, and may lack expertise is marketing real estate. Although some foreclosures may be rented or left vacant and held off the market, carrying costs will prompt many new owners to sell into a declining market.

2.5 High Foreclosure Rates Are Likely to Prevail for Some Time

Excess supply of houses, both vacant and occupied, has caused a decrease in housing prices. Reduced mortgage finance has caused demand to decline, further aggravating the price decline. As prices have declined, foreclosures have increased, adding to the supply of houses for sale. This adverse feedback may continue to exert downward pressure on house prices for some time, unless government intervention to increase demand and reduce foreclosures changes market dynamics.

2.5.1 Trends in House Prices

In the current environment it is difficult to forecast the trend in house prices. Although the Case-Shiller 20-city price index rose between May and August, there are still significant headwinds to sustained price increases. Inventories of houses that are vacant and for sale remain high, and continuing job loss will erode demand for houses. These factors are reflected in the views of housing market analysts. The Congressional Budget Office has forecast that the Federal Housing Finance Agency (FHFA) index of house prices will fall by 10 percent during 2009. The October 2009 *Wall Street Journal* economic forecasting survey showed an average expected decline of 3.7 percent in the FHFA index.[12]

2.5.2 Trends in Foreclosures

Foreclosure rates, as we have seen, have jumped since the housing bubble collapsed. The regression results in figure 2.5 suggest that those increases have been caused by declines in employment and declines in house prices. Hence given estimates of changes in employment and house prices for 2009, we can estimate foreclosure rates that are likely to prevail at the beginning of 2010. The procedure for doing so is described in the appendix.

Using the Blue Chip unemployment rate forecast and the Congressional Budget Office forecast of house prices, the regression results indicate that the foreclosure rate for subprime ARM mortgages will rise to 25.3 percent by the end of the year. The rate for subprime fixed rate mortgage is predicted to rise to 8 percent. While foreclosure rates for prime borrowers are predicted to remain substantially below those of subprime borrowers, they are also forecast to increase. The foreclosure rate for prime ARM mortgages is predicted to rise to 8 percent, and the rate for prime fixed rate is predicted to rise to 1.5 percent.

These foreclosures will add substantially to the stock of vacant homes for sale. The increased foreclosure rates imply that subprime foreclosures alone will total about 1.2 million in 2010. This volume of foreclosures is greater than the excess inventory of vacant homes that existed in mid-2009. So even if all the existing excess vacant homes were sold by the end of 2009, there would still be an abnormally large number of vacant houses on the market during 2010, putting downward pressure on prices. Foreclosures of prime borrowers, who are far larger in number than subprime borrowers, will add to the stock of vacant homes for sale.[13]

2.5.3 Implications for the Housing and Nonprime Financial Assets

The foregoing analysis indicates that, left to operate unhindered, market dynamics will continue to produce large inventories of houses that are vacant and for sale, which will maintain

downward pressure on house prices at least into 2010. The Federal Reserve, the Administration, and Congress have taken several steps to interrupt this market dynamic. The Federal Reserve plans to complete the purchase of $1.25 trillion in mortgage-backed securities and debt issued by the GSEs by the end of the first quarter of 2010. These purchases have helped reduce interest rates for conforming mortgages. Congress has implemented programs to increase loan modifications by lenders, which to the extent they are effective will reduce foreclosures and the size of vacant inventories. A 2009 home buyer tax credit—which provided approximately $16 billion in subsidies to buyers in 2009—has been extended into 2010. While the tax credit is an extraordinarily expensive device to stimulate demand for housing, it may at least temporarily help to reduce the excess supply of houses (see figure 2.8). The outcome of all these efforts is uncertain.

If these policy efforts are successful they will certainly benefit homeowners. By stopping the destruction of home equity they will leave homeowners less vulnerable to financial reverses. They will also help those financial institutions with

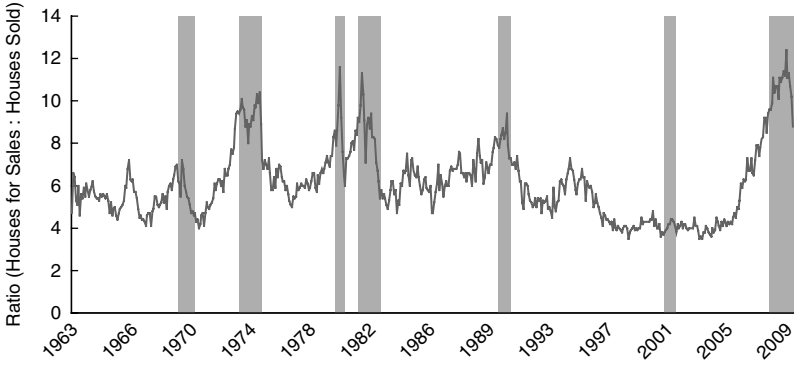


Figure 2.8 New single-family homes for sale, months supply 1963–2009

Note: The gray areas indicate periods of recession as defined by the National Bureau of Economic Research.

Sources: U.S. Department of Commerce and the National Bureau of Economic Research.

significant concentrations of nonprime assets, which decline in value as nonprime mortgage defaults increase. Hence there are many interested parties, and some important economic outcomes, that depend on their effectiveness.

Appendix

Estimating the Number of Subprime Foreclosures Regression Data

We use quarterly subprime foreclosure rates for fixed rate subprime mortgages and adjustable rate subprime mortgages from the Mortgage Bankers Association "foreclosure inventory" numbers. House price appreciation is calculated based on the FHFA house price index. Although the S&P/Case-Shiller indices appear to be the most accurate of the available indices that measure housing price changes, these indices are not available for every state.[14] The employment variable is state-level nonfarm employment.

The Congressional Budget Office forecasts that the FHFA house price index will decline by 10 percent during 2009, and we use this price forecast to predict the 2010 foreclosure rate. The Blue Chip forecast of the 2009 annual unemployment rate in June 2009 was 9.1 percent. We use this rate to calculate changes in nonfarm employment levels.

Using Regression Results to Forecast Foreclosures

To estimate foreclosure rates for 2009Q4, we use the 2008Q4 foreclosure rates, the coefficients on house price appreciation reported in figure 2.5, estimates of future housing prices, and estimates of future employment. That is, we calculate foreclosure rates according to $FC_t = FC_{t-1} + \beta_1 (\Delta\ HPA_t) + \beta_2(\Delta Employment_t)$ where FC_t is the foreclosure rate for quarter t, FC_{t-1} is the foreclosure rate in quarter t–1, $\Delta\ HPA_t$ is the change in cumulative two-year housing price appreciation between quarters t and t–1, $\Delta Employment_t$ is the change in

cumulative one-year employment growth between t and t–1, β_1 is the estimated coefficient on house price changes and β_2 is the estimated coefficient of employment changes reported in figure 2.5.

In order to estimate the number of subprime foreclosures in 2010, we assume that all subprime mortgages in foreclosure in a given quarter will be foreclosed within a year.[15] Given the predicted foreclosure rate for 2009Q4, and assuming that no additional subprime loans are made during 2009 and all the loans in foreclosure in 2008Q4 are foreclosed by 2009Q4, we find that 1.2 million subprime loans will be in foreclosure at the end of 2009. We assume that all these loans will be foreclosed by the end of 2010.

Within-sample forecasts for earlier periods tend to underpredict the number of foreclosures. This suggests that this method is somewhat conservative.

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CHAPTER THREE

The Credit Bubble Bursts, the Financial Crisis Begins

3.1 Introduction

When the house price bubble began to deflate in mid-2006, losses on nonprime mortgage assets were inevitable. For firms with large concentrations of these assets relative to their capital, these losses have meant insolvency. Over time, the cascade of insolvencies, and continuing uncertainty about the scale and location of insolvencies to come, provoked the largest financial crisis since the Great Depression.

As was shown in chapter one, many financial intermediaries acquired significant concentrations of nonprime mortgage assets during the house price boom. Mortgage banks and thrifts with large securitization platforms for nonprime mortgages held significant inventories of these mortgages on their balance sheets and in special purpose vehicles. Investment banks and commercial banks were exposed through securitization platforms, through financial derivatives based on nonprime assets, and through their support for off-balance-sheet conduits and SIVs. Fannie Mae and Freddie Mac were exposed through guarantees they extended to nonprime RMBS, and through their purchases of nonprime assets.

In many cases, these concentrations of subprime and Alt-A assets were achieved through the use of financial "leverage," which in financial jargon means using debt to finance asset purchases. Leverage can have the desirable effect of producing profits for those employing it. When relatively cheaper borrowing funds the creation or acquisition of assets with higher rates of return, the result of the arbitrage is profit. Often short-term borrowing is cheaper, and longer term assets pay higher rates of return.

But the use of leverage, especially when it is based on short-term financing, brings risk. If events reduce the market value of the purchased assets, there could be a rapid debt-holder run. Short-term funding must be renewed. And if lenders perceive that the debt they hold is not adequately secured by the assets they are financing, they can refuse to renew their lending and head for the exits. If the borrower is insolvent, and unable to repay its creditors from its existing capital, it will fail. And even if the borrower is not insolvent, a debt-holder run can provoke a liquidity crisis, in which the firm loses access to funding and cannot sell assets quickly enough to remain in operation.[1]

Debt-holder runs can also have spillover effects on other financial firms. Insolvent borrowers with devalued assets may be forced to sell simultaneously into markets where bids are scarce because the ultimate level of losses is uncertain. Sales of assets in those circumstances can lead to additional, exaggerated price declines. These price declines can then provoke debt-holder runs in other firms holding the depreciating assets.

Beginning in mid-2006, highly leveraged financial institutions began to register subprime losses, their stock market values fell sharply, and debt-holder runs and financial failures began. (For a graphical chronology of major financial failures, see figure 3.1.) Mortgage banks were first, then conduits and SIVs failed, followed soon thereafter by investment banks.

These entities are part of the "shadow banking system."[2] Shadow banks perform the traditional function of commercial banks, which also use short-term borrowing to fund the purchase of long-term assets. But they do so without substantial

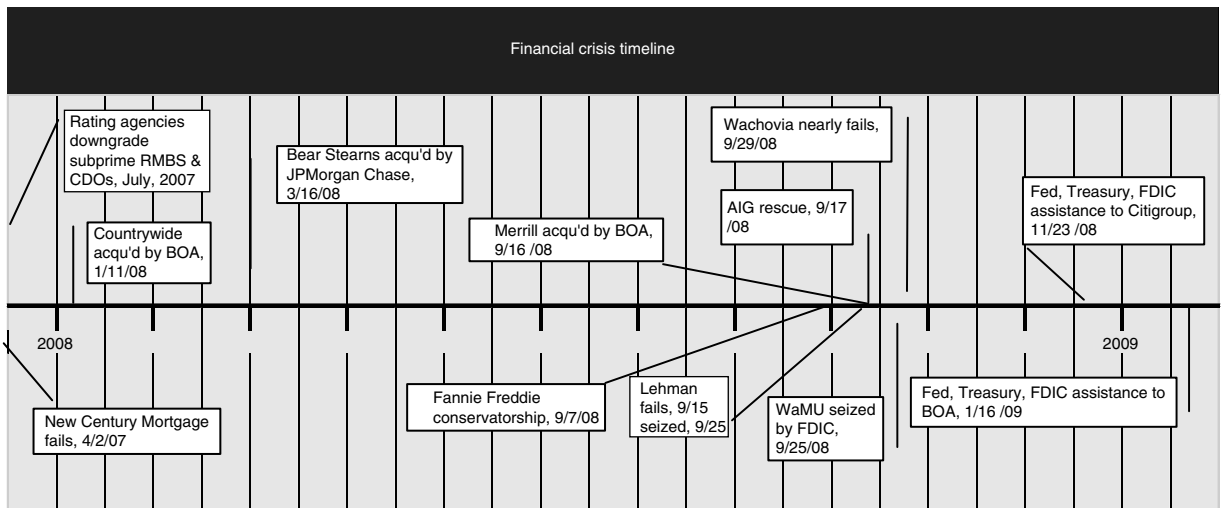

Figure 3.1 Financial crisis timeline

regulatory oversight, and are not required to have capital sufficient to meet losses in times of stress. Failures in the shadow banking system led to disruptions in the asset-backed commercial paper market, the interbank lending market, and provoked a shareholder run in money market mutual funds.

Financial misfortune, however, was not confined to the shadow banks. Other financial firms that were nominally well-regulated—including commercial banks, the insurer AIG, the mortgage GSEs, and several large thrifts—also became insolvent because of their bets on nonprime assets.

The cascade of insolvencies provoked a general financial crisis. The crisis was in part a result of uncertainty about the size and location of mortgage-related losses. Even now, more than three years after the house price bubble started to deflate, it remains impossible for outside observers to measure how much a bank has lost on its mortgage assets, much less the amount of the losses they are likely to experience in the future. This is partly because bank insiders always have much more information about their actual financial condition than any outside observer.[3] It is also a result of the difficulty in pricing mortgage-related assets. There are few buyers for the depreciating assets, and little confidence in mathematical models that have been used to price mortgage derivatives such as CDOs. Moreover, events have also demonstrated that assets that were once thought to be pedestrian and safe could in reality be exposed to nonprime mortgage losses.

As a consequence, large parts of the credit system became frozen. The market for RMBS that are not guaranteed by the federal government via the mortgage GSEs ceased to function. Banks refused to make unsecured loans to each other for any substantial time period, drastically scaled back lending, and held large excess cash reserves. Many asset markets contracted significantly. In response to this financial chaos, the Federal Reserve was forced to step in as a lender to both financial and nonfinancial firms, making it the most important commercial bank in the world. The Federal Reserve, the FDIC and the Treasury collectively rescued or closed several large banks, and

effectively nationalized the insurance firm AIG and the mortgage GSEs. Despite these extraordinary efforts, credit market disruptions continue.

3.2 Mortgage Banks: The Financial Crisis Begins in the Shadow Banking System

Among the first institutions to be damaged by subprime losses were mortgage banks specializing in subprime lending. Some of these banks were independent companies, and others were affiliates of commercial banks or investment bank holding companies.[4] None of them were closely regulated, either with respect to their lending practices or their degree of leverage and capital adequacy. Until 2006 few people outside mortgage markets paid close attention to them.

By June 2007 dozens of mortgage banks were in bankruptcy or had been acquired by other firms.[5] These banks, highly leveraged and dependent on short-term financing, failed because the mortgages they had originated were deteriorating in value as house prices began to decline and default rates began to rise. When it became apparent that they were insolvent, their funding was withdrawn by investors, and they had to seek bankruptcy protection or sell their assets to solvent entities.

Mortgage banks originate mortgages, sell them to others, or pool them in special purpose vehicles that are funded through the issue of RMBS. Funding for originations is typically through "warehouse" lines and "master repurchase" agreements. Warehouse lines are revolving loans extended by banks or investment banks. These loans are used to originate mortgages, and are secured by those mortgages. Master repurchase agreements allow the mortgage bank to transfer mortgages to a lender in exchange for funds. These funds are then available to the bank to originate additional mortgages. Mortgage banks also obtain short-term funding by issuing asset-backed commercial paper through conduits that contain mortgages and mortgage securities.

Lenders and investors advancing credit to mortgage banks include conditions to reduce their risk of loss. Under warehouse and master repurchase arrangements, the lender usually has the right to mark the value of the loans to market periodically, and can issue margin calls if the value of the collateral falls below the value of the loans.[6] When mortgage banks securitize pools of mortgages and sell RMBS to investors, or when they sell pools of mortgages to other financial institutions, they are typically obligated to repurchase or replace loans that violate "representations or warranties," related to such matters as early defaults by the mortgage borrower or inadequate supporting documentation for the loan.

Beginning late 2006 and late 2007, in response to conditions in the subprime lending market, lenders began to issue margin calls to mortgage banks, and to cancel their warehouse and master repurchase arrangements. These actions quickly demonstrated the insolvency of many of these firms, and led to a cascade of bankruptcies and takeovers.

Events at New Century, the second largest subprime lender in 2006, but in bankruptcy on April 2, 2007, illustrate this process. According to the New Century bankruptcy examiner:

> To finance and carry the mortgage loans New Century originated and purchased, pending their sale or securitization in the secondary mortgage market, the Company maintained credit facilities, typically in the form of master repurchase agreements, with multiple warehouse lenders, which were large banking and investment institutions...
>
> At the end of the third quarter of 2006, the Company reported that it had outstanding approximately $8.5 billion in short-term borrowings under 14 separate master repurchase agreements and an asset-backed commercial paper facility, all of which were secured by mortgage loans held for sale and other assets of the Company...
>
> Under the master repurchase agreements between New Century and its warehouse lenders, each lender also had the right to initiate a margin call, which required the

> Company to provide the lender with additional collateral or repay a specified portion of the outstanding borrowing, if the lender determined that the value of the mortgage loan collateral that secured the borrowing had decreased below a set amount.[7]

On February 7, 2007 New Century's 8-K filing with the SEC stated that the company had improperly accounted for losses related to loan repurchases during 2006. The company began to receive margin calls from its warehouse lenders, and very quickly was notified that it had defaulted on the terms of its master repurchase agreements:

> By the end of March 2007, New Century had received default and acceleration notices from all of its warehouse lenders, several of which informed the company that they intended to take the following actions: (1) sell the outstanding mortgage loans financed under the respective master repurchase agreements; (2) offset the proceeds from such sales against new Century's obligations to warehouse lenders; and (3) reserve all rights to seek further recovery from the company. As of March 31, 2007, the Company's outstanding repurchase obligations under master repurchase agreements with warehouse lenders exceeded $7 billion.[8]

With financing withdrawn, and without sufficient capital to pay its debts, the company filed for bankruptcy on April 2, 2007. It was the ninth largest bankruptcy filing in U.S. history, measured by the size of pre-petition assets.

The failure of New Century and other mortgage banks, while a harbinger of crises to come, did not produce widespread effects in financial markets. These banks could be viewed as badly run businesses eliminated by the ordinary forces of competition. Moreover, their role in financial markets was circumscribed. Unlike commercial banks or investment banks, they did not provide credit for other financial institutions or businesses, and they were not major market makers or

key counterparties for major financial firms. It was not until mid-2007, when the credit rating agencies downgraded several subprime securities, that the larger financial world began to worry.

3.3 RMBS and CDO Downgrades

When it became very obvious that losses on subprime assets were unavoidable and likely to be substantial, the credit rating agencies began to downgrade first subprime RMBS, and then CDOs that contained subprime securities or derivatives that referenced them. In mid-July 2007 Moody's, Standard & Poor's and Fitch all reduced ratings on tranches of subprime RMBS. Downgrades of CDOs followed quickly.

Data from Moody's show that the 12-month downgrade rate for subprime tranches jumped to 18.1 percent in 2007, compared to a 1998–2007 average of 3.0 percent. Tranches of other RMBS were also downgraded because of rising Alt-A mortgage defaults, but their deterioration was much less pronounced in 2007. For structured finance CDOs, the downgrade rate surged to 20.1 percent, well above the 1998–2007 average of 6.6 percent.[9]

Credit rating agency downgrades, and the continuing downward march of housing prices, had a rapid negative effect on the value and liquidity of outstanding subprime mortgages, RMBS and structured finance CDOs exposed to subprime mortgages. Because these assets are traded over the counter, direct data on price and quantity are not readily available. However, there are price indices for CDS written on representative tranches of subprime RMBS. These indices showed a sharp increase in the price of insuring these securities after mid-2007.[10] The same behavior is observable for CDS that refer to mezzanine tranches of CDOs containing asset-backed securities.[11]

These developments signaled that firms with significant exposure to subprime assets would experience large losses. Less obvious was the exact scale and location of these losses.

3.4 Conduits and SIVs: Large Branches of the "Shadow Banking System" Fail

Subprime losses next appeared in conduits and SIVs, two previously obscure shadow banking institutions. Conduits and SIVs are highly leveraged stand-alone entities that fund the acquisition of pools of long-term assets by issuing short and medium term "structured securities." These entities are subject to virtually no regulation. The securities they issue—called asset-backed commercial paper (ABCP)—are traded over the counter, and in the United States are exempt from most securities regulations because they are purchased by money market mutual funds and other institutional investors. These vehicles are usually sponsored by investment banks, hedge funds, and commercial banks.

Sponsors set up conduits or SIVs for several reasons. Doing so is profitable in itself, and they allow firms to move assets off the sponsors' balance sheets, which frees up capital for additional transactions. Moreover they can be a source of funding for the sponsor's other businesses. If a bank wants to finance tranches of the CDOs it has created, or pools of credit card receivables it owns, these vehicles can provide the needed cash. Since they are funded using short-term borrowing, they provide a cheap source of finance.

They offer additional advantages to commercial banks, because they allow banks to effectively increase their use of leverage. Nominally at least, liquidity guarantees to these highly leveraged vehicles expose banks to lower losses than direct ownership of the assets. Hence banks must reserve less capital than they would need if they directly owned the assets involved.

Since these vehicles have no public reporting requirements, information about the assets they purchased is proprietary, and available only to investors. There are, however, estimates of the aggregate size and composition of these entities at the beginning of the financial crisis. In 2007 there were an estimated $1.4 trillion in conduit securities, and about $400 billion in SIV

securities outstanding.[12] Although the financial world is very large, this amounted to real money. Total assets of the U.S. commercial banking system were about $10 trillion in 2007, so the conduit/SIV sector was about 20 percent of the size of U.S. banks. These branches of the shadow banking system may have been hard to see, but they were important.

Debt-holder runs first appeared in the market for asset-backed commercial paper in the third quarter of 2007. Once subprime losses were widely acknowledged, vehicles with high concentrations of subprime assets began to experience problems in rolling over their short-term paper. In the aggregate, only a small fraction of the assets funded through conduits were related to mortgages of any kind.[13] However, that was not true for certain individual conduits. On July 30 the IKB Deutsche Industriebank, which provided liquidity facilities for a conduit with subprime exposure, had to be bailed out by another bank that was a major shareholder. The $1.6 billion Broadhollow Funding conduit, set up by American Home Mortgage to fund its subprime lending, announced on August 6 that it was unable to redeem outstanding asset-backed commercial paper, and would instead extend the maturity of its notes. On the same day American Home Mortgage declared bankruptcy. Other conduits quickly began to have difficulty rolling over their short-term debt.

Funding difficulties soon extended to SIVs with subprime exposure. These vehicles had lower liquidity support than conduits, and in the aggregate had greater subprime exposure.[14] A firm providing liquidity to an SIV usually had an obligation to support only a fraction of the outstanding securities that it issued. However, several banks, including Citibank, HSBC, Societe Generale SA, and WestLB AG decided to assume the liabilities of the SIVs they had set up, in order to avoid damage to their reputations.

The difficulties at conduits and SIVs had a dramatic effect on the size of the asset-backed commercial paper market. Outstanding borrowing shrank from a peak value of $1.2 trillion on August 6 to less than $800 billion by mid-December

2007 (see figure 3.2). The decline shrank the market to its 2001–2005 value. The contraction of this market meant that a significant source of credit, used to fund a wide variety of loans, had been damaged. Subprime losses had thus extended beyond the housing market to other credit markets.

There was another profound impact of this contraction, felt by commercial banks around the world. As the asset-backed commercial paper market began to shrink, commercial banks became less willing to lend to each other. This unwillingness is reflected in the statistics such as the "TED" spread.[15] The size of this credit spread reflects the willingness of banks to part with their cash, and their estimates of other banks as counterparties. The value of the TED spread leapt dramatically in early August 2007. During 2006 the TED spread ranged from

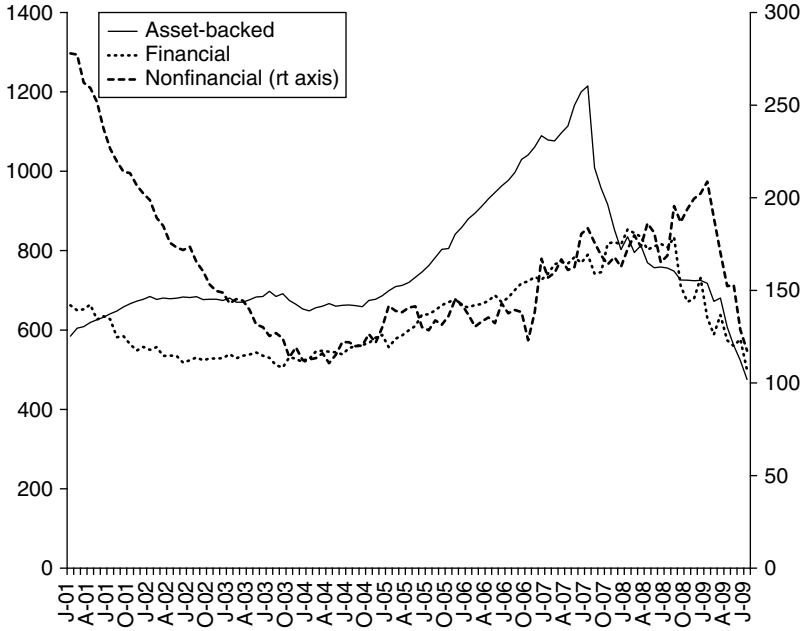

Figure 3.2 Commercial paper oustanding ($ billions)

Source: Federal Reserve.

25 to 60 basis points. But by August 21 it had jumped to 189 basis points. Difficulties in obtaining short-term finance had the effect of reducing banks' willingness to lend generally.

The disorder in the interbank market is explained in part by the financial constraints that conduits and SIVs began to impose on the banks that sponsor them. The need to finance the ABCP that investors were no longer willing to purchase reduced the ability of banks to make other loans. Moreover, there was uncertainty about the location and size of the subprime losses that individual banks might face. The rapid contraction of off-balance-sheet vehicles demonstrated that potential losses might not be easy to anticipate, even for experienced market participants.

3.5 GSE Insolvency: Losses Threaten Mortgage Markets and Federal Government Borrowing.

The two mortgage GSEs, Fannie Mae and Freddie Mac, have for decades played a central role in U.S. mortgage markets. Fannie was originally a government agency that was intended to help make mortgage finance affordable and provide liquidity to the mortgage market. It was turned into a hybrid corporation in 1968. The hybrid became privately held and run, but was subject to government oversight through the Office of Federal Housing Enterprise Oversight (OFHEO), which was part of the Department of Housing and Urban Development.[16] Freddie Mac was created in 1970 to provide GSE competition for Fannie Mae. The debt of both GSEs was treated by investors as implicitly guaranteed by the federal government, which lowered the GSE cost of finance.

Both GSEs make profit in two ways. First, they operate large securitization platforms, buying mortgages from originators and issuing mortgage-backed securities. Payments on these securities are guaranteed by Fannie and Freddie in exchange for an insurance fee. Second, both firms buy mortgages, RMBS, and other mortgage-related securities and hold them as investments.

Both GSEs are highly leveraged. By statute each is required to have capital equal to 2.5 percent of on-balance sheet assets, and 0.45 percent of off-balance-sheet (guarantee) obligations. This allows the firms to own large volumes of mortgage-related assets, and to guarantee even larger amounts of RMBS, with relatively little capital. In mid-2008, the combined guarantee portfolio of the two GSEs was $4.1 trillion, and the mortgage-related assets they held for investment were valued at $1.5 trillion. But at the end of the first quarter of 2008 their total capital was valued at $81 billion.[17]

As the mortgage market crisis got under way in 2007, Fannie, Freddie, and OFHEO reported that all was well. Equity and debt market participants, aware of the GSEs' exposure to nonprime mortgages, grew increasingly skeptical of their financial soundness. The two firms were heavily exposed to subprime and Alt-A mortgages, both through their purchases of private RMBS and their guarantees for loans they had securitized.

At the beginning of July 2007, shares in both GSEs traded above $60. A year later shares in both firms had fallen by more than two thirds. In the second week of July the share price of each firm declined sharply, by some 60 percent. The July 2008 equity price decline was a response to the possibility of a debt-holder run and possible default by the GSEs. In early July Freddie Mac experienced difficulty auctioning short-term debt, an unprecedented event. News of Freddie Mac's problems with creditors alarmed equity traders.

A default by Fannie and Freddie would have produced very negative consequences for them, mortgage and financial markets, and the federal government. By 2008, investors were not buying RMBS unless they were issued by Fannie or Freddie. If the GSEs were unable to function, mortgage finance would have become almost unavailable. Moreover, given the trillions in outstanding RMBS guaranteed by the GSEs, questions about their ability to meet their guarantees would have reduced the value of these assets and added to the financial crisis. In addition, since GSE debt was treated as nearly equivalent

to Treasury debt, and considerable amounts were held by foreign central banks, there was a possibility that contagion would harm the ability of the federal government to borrow.

Congress responded by passing the Housing and Economic Recovery Act of 2008, merging OFHEO and the Federal Housing Finance Board, and giving the Treasury authority to place the two GSEs in conservatorship. The Treasury did so on September 7, thereby making the government guarantee of GSE debt explicit in all but name.[18] The conservatorship plan included capital injections in the form of Treasury purchases of preferred shares of up to $100 billion in each GSE, a credit line for short-term loans, and a Treasury commitment to purchase newly issued RMBS from the GSEs.[19] The precise scale of the losses at each firm has not yet been calculated, although given the size of their exposure it is likely to be very large.

To many observers the crisis at Fannie and Freddie was difficult to understand. Given their quasi-public mission and federal oversight, how could they be exposed to losses from nonprime lending? The simplest and most convincing explanation of GSE behavior is that they wanted to maintain their positions as leading mortgage securitizers, and they wanted the high rates of return that other investors were earning from subprime and Alt-A assets.

For example, an internal Fannie Mae presentation from June 2005 entitled "Single Family Guaranty Business: Facing Strategic Crossroads," discusses the costs and benefits of two alternatives: "Stay the course" and "Meet the market where the market is."[20] The document concludes that while Fannie Mae was not equipped to "meet the market" it should begin "underground efforts to do so by developing a subprime infrastructure, modeling capabilities for alternative markets, and conduit capability. Unless these investments were made, Fannie Mae risked becoming "a niche player," "less of a market leader," and "less relevant to the secondary market." As late as May 2007 the firm was discussing purchases of tranches of subprime RMBS rated AA and A as a way to boost returns.[21] Data show that from 2005 to 2007 the firms significantly increased their exposure

Figure 3.3 Fannie and Freddie guarantees for Alt-A mortgages by year of origination December, 2008 ($ billions)

		vintage				
	Unpaid Alt-A balance	*2008*	*2007*	*2006*	*2005*	*2004 and earlier*
Fannie	298.9	6.6	80	84.5	56.3	74.6
Freddie	184.9	14.8	58	51.8	31.4	19.6
Total	483.8	21.4	137.4	136.3	87.7	94.2

Source: Fannie Mae 2008 Q3 10-Q Credit Supplement, Freddie Mac Q4 2008 Financial Results Supplement.

to Alt-A mortgages (see figure 3.3), and by 2008 the cumulative exposure to subprime mortgages was also significant.

While we can attribute the behavior of the GSEs to the pursuit of profit, it is harder to explain the lack of regulatory response to their increasing exposure to risky assets. OFHEO failed to restrain their growing involvement with nonprime mortgages, and did not effectively call attention to the potential for loss.

3.6 Investment Banks: An Entire Branch of the Shadow Banking System Is Transformed within Six Months

Investment banks are highly leveraged intermediaries involved in a wide variety of high risk activities. They trade and underwrite equities, fixed income securities, and derivatives; act as prime brokers; facilitate mergers and acquisitions; and act as investment advisers. They have been very active in creating, making markets in, and trading structured financial products such as CDOs. Many were heavily involved in originating and securitizing subprime mortgages, and in creating CDOs based on those securities.

Despite their size, leverage, and their complex role in many financial markets, investment banks are subject to very little regulation. In the United States their broker-dealers are overseen by the SEC. This oversight consists primarily of rules

related to record keeping, customer protection, and to maintenance of minimum levels of net capital. Beginning in 2004 the SEC offered investment banks a regulatory deal: if they voluntarily agreed to oversight of their entire enterprise, they would be allowed to calculate the net capital requirements of their broker-dealers using internal risk models.[22] This deal gave the banks latitude in determining their broker-dealer net capital, and therefore the leverage of these businesses. It also allowed investment banks to meet requirements for consolidated supervision in foreign jurisdictions. Hence the five largest U.S. investment banks agreed to consolidated SEC oversight. However, since participation was voluntary and the SEC lacked the extensive powers and resources of bank regulators, the SEC's ability to influence overall investment bank behavior was limited.

Three of the five largest investment banks, heavily exposed to subprime and Alt-A assets, failed in quick succession. Bear Stearns was the first to go. In public filings the bank had described itself as "a market leader in mortgage-backed securitization and other structured finance arrangements" and noted that the it was "an active market maker in mortgage-backed securities and therefore may retain interests in assets it securitizes, predominantly highly rated or government agency-backed securities."[23]

Bear's self-characterization was excessively sanguine. In reality, the bank was very heavily exposed to declining subprime assets. The first indication of this exposure came in July 2007. About a year earlier Bear had created two highly leveraged hedge funds—High Grade Structured Credit Strategies Fund and High-Grade Structured Credit Strategies Enhanced Leverage Fund—that had purchased CDOs based on subprime assets. As the subprime assets cratered, lenders—who had extended about $6 billion in loans to the funds—seized fund assets which had been pledged as collateral. The failure of the funds damaged trading in CDOs, and shook investor confidence in Bear. The bank's stock price began a long period of decline.

The reason for the stock price decline went well beyond the hedge fund losses. An examination of Bear's public disclosures made it clear that the bank would probably experience significant additional losses because of subprime exposure. This was evident, for example, in the bank's disclosures about the "fair value" of its assets.

When a U.S. company discloses the value of its financial assets, accounting rules require that it allocate these values into one of three categories.[24] Level 1 assets are those for which there are quoted market prices for identical assets; Level 2 assets are valued according to observed market-based inputs or unobservable inputs that are corroborated by market data; and Level 3 assets are valued using unobservable inputs that are not corroborated by market data. The higher the level, the more subjective the valuation. Level 2 assets are likely to be thinly traded, and trade in Level 3 assets is likely to have ceased, or is routinely based on projections from mathematical models.

The Bear Stearns holdings of Level 3 assets alone suggested that the bank had high levels of subprime exposure. In their February 2008 10-Q, Bear disclosed $22.2 billion in Level 3 mortgages and mortgage-backed and asset-backed securities. Since trade in subprime mortgages and RMBS had ceased in February, it was a reasonable guess that some portion of the $22 billion consisted of toxic assets. Bear also disclosed $6 billion in Level 3 derivatives holdings, and it was also reasonable to guess that this figure included non-tradable subprime CDO tranches. Moreover, given the subjectivity involved in allocating assets between levels, it was impossible for an outside observer to know whether Level 2 assets really belonged in Level 3.

Since Bear's total equity in February was $11.9 billion, these public disclosures suggested that Bear might be insolvent: after all, the firm admitted to having $28 billion in suspect assets, and there could well have been more. Moreover, since Bear's leverage ratio was 33.5, and since it depended very heavily on short-term repo financing, it was very vulnerable to a debt-holder run.[25]

A collapse materialized quickly, as Bear's stockholders, creditors, customers and counterparties concluded that the firm might fail. The stock price plunged, prime brokerage clients pulled their assets from the bank, trading partners withdrew as counterparties, and creditors declined to roll over lending agreements. Ultimately the bank could no longer obtain the cash it needed to conduct daily operations.[26] On March 6, before the debt-holder run, Bear had $20 billion in cash and highly liquid assets on hand to run its business. By March 13 it was down to $2 billion in cash, and could find no lenders, even on a short-term, secured basis.[27]

The Federal Reserve and the Treasury stepped in and arranged for the acquisition of Bear by JPMorgan Chase on March 16. As part of that transaction, the Federal Reserve agreed to fund a special purpose vehicle, called Maiden Lane, to hold $30 billion in Bear assets. The Federal Reserve provided a $28.8 billion senior loan, and JPMorgan provided a subordinate loan of $1.15 billion.[28]

Although then SEC chairman Christopher Cox insisted that the failure of Bear was a "liquidity crisis," and did not reflect insolvency, JPMorgan apparently did not agree: it required that the Federal Reserve effectively insure it against losses on $30 billion of illiquid Bear assets before it would assume responsibility for Bear's liabilities.[29] Note that the amount of insured securities is close to the $28 billion in Level 3 securities reported in Bear's February 10-Q.

Lehman Brothers was the next investment bank to fail. Like Bear Stearns, it was highly dependent on borrowed funds—its leverage ratio was 24.3. And its holdings of suspect assets was large relative to its equity—the total value of the bank's Level 3 mortgage securities plus derivatives was $25.6 billion, and its equity was $26.3 billion.[30] Like Bear, Lehman experienced a dramatic decline in its stock market price, followed by a debt-holder run that cut off short-term funding. However, the Federal Reserve and the Treasury were unable to find a private sector firm that was willing and able to take over Lehman. On September 15 Lehman filed for bankruptcy protection.

The Lehman bankruptcy provoked a new level of disorder and panic in financial markets. The reason for the strong reaction was probably fear that regulators would not or could not prevent the failure of large institutions with significant outstanding debt. This made their commercial paper, asset-backed commercial paper, bonds, and other debt appear riskier, no matter how sound the issuer.

The new level of fear was first reflected in a run on money market mutual funds. The Reserve Prime Money Market Fund held $785 million in Lehman commercial paper. Because of the losses it had sustained, Reserve Prime shareholders withdrew more than $40 billion from the fund in two days.[31] The fund elected to freeze redemptions, because of losses that would have accompanied forced liquidation of its assets.

These events provoked a widespread run on other prime money market funds, leading to $500 billion in withdrawals within two weeks.[32] It is likely that many of these withdrawals originated with banks and securities firms, which had routinely deposited overnight sweep accounts in money market funds. Money market funds in turn began to exit the commercial paper market, which briefly contracted.[33]

Lehman's bankruptcy also led commercial banks to become increasingly wary of lending to each other, as reflected in a 233 basis point spike in the TED spread. Moreover, the cost of buying CDS protection against defaults by the remaining investment banks and by other assets with subprime exposure rose sharply. The effect was to increase CDS margin calls, which ultimately contributed to the failure of insurance company AIG.

The overall level of fear was also reflected in an investor flight to safety. Interest rates on short-term Treasury securities fell nearly to zero—which means, given positive price inflation, that buyers were willing to pay the Treasury a real rate of return in exchange for a guarantee the that their cash holdings would be secure. This signals a profound distrust of assets and institutions not guaranteed by the government.

On the day Lehman failed, Merrill Lynch, another large investment bank, was acquired by Bank of America. Prior to

the acquisition, Merrill had the characteristics of Bear and Lehman: a leverage ratio of 24.4 and plenty of subprime exposure. On July 28 Merrill had agreed to sell $30.6 billion of senior ABS CDO tranches to Lone Star Funds for $6.7 billion, i.e., for a mere 22 percent of their face value. Yet even after this transaction Merrill still retained significant "sizeable exposure to the market through securities, derivatives, loans and loan commitments."[34] With its stock price under pressure, Merrill decided to merge with Bank of America.

On the weekend of September 20 the two remaining large investment banks, Goldman Sachs and Morgan Stanley, announced applications to become bank holding companies, supervised by the Federal Reserve. Although federal regulation meant large potentially closer oversight, bank charters gave them access to the new sources of liquidity through the Federal Reserve and the Treasury, and thereby reduced the probability that they would experience the fate of their sister banks.

3.7 AIG Fails: An Insurer's Bets on Subprime Assets Threatens the Stability of Commercial and Investment Banks

On September 17, two days after Lehman failed, the Federal Reserve and the Treasury effectively nationalized the American International Group (AIG), a large financial conglomerate. The immediate cause of AIG's problem was a short-term debt-holder run, which had created a liquidity crisis. This crisis was, in turn, a result of two leveraged investment strategies pursued by AIG subsidiaries.[35]

The first strategy was executed through AIG's securities lending program. AIG's insurance subsidiaries operate a securities lending business that pools the highly rated fixed income securities owned by the insurance companies and lends them in exchange for cash. Cash from securities lending is usually invested in liquid, short-term securities. AIG, however, used the collateral from its securities lending to fund the purchase

of $40 billion (at par value) in subprime RMBS. The rate of return on these assets was much higher than the company could have earned on Treasuries or other safe investments. But it also exposed AIG to losses on RMBS.

The second strategy, deceptively profitable in the short term, was to write CDS on senior tranches of asset-backed CDOs, some of which contained subprime and Alt-A mortgage assets. As of June 2008 the AIG Financial Products Group (AIGFP) had written CDS guaranteeing $441 billion of these swaps. Of this total, about $307 billion was held by banks.

Banks purchased the CDS because they offered protection against loss, and simultaneously provided regulatory capital relief. So long as the swaps were counted as sound insurance against the CDO tranches they insured, the amount of capital that was required to support those assets was reduced. Hence AIGFP CDS contracts were crucial to the credit ratings of bank-held assets, and by extension to the capital position of these banks.

Some of AIGFPs, borrowing agreements, and many of the CDS contracts it wrote, required AIGFP to post additional collateral should AIG's long-term credit rating be downgraded. AIGFP also was required to post more collateral if the value of the CDO securities insured by its CDS contracts declined. When some of the contracts were initially written, the CDOs looked like good investments, which meant low levels of collateral relative to the losses insured, and a steady stream of premiums. But as subprime and Alt-A assets deteriorated, collateral calls increased, and AIG needed additional credit to cover its liquidity needs. Banks and credit markets were unwilling to provide the needed cash.

At the moment that AIG was faced with losses on its RMBS investments and CDS contracts were deteriorating, the firm's credit rating was under review by the major credit rating agencies. A downgrade was likely, and the resulting increase in collateral calls was certain to force it to default on some of its borrowings. In the view of the Federal Reserve and the Treasury, this could have produced dangerous systemic shocks. Failure to repay the borrowing used to finance its RMBS

purchases would have imposed losses on banks that had lent the money, and the failure to make good on the CDS guaranteeing bank holdings of CDOs would have forced the banks to write them down. There was a fear that this would stoke the financial panic. As the Federal Reserve describes it:

> Under these circumstances, the potential failure of AIG posed significant systemic risks. A default by AIG on its commercial paper would likely have caused a number of money market mutual funds to "break the buck," potentially triggering runs on those and other money funds. Such a development could have significantly disrupted the market for commercial paper, undermining the ability of major financial and nonfinancial firms to obtain funding. The difficulties also could have spread to other important money markets, which were already under considerable stress. A default by AIG would have imposed a significant burden on its securities lending counterparties, who would have had to either fund or liquidate the securities they had borrowed from AIG in exchange for cash collateral. Large global banks had significant exposure to AIG on various credit facilities. In addition, many banks have purchased credit protection from AIG on CDS contracts that AIG had written to protect the banks against losses on super-senior asset-backed security (ABS) CDOs. While AIG had posted collateral to cover most of its counterparties' exposures on these CDS contracts, some uncollateralized exposure remained and a failure of AIG would have left the banks bearing the risk of losses if the value of the ABS CDOs declined further. Moreover, a failure of AIG would cause the closeout of derivatives contracts in which it is a counterparty, and many firms would have found the contracts difficult to replace.
>
> More broadly, the disorderly failure of AIG would have undermined business and household confidence and increased investor risk aversion. These effects would have contributed to substantially higher borrowing costs, reduced wealth, and materially weaker economic performance.[36]

On September 16 the Federal Reserve established a two-year revolving credit facility, able to lend AIG up to $85 billion. In exchange AIG pledged much of its assets as collateral, and gave the Treasury preferred stock convertible into 77.9 percent of AIG's outstanding common stock. Soon thereafter the Treasury bought preferred shares and warrants for $40 billion.[37] However, losses on subprime RMBS and collateral calls on CDS continued, causing about $19 billion in losses during the third quarter of 2008. In addition, the revolving credit facility raised AIG's leverage ratio and lowered its interest coverage ratio, two changes that had the potential to weaken its credit rating.

In response, the government restructured the revolving credit facility, extending its term and lowering the interest rate. It moved to end the damage caused by RMBS write-downs by setting up a special purpose vehicle, called Maiden Lane II, managed by an investment advisor hired by the Federal Reserve. Maiden Lane II paid $20.8 billion for RMBS with a par value of about $40 billion. The Fed loaned Maiden Lane II $19.5 billion, with the remainder of the purchase price coming from returns on the RMBS.[38] AIG's securities lending counterparties received an additional $24.2 billion in payments, financed by the Federal Reserve lending facility and payments from AIG.[39]

The government also set up another special purpose vehicle, called Maiden Lane III, to buy the CDOs protected by CDS written by AIGFP. Maiden Lane III, managed by an investment advisor hired by the Federal Reserve, paid $29.6 billion for CDOs insured by AIGFP, in order to limit additional collateral calls caused by declines in the value of the CDOs. The Federal Reserve loaned Maiden Lane III $24.3 billion and AIG provided $5 billion. The nominal value of these CDOs was $62.1 billion.[40] AIG had previously paid its CDS counterparties $32.5 billion as a result of collateral calls.

The Federal Reserve reports do not explain the pricing of the RMBS or CDO tranches that were purchased. Given that markets for RMBS and CDOs are essentially frozen, these assets

ought to have been steeply discounted. Recall that Merrill sold CDO tranches at 22 cents on the dollar. Paying for assets in excess of these steep discounts may be viewed as a windfall to the firms holding the assets.

It is remarkable that a financial firm so tightly connected to a variety of important financial markets and institutions was subject to so little oversight. AIG is incorporated as a thrift holding company, which makes its entire business subject to oversight by the Office of Thrift Supervision (OTS). OTS normally does not supervise entities as complex as AIG, and as is discussed below, has a record in recent years of allowing the savings and loan banks that it supervises to take extraordinarily large risks. State insurance commissioners, which supervised the AIGFP securities lending program, apparently did not recognize the implications of using cash collateral to fund speculative RMBS. And of course the CDS market has always been over-the-counter and completely without regulatory oversight.

3.8 Thrift Failures: Subprime and Alt-A Platforms Expand and then Collapse, While the OTS Looks the Other Way

As the housing price bubble expanded, several banks that were organized as savings and loan institutions—"thrifts"—established large, national subprime and Alt-A lending platforms. In many respects these thrifts operated like New Century and other stand-alone mortgage banks. They used short-term financing to originate, warehouse, and securitize large volumes of mortgages. As a consequence they held large amounts of the mortgages they originated as assets, either as loans held for sale or as loans held for investment.

The subprime and Alt-A thrifts differed from mortgage banks in several ways. Since the OTS is charged with overseeing their safety and soundness, and their deposits are insured by the Federal Deposit Insurance Corporation (FDIC), their depositors provide a stable and low cost source of finance.

In addition, they have low cost access to the capital markets through the Federal Home Loan Bank (FHLB) system. The 12 FHLBs are government supervised entities which have management appointed by member banks. They provide finance to members by issuing short and long-term securities backed by first liens on thrift assets. The seniority of FHLB debt makes this source of borrowing stable and low cost as well.[41]

While government guarantees to depositors, and the senior position of FHLB investors, meant that much of the financing for subprime and Alt-A thrifts was very stable, these banks were not insulated from all the effects of their mortgage losses. As the value of their subprime and Alt-A assets collapsed, their stock market values fell, and uninsured creditors ceased lending. They then became vulnerable to depositor runs.[42]

The first major thrift to fail in 2008 was Countrywide Financial, which was in reality a California-based mortgage finance company with a banking subsidiary attached. At the end of 2007 Countrywide's assets were $212 billion. During 2006 and 2007 Countrywide was the largest mortgage lender in the nation.[43] But its failure was caused by its central role in subprime and Alt-A lending: Countrywide was the third largest subprime originator in 2006 and 2007, and it ranked second in Alt-A originations in 2006 and first in 2007.[44]

Like its mortgage bank cousin New Century, Countrywide made mortgage loans in order to sell or securitize them. As a result, at any moment in time it held a large inventory of loans as balance sheet assets and in special purpose vehicles used for securitization. When the secondary market for subprime and Alt-A mortgages collapsed in mid-2007, Countrywide was saddled with large volumes of rapidly depreciating assets. During 2008 loans that had been "held for sale" were reclassified as "held for investment," so that losses would not need to be marked to market. But there was no avoiding the realities of its subprime and Alt-A exposure in the longer term. For example, at the end of 2007 Countrywide had $28.9 billion in "option ARM" mortgage loans—loans which do not require borrowers to cover even interest charges with their monthly payments—in

its "held for investment" portfolio, and there was little doubt that these loans ultimately would produce big losses.[45]

Unlike New Century, Countrywide did not immediately lose its access to finance when the subprime RMBS market cratered. It still had access to funding through the FHLB system and through deposits in its thrift. But its position began to erode. The credit rating agencies downgraded Countrywide's short-term and long-term debt in 2007, cutting off its access to the markets for unsecured commercial paper and asset-backed commercial paper.[46] The company was forced to draw down previously arranged revolving lines of bank credit in order to keep its mortgage business going.

With its access to capital markets shut down, and mortgage-related losses mounting, Countrywide was nearly insolvent. Hence in January 2008 Countrywide agreed to be taken over by Bank of America at a price of $4.1 billion, significantly less than the $14.7 billion in stockholder equity claimed in its public filings at the end of 2007.[47]

The next large thrift to fail was IndyMac Bank. Although it was a smaller than Countrywide, with assets of $32 billion, IndyMac had a more dramatic demise. In mid-2007, IndyMac held an inventory of Alt-A mortgages with a nominal value of over $16 billion. As defaults and delinquencies increased, IndyMac was forced to acknowledge its deteriorating position. In December 2007 the bank reclassified about $8 billion in mortgages that had been "held for sale" to "held for investment." The bank also began to write down its equity after mid-2007, reporting a decline from $2.05 billion in June to $1.34 billion in December.

Investors and creditors took note of these developments. Between June and December 2007 IndyMac's stock price declined by 35 percent. During the same period, IndyMac's borrowing declined from $4.5 billion to $652 million. It is likely that creditors were refusing to roll over IndyMac debt, or demanding increased compensation for risk. The bank replaced its borrowing in the credit market by boosting it deposits. It did so by seeking "brokered" deposits, which are more costly

that deposits acquired through bank branches.[48] This increase in IndyMac's deposit base of course increased FDIC exposure to loss, since brokered deposits usually take the form of insured certificates of deposit.

From June to December, OTS left its rating of IndyMac unchanged. But in reality, the deterioration of IndyMac had been severe. In March 2008, OTS lowered its rating of IndyMac by changing it from 2 to 3 (on a scale of 1 to 5, higher numbers indicating decreased soundness), which still failed to acknowledge the serious position of the bank (see figure 3.4).

At the same time, OTS simultaneously allowed the bank to engage in an accounting subterfuge. The bank's auditors, in their review of the bank's financial statements for the first quarter of 2008, found that its capital was less than 10 percent of its assets, the threshold for a bank to remain "well capitalized." Had Indymac lost that designation, it would not have been allowed to accept brokered deposits without a waiver from the FDIC. Negative reaction from equity holders and creditors would have been unavoidable.

According to the OTS Inspector General, these problems were averted only because OTS personnel permitted a violation

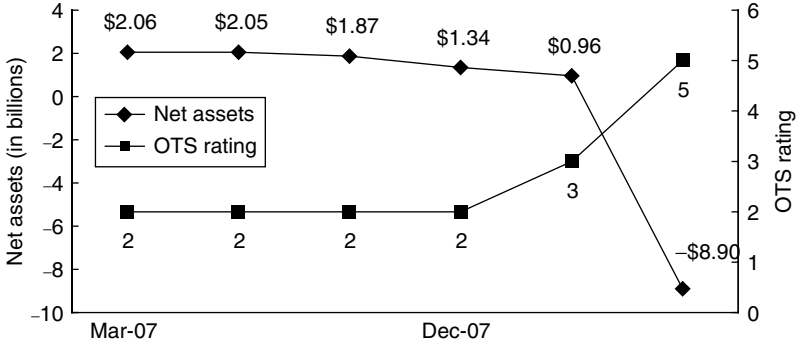

Figure 3.4 IndyMac fails to acknowledge asset deterioration until 7/07 OTS ratings lag behind

Source: IndyMac SEC filings, FDIC.

of accounting rules. The Director of the OTS West Region, Darrell Dochow, allowed IndyMac to backdate a May capital infusion from its holding company, made nearly six weeks after the close of its first quarter, in order to preserve the bank's capital classification.[49] The Inspector General also indicated, without including supporting details, that OTS had allowed backdated capital infusions by other thrifts.

When IndyMac's condition was reported in the press in early July, the bank experienced a depositor run. The FDIC seized the bank on July 11, and subsequently estimated that the Indymac insolvency would cost the insurance fund about $8.9 billion.

The biggest thrift to collapse in 2008 was Washington Mutual ("WaMu"). Like Countrywide and IndyMac, WaMu had spent years expanding its subprime and Alt-A lending platform.[50] As a result, when the secondary market for these mortgages crashed, WaMu held a huge inventory of deteriorating assets. At the end of 2007 it held nearly $59 billion in "option ARMs" and more than $18 billion in subprime loans.

WaMu was able to delay insolvency because of an injection of investor capital. In April 2008 a consortium of private equity funds led by TPG bought $7 billion of WaMu stock. That injection of capital proved insufficient, given the scale of WaMu losses. At the beginning of September the bank experienced a depositor run, losing more $16 billion in deposits over the course of 10 days. This prompted the FDIC to seize the bank on September 25. The bank's assets and liabilities—minus the claims of all debt and equity holders, who were wiped out by the insolvency—were acquired by JPMorgan Chase for $1.9 billion.[51] The failure of WaMu, with assets of $307 billion, was the largest in FDIC history.

3.9 The Crisis Spreads to Commercial Banks

As was pointed out in chapter one, several large banks had large exposures nonprime mortgage assets. They held mortgages and

RMBS; they held senior tranches of CDOs they originated or purchased; and they had agreements to support securities issued by the conduits and SIVs they sponsored, some of which had financed RMBS and senior tranches of the CDOs they issued. In some cases, exposure to these assets threatened bank solvency.

The first major commercial bank to suffer from its exposure to nonprime assets was Wachovia, then the fourth largest bank in the country. Wachovia's difficulties were due in significant part to its 2006 acquisition of Golden West, a California-based thrift that specialized in nonprime mortgage lending. Wachovia had bought the Golden West portfolio at the height of the house price bubble. By September 2008 the losses on the Golden West loan portfolio were so large that Wachovia was about to fail. On September 16, the same day that the AIG rescue began, the Federal Reserve, Treasury, and Federal Deposit Insurance Corporation announced a program of open bank assistance to help Citigroup acquire it. That deal was not consummated, and Wells Fargo ultimately acquired Wachovia.

Developments at Citigroup, a leading multinational bank with over $2 trillion in assets, are a more complicated version of the Wachovia story. Part of the damage to Citigroup came from its role as a large issuer of CDOs based on subprime mortgages.[52] As part of its CDO business, Citigroup retained senior tranches from many of the securities it issued. Citigroup also held an inventory of subprime loans, used as inputs to the securities. In September 2007 Citigroup listed its total exposure to these assets as $53.4 billion. By 2008Q3 cumulative write-downs on these assets had reached $33.2 billion.

Citigroup's exposure to subprime losses did not stop there. According to its 2007 10-K, at the end of 2006, Citigroup had involvement in "variable interest entities" (VIEs) valued at $388.3 billion. This sum included conduits, CDOs and SIVs valued at $182.5 billion.[53] Although Citigroup did not say so explicitly, it was likely that these entities included nonprime mortgage assets.

Citigroup estimated that its maximum exposure to loss from all its VIEs amounted to $147.9 billion, but emphasized that

> ...maximum exposure is considered to be the notional amounts of credit lines, guarantees, other credits support, and liquidity facilities, the notional amounts of credit default swaps and certain total return swaps, and the amount invested where Citigroup has an ownership interest in the VIEs. This maximum amount of exposure bears no relationship to the anticipated losses on these exposures.[54]

But it was hard to take this reassurance at face value. In its September 2007 10-Q, for example, Citigroup had estimated its maximum exposure to loss from unconsolidated VIEs, as of December 2006, to be only $109 billion.[55]

Moreover, Citigroup's relationship to its unconsolidated VIEs also proved to be subject to revision. In December 2006 the bank's $79.9 billion in SIVs were said to expose Citigroup to no potential loss. But by December 2007, Citigroup had consolidated its SIVs onto its balance sheet. The decision to support these highly leveraged vehicles was based on business considerations. Failure to do so could have harmed Citigroup's relationships with counterparties. But such a change was dramatic, even for a bank with trillions in assets.

Citigroup's acknowledged losses—together with uncertainty about the scale of additional losses—raised questions about the bank's solvency. This created the conditions for a depositor and debt-holder run. At the beginning of 2008 shares were trading at $28.92, but by November 21 the price had fallen to $3.77. The price of credit default swaps written on Citigroup spiked, and there was fear that European depositors might withdraw funds and creditors might refuse to roll over Citigroup debt as it came due.[56]

The Federal Reserve, the Treasury, and the Federal Deposit Insurance Corporation responded on November 23 with a set of measures intended to prevent such a run. These included an injection of $20 billion in capital via the purchase

of preferred shares under the Troubled Asset Relief Program, and an agreement to guarantee the value of $306 billion in Citibank assets.[57] For practical purposes, regulators had nationalized Citigroup losses without taking control.

Bank of America, the country's largest bank holding company, was the next to require a rescue. By the beginning of 2009 losses associated with the acquisitions of Merrill Lynch and Countrywide had put the bank into a precarious condition. Its stock market value declined and the price of insuring its debt via CDS spiked. Since it was the largest U.S. bank holding company by assets, threats to the bank were viewed as a threat to overall financial stability. On January 19 the Federal Reserve and the FDIC announced that they would guarantee a pool of $118 billion of Bank of America assets, which included loans, RMBS, and commercial real estate loans. The Treasury also purchased $20 billion in preferred shares under the TARP program.[58]

3.10 Fed, Treasury, and FDIC Efforts to Stabilize Financial Markets: Regulators Gradually Recognize that the Issue Is Solvency, Not Liquidity

The Federal Reserve, the Treasury, and the FDIC were compelled to take a series of extraordinary measures to contain the financial crisis and to restore credit markets. The chronology of their efforts reflects an evolving view of the underlying problems (see figure 3.5). Regulators first treated the problem as a temporary disruption of liquidity. The failure of large institutions, which threatened overall financial stability, caused the regulators to change their focus. The $700 billion allocated by Congress under the Emergency Economic Stabilization Act of 2008 was used to inject capital into banks as part of the Troubled Asset Relief Program (TARP), and to help rescue AIG, General Motors and Chrysler. In addition, TARP funds were used to support programs designed to restart credit markets damaged by the crisis.

Figure 3.5 Domestic financial rescue facilities

Facility	*Purpose*	*Date Established*	*Selected Fed Assets on 6/24/09 ($ millions)*
Term Auction Facility (TAF)(1)	liquidity/price support	12/12/2007	283,000
Term Securities Lending Facility (TSLF)(2)	liquidity/price support	3/8/2008	7,000
Primary Dealer Credit Facility (PDCF)(3)	liquidity/price support	3/16/2008	0
Maiden Lane(4)	solvency	6/26/2008	25,863
Fannie Mae and Freddie Mac conservatorship(5)	solvency	9/7/2008	
AIG Rescue(6)	solvency	9/16/2008	43,000
Asset-backed Commercial Paper Money Market Mutual Fund Liquidity Facilty (AMLF)(7)	liquidity/price support	9/19/2008	15,000
Commercial Paper Funding Facility (CPFF)(8)	credit provision	10/7/2008	124,000
Money Market Investor Funding Facility (MMIF)(9)	liquidity/price support	10/21/2008	0
Troubled Asset Relief Program (TARP)(10)	solvency, credit provision	10/3/2008	
Temporary Liquidity Guarantee Program (TLGP)(11)	solvency	10/23/2008	
AIG Rescue Restructuring(12)	solvency	11/10/2008	
Guarantee for Citigroup Asset Pool(13)	solvency	11/23/2008	
Maiden Lane III(14)	solvency	11/25/2008	
Term Asset-Backed Securities Loan Facility (TALF)(15)	credit provision	11/25/2008	25,000
Fed Purchases of Agency Debt and Agency-guaranteed MBS	credit provision	11/25/2008	564,000
Maiden Lane II(16)	solvency	12/12/2008	62,000*
Guarantee for Bank of America Asset Pool(17)	solvency	1/16/2009	
Total			**1,086,863**

Sources: Federal Reserve,Treasury Office of Financial Stability, FDIC

Notes: (1) Secured 28-day and 84-day Fed loans to depository institutions; (2) Secured one-month Fed loans of Treasury securities to primary dealers; (3) Secured overnight Fed loans to primary dealers, which was in large part a support for the tri-party repo market;primary dealers; (4) NY Fed non-recourse loan to SPV holding bad assets from Bear Stearns. $1.1 loan (providing first loss protection) from JPMorgan Chase; (5) Treasury guarantees provision of up to $100 billion in capital for each GSE; (6) NY Fed establishes $85 billion credit facility in exchange for 77.9 percent of AIG equity; (7) NY Fed non-recourse loans to banks to buy asset-backed commercial paper from money market funds; (8) NY Fed funds an SPV to purchase newly issued commercial and asset-backed commercial paper from issuers; (9) NY Fed senior secured loans to SPVs to purchase CDs, notes and CP issued by financial institutions; (10) Congress allocated $700 billion to the Treasury for use in financial rescue under under TARP. The outstanding balance of the TARP program on August 4, 2009 was:Capital Purchase Program, $134.144;Targeted Investment Program (Citi, BOA), $40; Citi Asset Guarantee Program $5; AIG rescue, all programs, $69.835; Auto Industry Finance Program, $77.806; Automotive Supplier Program, $3.5; TALF, $20; Home Affordable Modification Program, $1.129;all figures in billions. The total was $351.4 billion; (11) FDIC-provided insurance for unsecured bank debt and transactions accounts. At the end of 2008 the FDIC insurance extended to $224 billion unsecured bank debt. In addition the FDIC was providing insurance to $684 billion in non-interest bearing transaction accounts; (12) NY Fed restructures credit facility, extending maturity and lowering rate of interest; approves Maiden Lane II and III; (13) Fed, Treasury and FDIC guarantee for $306 billion asset pool; (14)NY Fed loans to SPV to purchase CDOs insuredby AIG-issued CDS, Treasury invests $40 billion of TARP funds; (15) NY Fed non-recourse loans to customers of primary dealers, secured by ABS.ABS collateral held by SPV with loss protection from Treasury; (16) NY Fed loans to SPV to purchase of RMBS owned by AIG; (17) Fed, Treasury and FDIC guarantee for $118 billion asset pool; *net portfolio holdings of Maiden Lane I, II, III.

Early measures, taken principally by the Federal Reserve, reflected the view that financial market turmoil was caused by a liquidity crisis, in which temporary disturbances limited the willingness of major market players to purchase or lend against particular assets. The Federal Reserve's response was to significantly lower the Federal funds rate and the discount rate, and to establish three new facilities designed to provide liquidity to particular classes of financial intermediaries.

The new facilities were intended to provide short-term funds to financial institutions burdened with illiquid assets. The Term Auction Facility allowed eligible banks to obtain loans from the Federal Reserve, for periods of up to three months, with prices set in auctions. Collateral meeting the Federal Reserve's discount window lending standards—which includes RMBS, ABCP, and AAA-rated CDOs—was eligible.[59] The Temporary Securities Lending Facility allowed primary dealers to borrow Treasury securities from the Fed, using less liquid assets as collateral. Acceptable collateral included investment grade corporate, municipal, mortgage-backed, and asset-backed securities, as well as repo collateral meeting the standards of the New York Federal Reserve Open Market Trading Desk. The Primary Dealer Credit Facility allowed primary dealers to borrow overnight from the Federal Reserve, using the collateral normally accepted in the overnight repo market.[60] Under normal market conditions repo collateral includes Treasury, GSE, mortgage-backed and corporate securities. A major goal of the Primary Dealer facility was to insure that the triparty repo market—an important source of short-term funding to many financial firms—would not fail.

In addition to providing liquidity, the new entities were intended to keep illiquid assets off the market, at least temporarily. This helped their owners keep up appearances. By giving banks the option of borrowing against depreciating mortgage assets, rather than selling them, the banks avoided realizing losses. Moreover, because borrowing did not establish market prices for assets, banks avoided marking down the value of assets on their books.

The financial crisis, however, was not resolved by these policy moves. The failure of Lehman provoked a run on money market mutual funds, and threatened a major source of funding for commercial paper. The Federal Reserve responded by creating two new entities designed to keep money market funds in the game of buying commercial paper. It created the Money Market Investor Funding Facility (MMIFF), which bought highly rated commercial paper, certificates of deposit, commercial paper, and bank notes from money market funds. Its principal source of funding was the Federal Reserve.[61] The Federal Reserve also established the Asset-Backed Commercial Paper Money Market Fund Liquidity Facility (AMLF). It allowed banks to borrow from the AMLF to buy eligible ABCP from money market funds. All risk of loss on these loans was borne by the AMLF.[62] These two facilities—together with a Treasury program insuring individual money market investors—were intended to preserve an important channel of business finance.[63]

In order to further shore up the commercial paper market, the Federal Reserve began direct provision of business credit by establishing the Commercial Paper Funding Facility, which bought newly issued unsecured commercial paper and ABCP directly from issuers.[64]

The FDIC took steps to insure bank access to short-term borrowing by establishing the Temporary Liquidity Guarantee Program. Banks had the option of buying insurance for transactions accounts, and for newly issued senior unsecured debt. At the end of 2008 over 7,000 insured depositories had subscribed to the transaction account guarantees, and over 8,000 firms had joined the debt guarantee program.[65] A total of $224 billion in guaranteed debt was issued by 64 firms by the end of 2008.[66]

Although the Federal Reserves's early efforts were focused on providing liquidity and asset price support, by the third quarter of 2008 it was impossible to ignore the continuing and growing problem of insolvency in key financial institutions. The crashes of Bear, Lehman, AIG, and Fannie Mae and Freddie Mac, as well as the wave of thrift failures, each required resolution.

Treasury, with the support of the Federal Reserve, asked Congress for substantial funding to address the issue. In response Congress funded the Troubled Asset Relief Program (TARP) with $700 billion, giving the Treasury great latitude on how the money would be disbursed.[67]

Although Treasury initially proposed to use TARP money to buy bad mortgage-related assets from banks through reverse auctions, that approach was quickly abandoned. Over $200 billion was used to purchase preferred bank stock (with equity warrants) from bank holding companies. Citigroup and Bank of America each received $25 billion under this program.[68] As part of ad hoc rescues, each of these two banks also received an additional $20 billion in preferred stock purchases, and $5 billion more were used as part of the guarantee for Citigroup assets. AIG received $69.8 billion in exchange for preferred stock and equity warrants. General Motors, GMAC, and Chrysler received $79.7 billion in exchange for a combination of debt, preferred stock, and equity. Automotive suppliers received $5 billion. And $20 billion was used to support the Federal Reserve TALF program.

In May 2009 the Federal Reserve announced the results of its Supervisory Capital Assessment Program, the "stress tests" of the 19 largest bank holding companies.[69] It found that nine of the firms had capital buffers adequate to weather the losses associated with the Federal Reserve's "adverse" macroeconomic scenario for the 2009–2010 period. The remaining 10 were required to raise a total of $75 billion in additional capital. Soon after the completion of the stress tests several bank holding companies were allowed to pay back their TARP funds. By the end of July 2009 more than $70.17 billion in preferred stock purchases had been repaid.[70]

3.11 Conclusion

The U.S. financial crisis had its origins in the leveraged acquisition of subprime and Alt-A mortgage assets. Losses on those

assets caused the failure of a host of important banks and financial firms, provoking a widespread panic. As a consequence of the actions taken by the Congress, Federal Reserve, Treasury, and FDIC, the severity of the crisis was significantly reduced by mid-2009. Although smaller banks continued to fail, the disorderly collapse of another complex and highly interconnected firm appeared to have been averted. Interest rate spreads declined, and there was an improvement in financial market confidence. However, financial markets were still not back to normal.

While the utilization of several of the Federal Reserve's special facilities had declined, the Federal Reserve found it necessary to increase it purchases of mortgage GSE debt and securities, along with longer maturity Treasury securities. As a consequence, the Federal Reserve Bank credit outstanding on August 6 was $2 trillion, still well above the July 26, 2007 value of $896 billion. Two of the country's largest banks, Citigroup and Bank of America, continued to depend on support from federal authorities. Asset-backed commercial paper markets remained impaired. Moreover, the severe recession in the real economy, triggered by the massive interruption in the flow of credit, continued to feed back to the financial system. Losses on residential mortgages, commercial real estate, credit cards, and other assets continued to rise, limiting the ability of financial firms to provide credit.

Given the recent experience of other market economies facing similar financial crises, it is possible that additional government intervention will be required to bring this one to a conclusion. Real estate price bubbles produced severe financial crises in both Japan during the 1990s, and in Sweden during 1991–1994. In both cases, the crisis ended when regulators accurately measured losses, shut down insolvent banks, and provided capital to viable banks that were inadequately funded.[71] In addition, the Japanese experience also shows that failure to deal with financial disruption can frustrate attempts to restore the real economy using fiscal stimulus. It is to be devoutly hoped that the United States does not have a similar experience.

CHAPTER FOUR

Who Caused This Disaster?

The first three chapters have been devoted to understanding how the financial crisis developed. It has been argued that the house price bubble and the credit bubble that supported it created massive amounts of wildly overvalued mortgage-related assets and derivatives. While many of these assets and derivates were spread throughout the international financial system, large quantities were concentrated in the hands of several important and highly leveraged financial institutions. When the house price bubble collapsed, these assets lost much of their value and several key firms were made insolvent. Because information about the extent of the losses and their location was and remains limited, there was a general loss of confidence in and between financial institutions. For those firms unable to disguise or weather their losses, debt-holder runs followed quickly, forcing bankruptcy or government rescue.

This chapter will explore why so many important financial institutions failed in such a spectacular fashion. There are two principal reasons. The first is that, given the economic conditions that prevailed during the housing bubble, firms such as Citigroup, WaMu, Lehman, and AIG had the opportunity to earn very high returns from nonprime mortgage assets, so long as they were willing to put their enterprises in harm's way. The behavior of most of the failed firms is best characterized by the legal concept of "reckless disregard." That is, the firms took

actions which any reasonable person would avoid because of the damage that could easily follow. We know enough about the actions they took and the environment in which they took them to conclude that reasonable people, who had thought seriously about the consequences of their actions, would never have created the concentrations of overvalued assets that have produced this financial debacle.

The second reason for the financial collapse is that financial regulatory structures, set up to prevent reckless or criminal behavior from wrecking the financial system, failed to do their job. There were multiple sources of this regulatory failure. Some regulators, such as the Federal Reserve and the OTS, failed to use the statutory powers given to them. In the case of the OTS there is also evidence of deliberate decisions to ignore existing regulations. The Securities and Exchange Commission was asked to oversee financial firms and the credit rating agencies without having sufficient authority or resources to do the work effectively.

In addition, some relatively recent legislative changes significantly weakened the regulatory system. The movement to deregulate banks and other financial institutions, which culminated in the Gramm-Leach-Bliley Act, eliminated the separation of commercial and investment banking, and made it easy for Citibank and others to participate in the shadow banking system. Citibank's involvement in shadow banking was responsible for much of its losses. The decision to leave over-the-counter derivatives completely unregulated, a result of the Commodity Futures Modernization Act, made derivative trading part of the financial Wild West. As a result, the CDS market has produced considerable damage to the U.S. financial system.

4.1 Reckless Disregard for Obvious Danger

4.1.1 What All the Players Knew

When firms like New Century, Citigroup, WaMu, AIG, and the GSEs were originating, securitizing, structuring, and

insuring nonprime mortgage assets during 2001–2007, there was abundant evidence that they were operating in an anomalous and increasingly dangerous environment.

The most obvious anomaly was the house price bubble itself. Between 1997 and 2006 there were sustained and simultaneous price increases across many regional housing markets. A national boom of this magnitude had not occurred before. Moreover, this boom was obviously unsustainable. The real rate of increase in prices during this period was so large that houses were on track to become unaffordable for most households.

The inevitable end to the house price boom had obvious and negative implications for the value of many nonprime mortgages. In general, no mortgage borrower goes into foreclosure if he has equity in his house, i.e., if the value of the house exceeds the value of the mortgage loan. If he is unable to meet his mortgage payments, he can always sell his house and pay off his mortgage. But because of the structure of their mortgages, many nonprime borrowers were likely find that they had negative equity even if house prices merely ceased to rise. Subprime mortgages frequently were written with significant prepayment penalties, and second liens often meant that the borrower started with little or no equity. If the market price of the house did not increase, the borrower would find himself owing more than the house was worth. Option-ARM mortgages, which allowed borrowers to add some part of their interest obligation to the principal of their loan, also had the potential to create negative equity absent house price appreciation.

And of course there was no good reason to believe that house prices would never decline. A glance at the historical data on regional house price run ups, which had occurred in previous decades in major metropolitan areas such as Denver, Los Angeles, and Boston, showed long periods of consistent decline following large run-ups.[1] Declining house prices would obviously increase the frequency of negative equity, especially among nonprime borrowers.

There is no question that the importance of continued house price appreciation to the success of nonprime mortgage

lending was well known and in the air during the height of the nonprime lending boom. In a review of analyst reports from investment banks, made during 2004–2006, economists at the Federal Reserve Bank of Boston conclude that many analysts had a very clear understanding of how house price appreciation sustained profitability in nonprime mortgage lending. These same analysts knew what might happen if house price appreciation came to an end. The Fed authors conclude that the bank analysts "anticipated the crisis in a qualitative way," without actually quantifying the potential losses, and were "remarkably optimistic about [house price appreciation]."[2] But even if the analysts maintained an optimistic tone, there was no reason why lenders had to do the same.

Moreover, any firm operating a large nonprime origination or securitization platform knew that it would be forced to carry large inventories of nonprime assets. To sustain a large flow of loans or mortgage-backed securities, a mortgage or investment bank had to accumulate stocks of nonprime mortgages. This meant that a sharp decline in demand for these mortgages and securities would leave the platform holding the bag.[3] The same difficulties existed for an investment bank using nonprime loans or RMBS to construct structured finance products such as CDOs or SIVs.

As we saw in chapter one, the quality of subprime lending deteriorated steadily during the boom. Loan to value ratios increased, there were more hybrid loans, more prepayment clauses, and shoddier documentation. As time went by and house price increases made owning a home more difficult, Alt-A lending spread the use of "option ARMs" and negative amortization loans. Reported data on loans and borrowers became less reliable. These trends were obvious, or should have been, to any professional working in these markets.

It was also obvious that the value of structured finance products larded with these assets could not be reliably evaluated. The prices of CDO tranches were inferred from models using CDS prices as proxies for market prices of CDOs. But there was no agreed set of assumptions about how these models ought to be

constructed, and no substantial statistical history of subprime CDO behavior against which to test the predictions of these models. In short, the value and likely future performance of nonprime CDOs was at best guesswork.

In addition, CDS contracts, which are used to value CDOs and were in some cases included as underlying assets in CDOs, were traded on an entirely unregulated over-the-counter market. There was no clearing house or exchange that required margins from parties writing CDS contracts. Also lacking were the mutual guarantees normally provided by clearing house or exchange members. This situation allowed purely speculative contracts to be written, and it means that CDS prices had limited value as predictors of actual CDO behavior.

4.1.2 More Evidence of Lender Recklessness

4.1.2.1 Ignoring Readily Available Information about Risk

While these realities were widely known to financial market professionals, there is also plenty of evidence that the large firms that failed each had direct access to very specialized and detailed information about the mortgage assets that underlie this disaster. Consider figure 4.1, which lists the largest nonprime mortgage originators in 2006. No firm on this list originated less than $10 billion in nonprime mortgages during that year. That means that each of these firms had a complete understanding of nonprime mortgages and the business of nonprime lending. The list includes all of the big private failures so far—Countrywide, IndyMac, WaMu, New Century, Lehman, Merrill, AIG, and Bear Stearns are all there.

Therefore all of these failed firms knew, or had reason to know, how mortgage brokers and appraisers conduct their business, and the strong economic incentives they have to write loans that borrowers could not repay. They had data on large pools of borrowers, and were perfectly positioned to audit underlying loan documents, and to verify the income and credit standing of borrowers. They had every opportunity to view changes in the quality of the loans they were underwriting.

Figure 4.1 Top 25 originators of subprime and Alt-A combined 2006

Rank	*Originator*	*Originations ($ Billions)*	*Status 2009*
1	Countrywide	109	Insolvent, acquired by BOA
2	IndyMac	70	Insolvent, FDIC takeover
3	HSBC Finance	53	Bankrupt
4	Washington Mutual	52	Insolvent, acquired by JPMorgan Chase
5	New Century Financial	49	Bankrupt
6	Citigroup(CitiMortgage)	46	Fed/Treasury rescue of Citigroup
7	GMAC (Residential Capital)	44	GMAC becomes bank holding company, receives TARP funds
8	Lehman (BNC, Aurora)	35	Bankrupt
9	General Electric (WMC)	33	mtg. lending operations discontinued
10	Fremont Investment & Loan	32	Bankrupt
11	Ameriquest Mortgage	30	mtg. lending operations discontinued
12	Option One Mortgage	29	mtg. lending operations discontinued
13	Wells Fargo Home Mortgage	28	nonprime mtg. lending discontinued
14	Merrill(First Franklin)	28	Insolvent, acquired by BOA
15	Residential Funding	21	Insolvent
16	Capital One Financial(Green Point Mortgage)	18	mtg. lending operations discontinued
17	Accredited Home Lending	18	acquired by Lone Star Funds
18	Aegis Mortgage	17	Bankrupt
19	AIG(American General Finance)	15	Fed/Treasury rescue of AIG
20	First Magnus	13	Bankrupt
21	Impac Mortgage	12	mtg. lending operations discontinued
22	Chase Home Finance	12	operating
23	Equifirst Financial	11	mtg. lending operations discontinued
24	NovaStar Mortage	10	mtg. lending operations discontinued
25	Bear(EMC)	10	Insolvent, acquired by JPMorgan Chase
26	Suntrust	10	operating
	total for top 25 originators	793	
	total sp & alt-a originations	1000	

Data Source: 2008 Mortgage Market Statistical Annual published by Inside Mortgage Finance Publications, Inc. Copyright 2008. Data reprinted with permission.

They certainly understood the key role that house price appreciation was playing in nonprime lending, because of the rapid refinancing in which nonprime borrowers engaged and from which these lenders profited. Moreover, they had to know that the mortgages used as building blocks for nonprime RMBS

and CDOs lacked a substantial history that could be used to judge their future performance.

In short, every firm on this list had detailed knowledge of the weaknesses of nonprime loans. They also knew that operating lending, securitization or structured finance platforms created significant risks of loss, since to be in those businesses meant holding inventories of nonprime loans or derivatives. And they were well aware that by using leverage to magnify the returns they were earning in these businesses they were also magnifying their potential losses.

4.1.2.2 Examples of Recklessness

The evidence of recklessness does not end there. If we look in more detail at some of the firms that have failed because of their exposure to nonprime mortgage lending, their cavalier attitude toward risk, and their determination to make money while the house price boom lasted, become very clear.

4.1.2.2.1 IndyMac: Casual Underwriting, Shifting Risk to Taxpayers. After the failure of IndyMac, the Treasury's Office of Inspector General (OIG) conducted a material loss review. According to the OIG report, "IndyMac's business model was to produce as many loans as possible and sell them in the secondary market. To facilitate this level of production, we found that IndyMac often did not perform adequate underwriting."[4]

The OIG reviewed a sample of 22 delinquent loans from IndyMac's "held for investment" portfolio. For these loans the OIG found

> . . . little, if any, review of borrower qualifications, including income, assets and employment. We also found weaknesses with property appraisals obtained to support the collateral on the loans. For example, among other things, we noted instances where IndyMac officials accepted appraisals that were not in compliance with the Uniform Standard of Professional Appraisal Practice (USPAP). We

> also found instances where Indymac appraisals on a property had vastly different values. There was no evidence to support, or explain why different values were determined. In other instances, IndyMac allowed the borrowers to select the appraisers . . . [5]

The OIG report also noted that IndyMac relied on outside mortgage brokers to originate many of its loans. These loans were purchased in bulk through IndyMac's Conduit Division, which grew rapidly between 2002 and 2006. During 2006, its peak year of production, the Conduit Division produced $31 billion in loans. The OIG concluded that many of IndyMac's problem loans were purchased through this Division.

The Conduit Division was poorly organized and not focused on risk management. Internal and external auditors recommended strengthening controls in 2005 and 2006, and the Division was shut down in 2007. OTS bank examiners who had reviewed the operations of the Conduit Division prior to the bank's failure believed that underwriting was weak, and one believed that "the Conduit Division did not underwrite loans, and that IndyMac was not properly reviewing the stated income loans purchased from brokers and was not monitoring the delinquency rate of these loans."

Hence we see that one of the very largest nonprime lenders in the country was more of a gambler than a lender. It paid minimal attention to the loans it was making, because it could sell large volumes into a bubble market with few questions asked. For many years the gamble paid off. The bank was able to sell or securitize tens of billions in loans each year, earning fees that added to profits. However, it was always clear that if the market for nonprime assets collapsed, the bank and the taxpayers would be left holding the bag.

The overall size and content of that bag were examined in chapter three. However the OIG report contains some telling detail. Many of the loans that IndyMac was forced to hold were Alt-A, and these often were structured as option ARMs. In 2008 the OTS examiners found that "34 percent of the [option

ARM] loans as of December 31, 2007, exceeded 106 percent of their original loan values due to negative amortization and would soon approach 110 percent."[6]

It is also important to recall that after June 2007, in its efforts to stay afloat, IndyMac shifted a substantial portion of its lending losses onto the FDIC and taxpayers. Brokered deposits—large CDs placed by brokers because IndyMac was paying relatively high rates—were used to replace debt as a source of funding. So when IndyMac failed, the FDIC was forced to make these depositors whole. This possibility must have occurred to the executives at IndyMac, but it did not stop them.

4.1.2.2.2 WaMu: Option ARM Lending Concentrated in California and Florida. WaMu, as we have seen in chapter three, was a large Alt-A lender. At the end of 2007 it had a portfolio of option ARM loans with a total unpaid balance of $58.9 billion. These loans were heavily concentrated in states that had experienced sustained run-ups in house prices. California loans accounted for 49 percent of the total by value, and Florida loans accounted for 13 percent.[7]

At the end of 2007, 50 percent of WaMu's option ARM borrowers (and 69 percent of all loans by value) were engaged in "negative amortization" of their mortgage loans.[8] These borrowers were deferring part of their interest payments and adding it to the principal of the loan, most likely because they could not comfortably afford their houses. They were counting on house price appreciation to help them pay off their increasing loan balances.

This was clearly a highly dangerous situation for WaMu. Without continued house price appreciation, all those negatively amortizing loans would shift toward negative equity. House price declines would create even more negative equity. In addition, option ARM borrowers were especially unlikely to pay on their mortgages if house prices failed to increase. Defaults were sure to follow without continuous house price appreciation.

Moreover, WaMu was betting very heavily on continued price appreciation in two states. Given the fact that house price bubbles had burst in Los Angeles, San Diego, and San Francisco in the early 1990s, and that Florida house price appreciation had reached historically unprecedented levels, this geographic bet was nothing short of ludicrous.

WaMu's response to the bursting of the house price bubble in 2006 was to act as if it had not occurred. The bank continued making subprime loans until the end of 2007, and continued option ARM lending until the middle of 2008.[9] There was clearly an element of "doubling down" by WaMu during 2007–2008: the bank continued to lend in hopes that the housing market would turn around. In doing so, it increased the size of potential losses, and increased the risk to taxpayers who guarantee deposits through the FDIC insurance program.

4.1.2.2.3 New Century: A Saleable Loan Is a Good Loan. New Century, the fifth largest nonprime lender in 2006, also took a cavalier approach to its business. As the house price bubble grew, New Century shifted into increasingly risky loan products. For example, between 2003 and 2006 the company markedly increased its origination of "80/20" loans, i.e., zero down payment loans with an 80 percent first lien and a 20 percent second lien. In March 2003, 7.9 percent of New Century's loans were 80/20. By June 2006 the percentage had risen to 34.8 percent. An increasing share of the company's loans were "stated income," i.e., without any documentation of borrower income. In June 2002 35.7 percent of its loans were stated income, and by June 2006 the share was up to 47.2 percent.[10]

Despite the risky nature of its loan products, New Century paid little attention to the process of underwriting. According to the bankruptcy examiner:

> Senior Management turned a blind eye to the increasing risks of New Century's loan originations and did not take appropriate steps to manage those risks. New Century's

> former Chief Credit Officer noted in 2004 that the Company had "no standard for loan quality." Instead of focusing on whether borrowers could meet their obligations under the terms of the mortgages, a number of the members of the Board of Directors and Senior Management told the Examiner that their predominant standard for loan quality was whether the loans New Century originated could be initially sold or securitized in the secondary market. This attitude resulted in an increasing probability that New Century would have to repurchase billions of dollars of the riskier loans because of significant defaults or loan defects, particularly if market conditions changed [emphasis added].[11]

By 2004 New Century loan performance was deteriorating. The share of loans with "early payment defaults"—in which the borrower of a securitized loan defaults before making his first required payment to the investor—began to rise. So did the rate at which New Century was forced to repurchase loans from securitization pools it had sold to investors.[12]

While the riskiness of New Century loans increased and loan performance deteriorated, the company made itself increasingly vulnerable to events in the housing market. First, New Century did not keep accurate track of the repurchases, or reserve adequate funds to cover these losses. Repurchases mean significant losses, because the loans must be redeemed at par, the originator must make good any unpaid interest, and such loans can only be resold at a steep discount. So a failure to track and cover these losses meant that the company was ignoring the deterioration of its financial position. Second, beginning in 2003, the company decided to raise its income by retaining large amounts of the loans it originated on its balance sheet. Between 2003 and 2005 the company retained 20 to 25 percent of its total loan originations.[13]

These actions were all taken by a company aware that, absent continued house price appreciation, the performance of its loans could deteriorate markedly. Internal company documents

show this. For example, in a January 2005 "View of the World" presentation to senior management, a New Century marketing employee noted that "lower housing price increases could hinder the ability of customers to refinance out of loans that are heading for trouble." An early-2005 discussion of subprime lending noted that "...[ARMS with teaser rates] essentially perpetuat[e] a cycle of repeated refinance and loss of equity to greedy lenders. Inevitably, the borrower lacks enough equity to continue this cycle (absent rapidly rising property values) and ends up having to sell the house or face foreclosure." And in a discussion of appraisals and compliance issues a manager noted that "...We are in an environment of decreasing if not stagnant value appreciation which means borrowers will be less able to refi for lifestyle finance or to get out of bad situations..."[14] New Century's management was aware of the dangers it faced, but cared only about short-term results.

New Century, however, was more than a rogue mortgage lender that ultimately got what it deserved. It was an important intermediary in the nonprime lending process, receiving financing from large commercial and investment banks, and selling its loans to some of these same institutions. New Century's self-description of its "long-standing institutional relationships" in its 2005 SEC filing is revealing:

> We have developed long-standing relationships with a variety of institutional loan buyers, including Credit Suisse First Boston (DLJ Mortgage Capital, Inc.), Goldman Sachs, JPMorgan Chase, Lehman Brothers, Morgan Stanley, Residential Funding Corporation and UBS Real Estate Securities Inc. These loan buyers regularly bid on and purchase large pools from us, and we frequently enter into committed forward loan sale agreements with them. In addition, we have developed relationships with a variety of institutional lenders who provide reliable and stable sources of warehouse financing, including Bank of America NA, Barclays Bank PLC, Bear Stearns Mortgage Capital Inc., IXIS Real Estate Capital Inc. (formerly known as CDC

Mortgage Capital Inc.), Morgan Stanley Capital Inc. and UBS Real Estate Securities.[15]

Lots of big-time financial firms funded New Century and packaged its wretched loans for sale into the RMBS market. Some, such as Bear and Lehman have failed, because of their exposure to the kinds of loans made by New Century. Others, such as Goldman Sachs and JPMorgan Chase, were faster on their feet—they avoided being stuck with too much New Century loan inventory or too much New Century debt. But it is not credible that any of these firms, highly sophisticated and well informed as they were, could have been unaware of what they were funding and what they were selling.

4.1.2.2.4 AIGFP: A Hedge Fund Playing with House Money. Although AIG is often regarded as an insurance company, it is in fact a very large and complex financial conglomerate. Its demise was in significant measure a result of the activities of AIGFP, its London-based in-house hedge fund. Though AIGFP was apparently a very successful subsidiary, making an important contribution to AIG's bottom line, there was an unambiguous warning sign about the group well before the 2008 crack-up.

In 2004 AIG reached a settlement with the SEC, which alleged that AIGFP had, for a $39.8 million fee, engaged in a sham transaction with PNC Financial Services Group. The 2001 transaction involved the transfer of $762 million in troubled PNC assets to an SPV, to which AIGFP nominally contributed 3 percent of the total assets. The transfer allowed PNC to avoid recognizing losses on the assets. However, AIGFP was taking virtually no risk in this venture, since its 3 percent investment was used to purchase a highly rated debt security, which paid dividends to AIGFP regardless of the performance of the SPV.[16] As a result of the SEC lawsuit, AIG disgorged the fee plus prejudgment interest, and also paid $126 million in disgorgement and penalties for related criminal charges brought by the Department of Justice.

The SEC investigation prompted AIG to review its overall accounting record and restate its financial results for the period 2000–2004. The company disclosed that it had overstated income by $3.9 billion, and admitted that it had inadequate internal controls. But that episode had no effect on AIGFP's standing in the corporation, or on the application of internal controls to its business. The most credible explanation for this failure to act is AIGFP's history of financial success.

Between 1997 and 2005, AIGFP's operating income totaled $7.7 billion, no small amount even for a large corporation such as AIG. These large earnings also brought extraordinary income to employees of AIGFP. The unit's bonus pool was equal to 30 percent of its operating income.[17] Under this formula, the total bonus pool for 1997–2008 was $2.3 billion. Divided among approximately 400 employees, this meant an average bonus ranging from $180,000 to $2 million, depending on the year.[18] Management of AIGFP received bonuses considerably above these averages.

The ability to reap short-term incomes of this magnitude provided plenty of incentive for the managers of AIGFP to take extraordinary risks. Because of AIG's credit rating and size, AIGFP was able to write mountains of CDS but was under no obligation to reserve capital for potential losses, or to provide initial or variation margin beyond what was required in each individual swap contract. This boosted AIGFP's earnings in the short term. So did its decision not to hedge these risks. Although by 2007 AIGFP had more than $560 billion of CDS contracts outstanding, AIG acknowledged that "[i]n most cases AIGFP does not hedge exposures related to the credit default swaps it has written."[19] In essence AIGFP was writing insurance contracts that were backed by nothing, and paying its employees very high incomes from the premium income. This is a great business, so long as no one makes a claim.

AIGFP management not only took large risks, it worked diligently to avoid oversight from AIG internal control groups. In August 2007, when the financial crisis began, Joseph Cassano, the CEO of AIGFP, assured the world that the CDS that his

group had written on subprime CDOs would never harm AIG. In an August earnings call he said "[i]t is hard to get this message across but these [CDOs] are very much handpicked. We are very much involved in the process of developing the portfolios in which we are going to wrap . . . it is hard for us with, and without being flippant, to even see a scenario within any kind or realm of reason that would see us losing $1 in any of those transactions."[20] He was contradicted by reality in September 2007 when AIGFP began to receive collateral calls on the CDS contracts written on subprime CDOs.

Yet Cassano was determined to prevent AIG accountants from independently determining the extent of the damage. After the margin calls began Cassano told his vice president for accounting policy, Joseph St. Denis that "I have deliberately excluded you from the valuation of the Super Senior [CDS] because I was concerned that you would pollute the process." It was Mr. St. Denis's belief that " . . . the 'pollution' Mr. Cassano was concerned about was the transparency I brought to AIGFP's accounting policy process." He resigned soon after his conversation with Cassano.[21]

AIGFP was in fact able to avoid internal oversight well into 2008. AIG Audit Committee minutes indicate that as late as February 2008 AGIFP was not fully informing AIG management about collateral calls, and only AIGFP was involved in attempts to estimate the losses it would incur on its outstanding CDS. According to the January minutes:

> With respect to AIGFP, Mr. Ryan [the PwC audit partner] commented that while day to day communication with AIG Finance, Enterprise Risk Management and PwC improved, Mr. Habayeb believes he is limited in his ability to influence changes, and the super senior valuation process is not going a smoothly as it could. Mr. Ryan said that the control functions are not included in the ongoing process and lose the ability to participate in the discussions of issues. He added that roles and responsibilities need to be clarified, pointed out that the collateral

> issues should have been escalated to the AIG level earlier in the process.[22]

There are similar complaints in the February Audit Committee minutes.[23] But by 2008 it was too late to reign in AIGFP. The margin calls on the CDS, and losses on the subprime RMBS, were so large that the company required a federal takeover.

There is no question that AIGFP—and the AIG management that allowed it to operate without oversight—were both extremely reckless. AIGFP—with respect to its operations, disclosures and compensation scheme—was a hedge fund. But because it was a subsidiary of AIG, it did not need to recruit outside investors. It had the use of AIG's credit rating. The fact that the management of a publicly traded company, with large and established insurance components, allowed AIGFP to function with no real oversight is scarcely believable.

What is yet to be determined is whether AIGFP management was engaged in looting—deliberately taking positions that would lead to long-term losses in order extract large bonuses in the short term. This possibility cannot be dismissed. The protracted resistance to internal oversight suggests that they knew there was something to hide. The truth of the matter may become clear as lawsuits are filed and the legal discovery process provides access to AIGFP's internal documents.

4.1.2.2.5 Fannie and Freddie: Keeping Up with the Private Label Securitizers. The two mortgage GSEs, Fannie Mae and Freddie Mac, were in an enviable position to understand developments in mortgage lending. As major issuers and guarantors of RMBS, both had detailed knowledge of how loan structure, borrower characteristics, and housing market conditions affect mortgage outcomes. Despite having this informational advantage, both firms chose to expand their purchases of subprime and Alt-A mortgages and RMBS as the house price bubble developed, in order to maintain their market position and boost their returns.

The lure of short-term growth and profit is illustrated by an incident at Freddie Mac in 2004. The firm was contemplating expanded purchases of No Income/No Asset mortgages and securities backed by these loans. Freddie Mac's Chief Risk Officer David Andrukonis objected. He wrote to Richard Syron, the CEO, to list his reasons:

> Freddie Mac should withdraw from the NINA [No Income/No Asset] market as soon as practicable. Our presence in this market is inconsistent with a mission-centered company and creates too much reputation risk for the firm...
>
> Today's NINA product appears to target borrowers who would have trouble qualifying for a mortgage if their financial position were adequately disclosed. The best evidence for this is the first year delinquency rates on these mortgages, which range from 8 to 13% depending on the lender...
>
> An additional problem with these mortgages is that it appears they are disproportionately targeted toward Hispanics. The potential for the perception and reality of predatory lending with this product is great...
>
> Exiting the NINA market would be difficult and expensive, but there is also an opportunity. Certainly lenders would criticize us because our withdrawal might affect their margins on this business. Freddie Mac would also stand to lose $25 to $50 million in annual profits. Finally, since NINA loans are minority rich, it will make it even more difficult to match the private market level of minority and underserved market production.
>
> On the other hand, what better way to highlight our sense of mission than to walk away from profitable business because it hurts the borrowers we are trying to serve?[24]

Mr. Andrukonis was fired for his trouble, and Freddie Mac accelerated its purchase of Alt-A loans and securities.

4.1.2.2.6 Shadow Bankers: Why Quibble about Risk When There Is Money to Be Made? As we saw in chapter three, the world of

shadow banking thrived on leverage funded by short-term borrowing. As we also have seen, when thing go bad short-term funding can disappear literally overnight. Under such conditions, one would expect the masters of the financial universe to carefully monitor the risks they were taking. Evidence on the business practices of Bear Stearns shows that this supposedly sophisticated firm cared very little about measuring threats to its existence.

After the demise of Bear, the SEC Office of Inspector General (SECOIG) conducted an audit of the SEC's consolidated supervised entity program, which had oversight responsibilities for the five large investment banks.[25] The audit report paints an appalling picture of Bear's approach to evaluating and managing the risks that were created by its increasing exposure to nonprime mortgage assets.

When Bear came under SEC supervision in 2005, the firm's risk managers lacked expertise in mortgage-backed securities, models designed to measure mortgage risk were not reviewed formally, there was persistent understaffing, and a lack of independence from traders. The models that were used to evaluate mortgage-related risk did not incorporate fundamental mortgage credit risk factors, including house price appreciation, consumer credit scores, and delinquency rate patterns.

In addition, the SECOIG found evidence that overall risk management at Bear was often nothing more than window dressing, with little influence on actual trading decisions:

> In some cases, Bear Stearns risk managers had difficulty explaining how firmwide VaR numbers were related to desk-specific VaR numbers…Bear Stearns used VaR numbers more for regulatory reporting than for internal risk management. This inconsistency between the use of VaR numbers for internal and regulatory reporting purposes does not comport with the spirit of Basel II and makes it harder for [the SEC] to understand what is going on inside the firm…[26]

It was not until the end of 2007 that Bear incorporated house price appreciation into its mortgage risk models, but by then it was too late. The bank already had large inventories of mortgage-related assets that were depreciating and illiquid.[27]

Like Bear, Lehman Brothers had billions of nonprime assets on its balance sheet, and was leveraged to the gills. In 2001 Lehman's leverage ratio was 17.9, which meant that a 5.6 percent decline in asset values would wipe out its equity. By May 2008 its leverage ratio was up to 24.3, which meant that its equity could be destroyed by a 4.1 percent asset price decline.

Moreover, Lehman's funding was highly concentrated in a few counterparties. An internal document from 2008 indicates that the top eight buyers of Lehman offerings accounted for 50 percent of total demand. Hence a shift in perception by a small number of counterparties was capable of shutting off Lehman's access to funds.[28]

Viewed against this background, Lehman's decision to accumulate nonprime mortgage assets might seem inexplicable if we ignored the short-term benefits to management. During 2004–2008, when leverage was returning high profits and Lehman had no trouble selling its debt, the CEO received more than $269 million in salary and bonuses.[29] Other executives were also paid handsomely, often more than $1 million per month. Even though Lehman failed, they did very well in the short term.[30]

4.2 Regulatory Failure

The recklessness we have witnessed during this financial crisis has produced a disaster, but it is not unprecedented. Asset market bubbles and financial crises have a long history in market economies.[31] That history makes it clear that reckless financial actors can significantly harm the prudent, and can wreak damage on the real economy that can take many years to repair.

In the United States the damage done by previous crises produced an elaborate system of banking and financial regulation,

intended to prevent and contain the potential harm. It failed in its mission for a several reasons. First, in several instances banking regulators were negligent in the exercise of their authority. The actions of the Federal Reserve and the Office of the Comptroller of the Currency (OCC)—with respect to both mortgage origination rules and the treatment of off-balance-sheet entities—fall into this category. So does the decision of the OTS to allow a handful of Western thrifts to originate and hold huge concentrations of subprime and Alt-A assets.

Second, important financial institutions were subject only to nominal oversight. Although AIG was supervised by OTS and the New York State Insurance Commissioner, its uncontrolled AIGFP subsidiary was allowed to demolish the company. The large investment banks, formally supervised by the SEC, were also without effective oversight.

Third, the markets for important credit derivatives, including credit default swaps and CDOs, were left entirely unregulated by deliberate legislative decision.

Fourth, the credit rating agencies, whose decisions determine whether assets can be held by pension and money market funds, and also influence the amount of capital that banks must hold, were free to rate subprime CDOs as if they were corporate debt, even though statistical evidence for those ratings was nonexistent. They were also free to rate CDOs they had helped to structure.

Finally, financial firms were allowed to achieve a size and scope that that put them in the category of "too big to fail." This made them a threat to financial stability, and may have altered their attitude toward risk.

4.2.1 Regulatory Negligence

4.2.1.1 Mortgage Lending Rules

Because of concern over abusive home mortgage lending, Congress passed the Home Ownership and Equity Protection Act (HOEPA) in 1994. According to the Federal Reserve's own analysis, HOPEA and the Truth in Lending Act (TILA) give

the Federal Reserve very broad authority to create mortgage-related regulations:

> . . . [HOPEA] gives the Board authority to prohibit acts and practices in connection with:
>
> Mortgage loans that the Board finds to be unfair, deceptive, or designed to evade the provisions of HOEPA; and
>
> Refinancing of mortgage loans that the Board finds to be associated with abusive lending practices or that are otherwise not in the interest of the borrower.
>
> The authority granted to the Board . . . is broad both in absolute terms and relative to HOEPA's statutory provisions. For example, this authority reaches mortgage loans with rates and fee that do not meet HOEPA's rate or fee trigger . . . Nor is the Board's authority limited to regulating specific contractual terms of mortgage loan agreements; it extends to regulating loan-related practices generally, within the standards set forth in the statute. Moreover, while HOEPA's current restrictions apply only to creditors and only to loan terms and lending practices, . . . [the Board's authority under TILA] is not limited to creditors, nor is it limited to loan terms and lending practices. It authorizes protections against unfair or deceptive practices when such practices are "in connection with mortgage loans," and it authorizes protections against abusive practices "in connection with refinancing of mortgage loans."[32]

That is to say, under HOEPA and TILA the Federal Reserve has always had the authority to define acceptable terms for subprime and Alt-A loans, and its authority extended beyond the bank holding companies that it supervises and examines.

Therefore there is no question that the Federal Reserve could have intervened in the nonprime mortgage market and limited its growth. It could have prohibited asset-based lending that ignores the borrower's ability to repay, insisted on income and asset verification, prohibited prepayment penalties, required creditors to establish escrow accounts for property

taxes and homeowner's insurance, and prohibited lenders and mortgage brokers from coercing real estate appraisers to misstate a home's value. We know that the Federal Reserve could have made these rules because in July 2008 it did so, amending Regulation Z.[33]

Had these changes been made in a timely fashion, they would have eliminated many nonprime loans because borrower's would have been disqualified, loans would have been less profitable to lenders, the real costs of homeownership would have been more apparent to borrowers, and lender and broker fraud would have been more difficult. The fact that the Federal Reserve chose not to do so, even after the house price bubble was under way, and reports of shoddy nonprime lending were widespread, indicates willful blindness.

Although the Federal Reserve was unwilling to slow nonprime lending, some state governments did try. At least 30 states enacted laws that were intended to complement HOEPA.[34] The Office of the Comptroller of the Currency (OCC), however, did what it could to limit the effectiveness of these state laws. In 2003 OCC issued an order stating that, with respect to nationally chartered banks and their subsidiaries, federal law pre-empts state law. Hence national banks were free to ignore state laws designed to strengthen HOPEA regulations, and pay attention only to the provisions of Regulation Z.[35]

4.2.1.2 Bank Capital Requirements for Structured Finance Products

In the case of Citibank and possibly other large banks, a significant part of nonprime losses have resulted from holding structured products such as RMBS or CDO tranches. Banks had an incentive to hold the highly rated tranches of these structured products because of the effect on their capital requirements. For purposes of capital calculations, a bank holding a subordinated AAA-rated RMBS or CDO tranche is required to have capital equal to 1.6 percent of its value. Whole residential loans, by contrast, have a 4 percent capital requirement.[36] Hence bank

regulation encouraged the creation of opaque structured products while reducing the capital buffers that protected against losses in the underlying assets.

4.2.1.3 Treatment of Off-Balance-Sheet Entities

The Federal Reserve also took a lax view of bank off-balance-sheet vehicles. Citigroup, which has OCC as its primary supervisor and whose bank holding company is overseen by the Federal Reserve is a clear example of this. When Citigroup's SIVs went spectacularly bad, it was compelled to make good the losses in order to preserve its business reputation, even though it was not legally obligated to do so. Given the size of Citigroup's SIVs and their importance to the bank's overall operation, this was foreseeable.

Moreover, the ability of Citigroup to set up highly leveraged off-balance-sheet entities allowed it to get around bank capital requirements. While the bank itself could stay within de jure leverage requirements, the creation of highly leveraged SPVs that purchased the bank's structured financial products allowed much higher de facto leverage. Before the financial crisis Citigroup could, through its off-balance-sheet activities, achieve some of the returns enjoyed by its investment bank competitors. However, when things turned sour this high leverage amplified the crippling losses at Citigroup.

4.2.1.4 OTS: Western Savings Banks, AIG Receive Minimal Oversight

The outcomes for several OTS-supervised entities during this financial crisis were especially poor. Western thrifts such as Countrywide, WaMu, and IndyMac were allowed to build huge concentrations of subprime and Alt-A risks without financial resources to withstand the potential losses. The harm done by these banks has not been limited to the costs to the FDIC insurance fund, however. As major national originators of nonprime mortgages, they played a important role in creating the loans and RMBS that have produced losses throughout the financial system.

In at least one instance, OTS thrift supervision may have been worse than negligent. As was discussed in chapter three, there is evidence that the director of the OTS West Region colluded with IndyMac in 2008 to disguise its declining financial condition. OTS was also the federal regulator of AIG's holding company, by virtue of the fact that AIG owned a thrift. OTS had a Complex and International Organizations supervisory group, but it was apparently unaware of the risks AIGFP was taking.

4.2.2 Regulatory Gaps

4.2.2.1 SEC Supervision of Investment Banks

Investment banks in the United States have always been lightly regulated. Although their holding companies are complex, at the start of the financial crisis none owned commercial banks. Hence their holding companies were exempt from Federal Reserve oversight, as were most of their subsidiaries. Their broker-dealer subsidiaries were the exception, since all broker-dealers are subject to SEC rules on matters such as net capital and record keeping.

Beginning in 2004 the SEC made an effort to close this gap through a system of "voluntary regulation," under which the five largest investment banks agreed to SEC supervision of their holding companies. Under the terms of the new regulatory regime, the banks were required to have a documented internal control system, subject to SEC approval; they were subject to SEC monitoring for financial and operating weakness; their holding companies had to meet Basel capital adequacy standards; and they were required to maintain a pool of liquid assets at the holding company level sufficient to compensate for the loss of unsecured borrowing facilities for up to one year.

The benefits to the investment banks were twofold. Use of the Basel standard meant that their broker-dealers were subject to lower capital requirements than those previously set by the SEC, which meant a capacity for higher leverage and higher profits. In addition, since their consolidated enterprises

were subject to regulation by a supervisor recognized by the European Union (EU), they were able to avoid restrictions on their EU operations.

The SEC thought that it was bringing systemically important financial firms into the regulatory system. That belief was an illusion, although not one that was given up easily. In May 2008 Erik Sirri, the director of the SEC Division of Trading and Markets, the group responsible for investment bank oversight, told a Senate subcommittee:

> The oversight of the CSEs ["consolidated supervised entities"] at the holding company level is similarly based on rules that incorporate principles of prudential oversight, backed by monitoring and examinations. When potential weaknesses are identified at the CSEs, the Commission has broad discretion under its authority to respond, for example by mandating changes to a firm's risk management policies and procedures, by effectively requiring an increase in the amount of regulatory capital maintained at the holding company, or requiring an expansion of the liquidity pool held at the parent. These powers are not theoretical abstractions. All three of the steps I have just mentioned have been taken at various firms over the past two years. If these actions are unsuccessful, the Commission can limit the CSEs business or effectively terminate consolidated supervision, which would, inter alia, require disclosure and have significant implication in European jurisdictions.[37]

These remarks point to the weaknesses of the SEC investment bank supervision program. Participation was voluntary, so the investment banks had an incentive to stay in the program only so long as the benefits of reduced broker-dealer capital requirements and compliance with EU regulatory requirements outweighed the costs, financial or otherwise, of puting up with the SEC. Since the SEC supervisors were aware of this, every regulatory move was at its core a negotiation. Moreover, the SEC, unlike the Federal Reserve Board, did not have a large

staff of examiners or an elaborate reporting system connected to its own risk management system. It relied very heavily on the cooperation of the investment banks, whose employees were far larger in number and had more detailed knowledge of their operations than the SEC staff assigned to oversee them.

These shortcomings are discussed in the SECOIG report on the demise of Bear Stearns. The report takes a very dim view of the voluntary supervision program. For example, the SEC ignored its own vetting procedures when Bear applied for admission to the program. Bear was allowed to implement Basel capital calculations before the firm was inspected to verify the information it had provided in its application for the program, and to determine the adequacy of its risk management policies and procedures.[38] Once Bear was admitted to the supervisory program, SEC rules requiring external audit of the firm's risk management control systems were waived, and Bear's internal auditors were allowed to perform this task.[39] Moreover, even though the SEC was always aware of the firm's large and increasing concentration in mortgage-related assets, its high leverage ratio, and its deficient risk management system, it never took effective steps to address these issues.[40]

After the failure of Lehman, the SEC supervisory program was ended. Morgan Stanley and Goldman Sachs became bank holding companies and Merrill Lynch was acquired by Bank of America, bringing all the survivors under Federal Reserve authority.

4.2.2.2 OTC Derivatives

The failure of AIG is attributable in part to the failure to regulate the markets for financial derivatives. AIGFP sold its loss-causing CDS "over the counter," that is in bilateral trades with other firms. While the counterparties were all sophisticated, they had no way of knowing the potential losses the AIGFP was piling up. They were willing to buy these insurance contracts because of the backing provided by the parent company, which was apparently financially sound and well-managed. AIGFP's customers were, however, cautious enough to require

AIGFP to put up collateral if the value of the insured assets or AIG's credit rating declined.

The individual customers for CDS had no way to know the extent of AIGFP's exposure, nor did anyone else outside the company. Outcomes could have been much different, however, had CDS trading been more highly regulated. The absence of oversight was no accident. The Commodity Futures Modernization Act of 2000 excluded most over-the-counter derivatives, including CDS from regulation.[41]

4.2.2.3 Credit Rating Agencies: Faulty Methods and Conflicts of Interest

The three largest U.S. credit rating agencies—Moody's, Standard & Poor's, and Fitch—played an important role in the financial crisis. They evaluated the riskiness of nonprime mortgage-backed securities issued by numerous securitization trusts, and they evaluated the structured securities issued by CDOs, SIVs and other entities that contained these nonprime mortgage securities.

Their ratings affected the willingness of many purchasers to buy these securities. Money market funds, restricted by law to purchasing investment grade securities, were allowed to buy highly rated structured securities with nonprime exposure. Pension funds, which are often required to purchase investment grade securities, also became customers. Banks had an incentive to hold highly rated senior tranches on their balance sheets, because under banking regulations the higher ratings meant reduced capital charges.

We now know that these credit rating agencies failed miserably in their evaluations of nonprime mortgage securities and derivatives. There are several reasons for this debacle. Their statistical models for both mortgage-backed securities and CDOs were inadequate. The models that they used to estimate the default probabilities and expected losses for nonprime RMBS were based on short performance histories, and were therefore very likely to be statistically unreliable. Loans such as hybrid ARMs and negative amortizations loans previously had not

been issued in massive quantities, and the expansion of these loans occurred during a bubble period. In fact, one credit rating agency did not have a specific subprime ratings model prior to 2007. It instead made adjustments to a model that was used to rate prime RMBS.[42]

Moreover, it is important to remember that the credit ratings agencies had a policy of not auditing the data that they were given by RMBS arrangers. They accepted the information about loans as given, and did not inquire into its accuracy. This allowed them to preserve their First Amendment defense to any liability for the accuracy their ratings. It also meant that they were willing to rate securities that were based on high-risk loans, without independently determining whether the information they were given was accurate.

After it was obvious in 2007 that the subprime lending market was finished, Fitch got around to auditing some of the loans that were part of RMBS deals that it had rated. Analysts selected 45 loans made to borrowers with high FICO scores and looked at the origination and servicing files. They found that "there was the appearance of fraud or misrepresentation in every file." For 66 percent of the loans, the claim of owner occupancy was false; for 51 percent there was evidence of faulty appraisals; and for 44 percent there was questionable stated income or employment. While this was a small sample, the outcome is appalling. The obvious question is why none of the agencies insisted on audits before deciding to provide ratings.[43]

According to a report by the SEC, models for CDOs containing nonprime RMBS did not use information on the underlying mortgage assets. Instead they relied on only 5 variables—current credit rating of the securities in the CDOs, maturity, asset type, country and industry.[44] It is well known that models that use more detailed information about the assets contained in CDOs—including default probabilities and loss rates—produce results that are extremely sensitive to small changes in these assumptions. A small change in the likelihood of default can lead to a big change in the loss experienced by a highly rated CDO security.[45] Hence it is hard to take credit rating agency models seriously.

Not only were the ratings procedures questionable, they produced profits for firms with significant conflicts of interest. The arrangers of subprime investment trusts and CDOs chose and paid the rating agencies, as do all issuers of rated securities. In the case of CDOs, the rating agencies also acted as consultants, helping to structure the deals that they would rate. The underlying information about structured securities was not publicly available, making independent rating by third parties impossible. Moreover, the demand for rating services came from a very limited number of sources. In an SEC sample of 642 subprime RMBS and CDO deals, 12 firms arranged 80 percent of the subprime RMBS in dollar terms; and 11 firms accounted for 80 percent of the CDO deals.[46]

In short, the credit rating agencies knew that their access to deal-rating revenues depended on the good will of a handful of firms. That, in turn, meant providing high ratings for as many of the issued securities as possible, and low requirements for credit-enhancing overcollateralization. The profitability of any structured finance vehicle depended on both factors.

Internal credit rating agency emails show that agency employees were aware of the shortcomings of agency methods. On March 19, 2001 a Standard & Poor's employee named Frank Ratier, who was involved in rating a CDO, asked in an email for data tapes on the underlying assets:

> Peter, if the deal closes next week when are the credit estimates due? What is the fee you quoted? If we are to use the same criteria we used on the C-BASS deal we need current collateral tapes. Are these available? I think you need to get with Mike Stock and make a joint call to Neil to cover these outstanding issues. FR.

The next day his supervisor Richard Gugliada replied:

> . . . Any request for loan level tapes is TOTALLY UNREASONABLE!!! Most investors don't have it and can't provide it. Nevertheless we MUST produce a credit estimate.

Raiter's response was:

> This is the most amazing memo I have received in my business career.[47]

In another instance, an analytical manager in an agency CDO group wrote to a senior analytical manager that:

> [the rating agencies continue to create] an even bigger monster—the CDO market. Let's hope we are all wealthy and retired by the time this house of cards falters.;o).

Another analyst expressed concern that her firm's CDO rating model did not capture "half" of a deal's risk, but that "it could be structured by cows and we would rate it."[48]

Employee correspondence also reflects the conflict of interest created by their need to please deal arrangers. A senior analytical manager in an agency structured finance group wrote:

> I am trying to ascertain whether we can determine at this point if we will suffer any loss of business because of our decision [on assigning separate ratings to principal and interest] and if so how much? . . . Essentially [names of staff] ended up agreeing with your recommendations but the CDO team didn't agree with you because they believed it would negatively impact business.

In another instance an employee writes:

> [w]e are meeting with your group this week to discuss adjusting criteria for rating CDOs of real estate assets this week because of the ongoing threat of losing deals.[49]

Although the big three credit rating agencies are "nationally recognized statistical rating organizations" regulated by the SEC, the SEC's authority is limited. The SEC is explicitly forbidden from regulating "the substance of the credit ratings or

the procedures and methodologies" by which they are determined. It does prescribe rules related to disclosure, recording keeping, procedures for handling non-public information, and limiting conflicts of interest.[50] But those rules have obviously been ineffective in addressing either the problems inherent in the issuer-pays ratings system.

4.2.2.4 Decades of Banking Deregulation: Amplifying the Problem of "Too Big to Fail"

The structure of the banking industry in the United States has changed significantly since the 1980s. The number of commercial banks and thrift institutions has declined by approximately 50 percent. Concentration, measured by shares of assets or deposits, has increased. This process of consolidation is explained by several factors. The development of information technology has reduced the cost of processing information, increasing scale economies. The globalization of markets has provided incentives for multinational banking. Events such as the savings and loan crisis in the 1980s caused weak banks to merge with stronger banks.

However, consolidation at the observed levels would not have been possible without a steady process of deregulation over two decades. The 1982 Garn-St. Germain Act permitted banks to purchase failing banks and thrifts across state lines. The 1994 Riegle-Neal Interstate Banking and Branching Efficiency Act allowed interstate branching. Several court rulings in the early 1990s overturned restrictions on bank sales of insurance and annuities. During the same time period, the Federal Reserve eliminated firewalls between bank and non-bank subsidiaries of bank holding companies. Deregulation culminated in the 1999 Gramm-Leach-Bliley Act, which gave financial holding companies permission to engage in a full range of financial services including commercial banking, securities dealing, insurance, and investment banking.[51]

In addition to banking laws, the mergers and acquisitions that fueled this long period of consolidation also were subject to antitrust review. But antitrust law was not an obstacle

even to very large mergers and acquisitions. In 1998, for example, Citicorp merged with Travelers Insurance in a $70 billion deal. The Justice Department waved the deal through, along with several other large mergers. In early 1999 the Chief of the Litigation II Section of the Antitrust Division told the American Bar Association somewhat prophetically that "[w]e heard numerous complaints that Citigroup would have an undue aggregation of resources—that the deal would create a firm too big to be allowed to fail. But, we essentially viewed this as primarily a regulatory issued to be considered by the FRB."[52]

The creation of "too big to fail" banks is unimportant to antitrust law, because antitrust statutes are designed to prevent harm to competition. When banks merge, the question before the Justice Department is whether the new entity will gain enough market power to raise the price of its services above competitive levels.

However, while the creation of a financial firm that is "too big to fail" may not affect market prices, it sets the stage for an important external effect. Once a firm has grown large and complex enough, a disorderly failure will not only ruin the firm's stockholders and creditors, it can threaten the stability of financial markets. Because of this potential systemic threat, the stockholders and creditors of a "too big to fail" bank have an implicit government guarantee, even when the bank behaves recklessly. The efforts required to rescue AIG, Citigroup, and Bank of America are a testament to the reality of this problem and the strength of the guarantee.

The deregulators of the U.S. financial system were oblivious to the problem they were helping to create. There was nothing in Garn-St. Germain, Reigle-Neal, or Gramm-Leach-Bliley that addressed the fact that systematic deregulation would foster larger and more complex financial firms, the failure of which could threaten financial stability, and force the government to protect the nominally unprotected stockholders and creditors.

The 1991 Federal Deposit Insurance Corporation Improvement Act (FDICIA) was seen by some as solving the

"too big to fail" problem.[53] Yet there was nothing in FDICIA to make it less desirable to become larger and more complex. The FDIC was required to take "prompt corrective action" to prevent weak banks from costing the bank insurance fund money, and to adopt a least cost resolution strategy for banks that did fail. The law, however, made an exception to the least cost resolution requirement in cases of systemic risk. That meant the rules did not apply to banks that got large enough to threaten the stability of financial markets.

The process of deregulation is particularly strange in light of banking history. In 1984 Continental Illinois, then the seventh largest bank in the United States, failed. However, its creditors were not wiped out as they would have been in a normal bankruptcy. Instead, the FDIC protected all of the bank's depositors and creditors, purchased billions in troubled loans, and injected capital. That same year the Comptroller of the Currency said that the 11 largest banks would be treated in a similar fashion should they fail, effectively announcing the creation of a "too big to fail" category. In 1998 the failure of Long Term Capital Management (LTCM) saw the Federal Reserve reduce the cost of overnight borrowing by large banking organizations that had not been lenders to LCTM. This was interpreted as a Federal Reserve attempt to limit spillover effects and preserve the stability of the "too big to fail."[54] Despite the red flags, deregulation proceeded apace, with no real thought to the systemic consequences of creating bigger and more complex financial firms.

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CHAPTER FIVE

Implications and Solutions

5.1 Introduction

Previous chapters have sketched the trajectory of the ongoing financial crisis. It had its origin in the market for houses. Beginning in 1998, the real price of houses began to rise at an accelerating and historically unprecedented rate. This price trend turned into an asset bubble—houses were bought at prices that made sense only if house prices continued to rise. When the price increases did cease in 2006—because inventories of vacant and unsold houses grew too large—the weakest homeowners were immediately affected. Nonprime borrowers, who were dependent on increased equity to allow them to refinance or at least pay off the value of their loans, were the first to suffer. By 2007 nonprime borrowers were defaulting and going into foreclosure at an accelerating rate.

As house prices have continued to decline, mortgage default rates have begun to rise for prime as well as nonprime borrowers. Many households who paid bubble prices for their homes now find that they have "negative equity" in those homes. The market value of their house is now below what they owe on their mortgage. When these households experience disruptions to their incomes or unexpected expenses, and if they lack adequate financial assets to help them cover mortgage payments, they are being forced into foreclosure.

The house price bubble could not have existed without the active cooperation of sophisticated financial institutions. Very few households can buy a house without borrowing money, so the house price bubble needed to be financed. The finance was forthcoming, for all classes of borrowers, but increased with unprecedented speed for those taking out nonprime mortgages.

The lenders who were making nonprime loans also were participating in a credit bubble. The performance of their loans depended on the course of house prices. The conditions under which nonprime loans were made meant that many borrowers could avoid default only through periodic refinancing, or through the sale of their house. Both options required rising house prices. But house price increases required continued lending on assets with inflated prices. So lender bets could not pay off unless other lenders kept the game going. And in fact the credit bubble continued for years, causing the volume of nonprime assets to grow incredibly large.

Had these assets been dispersed evenly throughout the financial system, the collapse of the house price and credit bubbles would have caused large losses, but no financial crisis. Unfortunately, there were large concentrations in the hands of highly leveraged financial institutions. Leverage had allowed these firms to acquire large amounts of nonprime assets and earn high returns while asset prices held up. When defaults increased and asset values collapsed, debt-holder runs began and some firms were shown to be insolvent. Mortgage banks, lower-level intermediaries in the mortgage production system, were the first to go. They were followed by thrifts, commercial banks, and investment banks with large nonprime exposure.

Some of the most damaging concentrations of nonprime exposure were contained in credit derivatives. The commercial and investment banks that created CDOs containing nonprime assets—such as Bear Sterns, Lehman, and Citigroup—often retained significant quantities of the senior securities in these structures. Although these securities were nominally low risk, they quickly went in the tank, taking major institutions with

them.[1] It also turned out that AIGFP had insured billions of these depreciating CDOs by writing credit default swaps without reserving capital to cover potential losses.

In summary, the main economic ingredients of the current financial crisis were the house price bubble, the credit bubble that both depended upon and supported it, and the concentration of losses in highly leveraged financial institutions. These ingredients existed and were baked into a disaster because important financial institutions were willing to behave recklessly, and because the regulations that might have restrained them were negligently applied or missing entirely.

This understanding of events, however, is incomplete. The economic dislocations we have observed since mid-2007 contain an important demonstration about how badly market economies can behave. Carefully examined, they challenge widely held beliefs about the stability and self-correcting properties of markets. This crisis provides an utterly clear and very costly proof that financial markets, as a result of their normal operations, can veer toward instability, taking the rest of the economy along with them. If we look back at the key players in this disaster and the actions that they took, it is abundantly clear that their self-interested behaviors are sufficient to explain what happened.

Moreover, financial firms pursuing short-term gains from nonprime assets have created huge negative economic "externalities" for the rest of the economy. By accumulating large concentrations of rapidly devalued assets, key financial firms created a crisis that continues to have a damaging impact on the entire financial sector and on the real economy. The costs of their decisions include contracting GDP, staggering declines in employment, and huge expenditures on financial rescue and fiscal stimulus that were required to forestall an even greater disaster. These costs are large and continuing, and they will not be paid by the parties that are responsible for them.

Furthermore, it is apparent that financial market participants, far from producing the optimal outcomes they were touted to deliver, have instead delivered gross inefficiencies. Over

the course of many years, originators of subprime mortgages engaged in a gross misallocation of capital. Instead of directing funding toward investment in productive goods and services, they funneled trillions of dollars into speculative mortgages, which have rapidly declined in value.

The negative effects, however, do not end there. The rescue of financial firms that are "too big to fail" (TBTF), while necessary in the short term, has amplified an existing long-term problem. The steps taken to prevent a total financial crack-up have amplified the problem of "moral hazard" among very large financial firms. The clear demonstration of a cost-free federal insurance policy, which prevents bankruptcy and preserves to a large extent executive jobs and incomes, will undoubtedly affect future behavior of large, complex firms that are integrated across several financial markets. All those firms with sufficient scale will have an incentive to take more risk in the pursuit of short-term returns, since the costs of failure will be socialized.

As a result of this crisis it is also clear that we cannot rely on standard ways of looking at financial markets or the real economy. Financial markets are viewed by many economists as fast-moving Darwinian systems. Although the future is uncertain, it is assumed that market participants understand the distribution of possible outcomes and make their decisions based on that knowledge. Competition and arbitrage are assumed to produce continuously efficient outcomes and eliminate irrational players. Instead we have witnessed a process, lasting several years, during which sophisticated firms made large bets on nonprime assets and derivatives while plenty of information indicated that asset and credit bubbles were forming. Hence, policy steps which are taken to prevent recurrences need to take a more realistic view of how financial firms and markets operate.

The effects of the financial crisis on the real economy—on the output of goods and services apart from finance—also raise serious questions about established depictions of how the economy works. According to a largely influential view, the real

economy is always operating at full employment. Observed fluctuations are caused by "productivity shocks" that cause changes in relative prices and cause changes in the amount of labor employed. However, all these adjustments are voluntary and optimal, and employment is always full employment whatever its level. Over the course of this financial crisis, however, we have witnessed a contraction in output and employment that is the consequence of a reduction in credit. It was most definitely not the result of some technical innovation that called for a reorganization of production. Moreover it is incredible to claim that the millions of job lost since this recession began are the consequence of mass decisions to choose leisure over labor.

There have been a few attempts to argue that the crisis was caused by errant government policy, rather than the normal operation of markets. Some have argued that it would not have occurred if the Federal Reserve had pursued a more restrictive monetary policy. Others have argued that it is largely the result of the Community Reinvestment Act or the regulatory treatment of the housing GSEs. We will show why these lines of analysis are incomplete and unconvincing.

However, it would be equally unconvincing to assert that government policy played no role in this disaster. As was demonstrated in the previous chapter, the financial regulatory system was not up to the task of preventing a major crisis. It was unable to prevent important financial market actors from feeding asset and credit bubbles. When the bubbles collapsed, it was unable to prevent several large insolvent players from threatening the stability of the financial system.

Hence changes to financial market regulation are, or should be, on everyone's agenda. Close attention to the history of this crisis suggests several areas where change is needed. Oversight of financial companies that are "too big to fail"— whether they are banks, investment banks or insurance companies—is foremost on the list, because the damage they did during this crisis came close to triggering a complete financial collapse. There is a need to neutralize the threats to stability that are created

by unregulated markets for financial derivatives such as credit default swaps and CDOs. The role of credit rating agencies in the regulatory system needs to be rethought. The structure and function of the housing GSEs need attention. And the patchwork oversight of retail financial markets, which allowed hundreds of thousands of nonprime mortgage borrowers to sign agreements that were very likely to land them in trouble, needs to be reformed.

5.2 The Market Origins of Recklessness

There is plenty of evidence, reviewed in the previous chapter, that the corporations responsible for this financial disaster acted recklessly. But the fact that executives and employees of major financial institutions put their firms in harm's way is by no means inexplicable. There were outsized and immediate gains to be made: large bonuses and the appreciating value of previously awarded stock and stock options meant large fortunes to individuals, regardless of how their companies fared in the longer term.

AIGFP is a crisp example of this. Over the course of a few years a small group of employees were paid billions in bonuses while accumulating many more billions in losses that eventually demolished AIG. Those controlling AIG allowed AIGFP to operate with little oversight, because in the short run AIGFP was adding to the parent corporation's reported earnings. After AIG failed, the AIGFP and AIG executives still had the bonuses they had been paid.

The traders and executives at Bear Stearns and Lehman Brothers may have seen large portions of their portfolios destroyed when their firms failed, but they also accumulated outsized rewards during the housing bubble. So did the executives of firms that helped build the subprime bubble, but were clever enough to avoid being as heavily exposed to loss. Goldman Sachs, for example, was an important creditor for New Century, a major underwriter of subprime RMBS, and

a beneficiary of the government decision to pay off AIG CDS contracts at full value.[2] Goldman made a significant contribution to the bubble, and saw its stock market valuation decline when the financial crisis hit. But the highly paid executives and traders at that firm reaped large benefits from the bubble, and no doubt retained much of what they accumulated before the crash.

This self-interested behavior can of course be described as response to competitive pressure. If other banks are creating nonprime CDOs and making apparent fortunes at it, then your bank must do the same. This view is explicit in the words of Chuck Prince, CEO of Citigroup at the beginning of the financial crisis, who proclaimed in 2007 that "[w]hen the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you've got to get up and dance. We're still dancing." But this is another way of saying that once-in-a-lifetime rewards are just too good to pass up, even if once-in-a-lifetime losses are very likely to materialize later.

The recognition that self-interest is the source of the nonprime mortgage financiers is not in itself surprising. All of economics since Adam Smith starts with the question "Who benefits?" It is equally important to note the failure of other self-interested parties to deliver any "market discipline" to the nonprime players. Funding for mortgage banks did not dry up until it was obvious that the house price bubble had burst. The origination and sale of nonprime mortgages and RMBS continued well into 2007, even though the game was well over by then. Structured securities based on nonprime assets—such as those issued by sponsors of CDOs—were still being issued in the middle of 2007. Stock market investors did not devalue IndyMac, WaMu, Citigroup, Bear, or Lehman while they were building their lethal holdings of nonprime assets. Their stock prices did not collapse until the damage to their balance sheets was irreversible. It appears that too many people were making too much money for the party to stop.

One can debate whether or not the people who made the self-interested decisions that destroyed their firms were acting rationally. There is research evidence that indicates that there is a shifting mix of logical reasoning and emotional response in economic decision-making. When economic conditions become extreme, emotion can take over.[3] So it may be the case that the executives at AIGFP were allowing their emotions to cloud their judgment, and that this is what caused them to focus on their immediate bonuses and ignore the potential effects on AIG. The resolution of this issue, however, is largely beside the point. This crisis has reaffirmed that naturally occurring market incentives can lead to system-destabilizing decisions, and that the destabilization can spill over into the lives of millions of people.

5.3 When the "Side Effects" Are the Most Important Effects: Negative Externalities, Inefficiency, and Increased Moral Hazard

5.3.1 Externalities that Overwhelm Private Benefits

The losses experienced by the banks and AIG, while substantial, measure only part of the costs of this financial crisis. The economic effects extend far beyond the owners and creditors of these firms, creating a large inventory of negative economic externalities.[4] Measuring the value of externalities is often difficult, because there is no market value assigned to the bad side effects. However, since the externalities of the financial crisis consist primarily of disrupted economic activity, we are in a good position to observe their extent, at least in terms of orders of magnitude.

We can begin by looking at the effects of the financial crisis on the macroeconomy. The National Bureau of Economic Research says the current recession began in December 2007. From that time forward, multiple measures of aggregate economic performance—such as GDP growth and employment—began to falter. There is general agreement that disruptions in

credit markets, turned a slowdown into a near catastrophe. As the downturn began, there was hope that the economy would experience a recession that could be mitigated. A modest fiscal stimulus package, that provided $168 billion in tax rebates to households, was executed in early 2008 in the hope that it would forestall a significant downturn. That hope was demolished by the intensification of the financial crisis in late 2008.

As we have seen in chapter three, the failure of Lehman Brothers and the rescue of AIG in September 2008 created a watershed moment in financial markets. The financial crisis became much more severe, and credit tightened significantly. This produced a new level of damage in the rest of the economy, as demand fell off and firms found it more difficult to fund their operations. The acceleration in the damage is very clearly evident in data on employment. From September onward, increasing numbers of workers lost their jobs, with monthly losses rising to over 700,000 in January 2009 (see figure 5.1). The rate

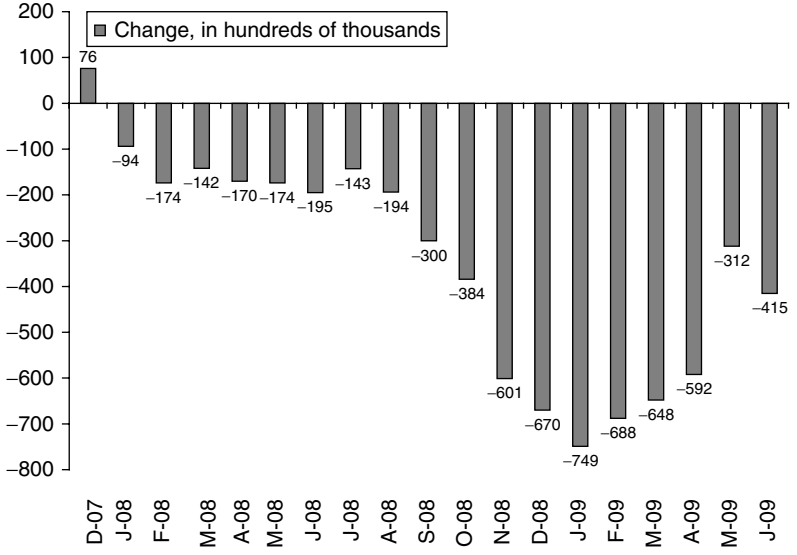

Figure 5.1 Monthly change in private nonfarm employment 12/07-6/09

Source: U.S. Bureau of Labor Statistics

of job loss has since declined, but losses have continued into 2010. It is expected that the unemployment rate for 2010 will be around 10 percent.

Total job losses at the end of October 2009 totalled 7.3 million and will no doubt rise higher before the economy begins to recover. Because these job losses did not need to occur, the lost income and personal anguish experienced by these millions of people are part of the external costs imposed on the economy by the financial crisis.

The total of lost income from this recession will be very large. The IMF has estimated that real GDP will contract by 2.75 percent in 2009 and grow at only 1.5 percent in 2010.[5] Compared to trend GDP growth of about 3 percent, this amounts to an income loss of approximately $1.9 trillion.

The catalogue of external costs does not end there. The GSEs, which bought large amounts of nonprime RMBS in their attempt to get in on a good thing, continue to take severe losses to their portfolios. As house prices continue to decline and more homeowners find themselves with negative equity, they will also experience losses on the huge portfolios of RMBS that they have insured. Because the government now explicitly guarantees the GSEs, these losses are shifted from the originators and purchasers of these securities to the federal government. The IMF estimates that cumulative losses at the GSEs will total $250 billion.[6] Hence a big part of the economic costs created by reckless mortgage originators and securitizers will be borne by taxpayers, rather than the parties who profited.[7]

There also has been a huge amount of loss shifting via the Deposit Insurance Fund, which is used by the FDIC to pay off depositors when insured banks fail. The biggest single cost to the Fund so far has been the takeover of IndyMac, which is expected to cost around $9 billion. Downey Financial cost another $1.4 billion.[8]

It is too early to tell how much other aspects of the financial rescue efforts will cost taxpayers, but the amounts could be painful. Together the Federal Reserve, Treasury, and FDIC have guaranteed over $400 billion in assets at Bank of America

and Citigroup. The Treasury and the Federal Reserve also are exposed to losses on its loans to AIG, and to the Maiden Lane SPV holding some of Bear Stearns' assets.

However one wishes to total all these costs, there can be no doubt that they are so large that the financial intermediaries who produced them would have acted far differently had they been forced to internalize the potential costs of their actions.

5.3.2 Inefficient Allocation of Capital

In addition to imposing the costs of lost jobs, reduced GDP, and the financial system rescue on others, the decisions of those firms that played the nonprime mortgage game produced another type of inefficiency. Financial intermediaries have an important role to play in a market economy. They help to allocate scarce financial resources among competing uses. The credit that they extend and the assets that they buy help to determine the economic future, because they influence the size and composition of the economy's future stock of productive capital.

Judged by the capital allocation that went on during the bubble period, many important U.S. financial intermediaries were grotesque failures. By originating over $4 trillion of nonprime mortgages between 2002 and 2007 alone, financial intermediaries allocated approximately 28 percent of 2008 U.S. GDP to the process of financing (and refinancing) nonprime mortgage loans.

The large and continuing losses on this investment are difficult to measure, because most data are proprietary, and not all of these mortgage will ultimately go bad. But what we do know is not encouraging. The IMF has estimated that during 2007–2010 U.S. losses on mortgages and RMBS will total more than $1.3 trillion.[9] Not all of these losses are nonprime-related, because the bursting of the house price bubble is affecting prime borrowers in large numbers.[10] But it is useful to compare these expected losses to what could have been purchased with an equivalent amount of finance. The American Society of Civil

Engineers has estimated that bringing the U.S. infrastructure up to standard—i.e., fixing and updating deteriorating water, electrical and transportation systems —would cost approximately $2.2 trillion.[11] So the $1.3 trillion in losses, usefully deployed, could have funded much of the repair needed by the failing U.S. public infrastructure. There can be no doubt that such an effort would have been incredibly productive, raising the effectiveness of transport, electrical, communication, and water systems, reducing the cost of doing business, and improving the lives of millions of citizen. Clearly the smart players in the nonprime mortgage market were grossly inefficient from a social point of view.

This extreme allocative inefficiency is one reason it is hard to accept a very popular explanation for the financial crisis. According to the "global savings glut" explanation, the crisis was caused by the decision of China and other economies to fix their exchange rates at relatively low levels. This stimulated exports, and gave these economies balance of trade surpluses. The United States, a major importer of their goods, got to buy them at a low prices. But at the same time the United States ran balance of trade deficits with these economies. To prevent these trade imbalances from exerting downward pressure on the dollar, which would have helped to eliminate the imbalances, China sterilized the dollar inflows and invested their currency reserves in U.S. Treasury bonds. These financial investments put downward pressure on U.S. long-term interest rates. The existence of these low rates caused financial firms to engage in financial innovation, such as structured finance, and to support the house price boom in order to increase profits.

There are a couple of problems with this explanation. First, real long term interest rates were not remarkably low during the house price boom.[12] But even if real interest rates had been abnormally low as a result of foreign asset purchases, it is not clear how that was a sufficient condition for a wave of speculative finance. Many large, sophisticated financial institutions had a world of other choices. Their decisions were certainly necessary to the process.

5.3.3 Amplification of Moral Hazard

In addition to negative externalities and inefficient allocation of capital, this financial crisis has increased the likelihood of future crises. Since the current crisis began, the federal government has taken unprecedented steps to prevent a deep recession from turning into something far worse. Although much can be said about the specific actions taken, there is little doubt that steps had to be taken to preserve the stability of the overall economy. However, the process of avoiding calamity has meant that an extraordinary amount of resources have been expended to preserve important, large financial firms that were deemed "too big to fail." This decisive action has provided an important lesson to large, important financial firms: if you fail, you will be rescued by a government that really has no choice in the matter.

Of course not all firms were rescued. Bear Stearns was quickly merged with JPMorgan Chase, and Lehman Brothers was allowed to go bankrupt. However, AIG and large banks such as Citigroup and Bank of America have been extended almost unlimited support, and it is pretty clear that effects of the Lehman failure means that normal bankruptcy procedures will not be followed in the future. Moreover, as the rescue has unfolded, the consequences for the management and highly paid employees of the rescued firms have been relatively mild. Many directors and managers have retained their jobs, and limits on compensation that were imposed on recipients of TARP funds have been lifted as those funds have been repaid, even though many other significant support programs remain in place.

Now that important financial firms know the almost unlimited scale of their insurance, we are faced with a "moral hazard" problem of historic size.[13] These firms will be tempted to take highly risky actions, knowing that public funds will prevent the immediate failure of their enterprises, and may be used to preserve them as going concerns. The federal government has yet to address the moral hazard problem created by its financial

rescue efforts. Failure to do so will affect the behavior of all financial firms that realize they are too important to fail.

5.4 Goodbye to All That: Narratives of Efficiency and Full Employment Equilibrium Meet Reality

The unfolding of this financial crisis has done damage to widely accepted views about how financial markets work. At its core contemporary financial theory depicts asset markets as a Darwinian system policed by financial "sharks." Individuals may get things wrong, or act on irrational impulse. But large, well-informed, and well-financed sharks will take complete advantage of every available opportunity to extract profits by trading assets. Relative prices are forced to reflect underlying economic fundamentals. The existence of one effective arbitrageur is, in theory, enough to get this result.[14]

A standard example of the power of arbitrage is the "spot" or current market for currencies. If the dollar currently exchanges for 100 yen, and the British pound currently exchanges for 150 yen, then the pound must exchange for $1.50. Otherwise an arbitrageur could make a killing. If, for example, the dollar exchanged for one pound, then we could buy a pound, exchange it for 150 yen, and then exchange the 150 yen for $1.50. Voila, a money machine. Clearly the relative prices of these three currencies would need to change to eliminate the arbitrage opportunity. Because the spot market for foreign exchange has lots of well-informed, profit-hungry, and well-funded traders, the change in relative prices would be forced very quickly.[15]

In this view of the world, financial markets are self-regulating and stable mechanisms. However, it is evident that the power of arbitrage—even though it may be real and important in most financial markets at most times—is not without limit. In a market where very large short-term profits can be made by creating and trading assets that are carried along on a wave of speculation, arbitrage can fail to bring those asset prices into conformity with underlying economic realities for very long periods of time.

The current financial debacle is a clear example of this. During the house price bubble, nonprime RMBS and their derivatives were commanding prices that were well above their long-term value. There was widespread recognition that housing prices would not in fact rise forever, and that when they ceased rising or began to decline, the losses on nonprime mortgages and the assets they supported would be very large. Yet many important firms held large, unhedged concentrations of these assets, and there were very few sharks circling in the water. Some hedge funds did take short positions in nonprime assets, and when prices collapsed in 2007 they were very richly rewarded. But there is no evidence that they were important in forcing a change in price. It is apparent that we need to abandon the comforting idea that in financial markets prices always and everywhere are "no arbitrage" prices.

The impact of the financial crisis on the real economies—on output and employment— also presents an uncomfortable counterexample to some very standard ideas of orthodox macroeconomics. Competitive equilibrium business cycle theory views the aggregate economy as a stable mechanism that produces trend growth in output and output per capita. Fluctuations around that trend, or shifts in the trend, are usually explained by appealing to effects of economic "shocks." Markets for goods and labor are assumed to clear continuously, so that there is always full employment of resources. The shocks identified as the causes of fluctuations come in lots of varieties—unanticipated changes in the money supply was a big favorite for many years among "new classical" economists, changes in production technology is still in vogue for those who are fans of "real business cycle" theory. These shocks do have something in common, however. They are not generated by the economic behavior of households and firms. Instead they are produced by the actions of non-economic agents—by government policy changes or by changes in technology delivered by scientific discovery. The thing that causes economic fluctuations is exogenous, acting on the stable market mechanism from the outside.[16]

The current recession, however, was quite clearly generated by the decisions of bona fide economic agents, who made them over the course of several years. Households borrowed trillions of dollars in the form of nonprime mortgages. Reckless lenders—including mortgage banks, investment banks and commercial banks—provided the funds for those mortgages. Homebuilders ramped up production to meet the steady demand for new houses. Home buyers ultimately stopped bidding up the price of houses, the house price bubble burst, and important financial firms experienced very large losses. These events produced the financial crisis endogenously, that is through the operations of market forces, and not by externally generated shocks.

Moreover, it is hardly convincing to say that the financial crisis has left the economy in full employment equilibrium. By reducing the availability of credit and creating great uncertainty among households and both financial and nonfinancial firms, the crisis has caused the most severe recession in the postwar period. Demand has declined, and output and employment have contracted. The millions of people who have lost their jobs since the recession began in 2007 have not suddenly decided that they should opt for leisure now and work more some other time. The supply of willing labor has exceeded the demand for it for some time now, and the gap has been growing during the 2008–2009 period.

Keynesians have an easier time explaining the development of the financial crisis and its impact on the real economy. Hyman Minsky, for example, joined Keynesian views on the determination of output and employment to an explanation of business cycles that he called the "financial instability hypothesis."[17] In his view, downturns in the real economy are caused by financial crises, and these crises are caused by changes in the way that firms use debt to finance their activity. After a downturn, when an economy is beginning to expand and economic conditions are favorable, nonfinancial firms take a wary approach to leverage. They try to have keep debt at safe levels, so that even if cash flows decline below anticipated levels, debt payments will be covered. He calls this "hedge" financing.

However, as economic expansion continues, greater leverage becomes acceptable, and this in itself pushes up asset prices. Financial innovation also makes it easier to borrow, which also boosts asset prices. This leads firms to engage in "speculative" financing, in which short-term obligations can be met only by additional borrowing, although long-term debt commitments are supported by longer term income flows.

The crisis is caused when speculative borrowers, because of some change in the economic environment, such as rising borrowing costs, can meet their payment obligations only by borrowing increasingly more and raising their debt levels. This is "Ponzi" finance, which can only go on for limited periods. When significant Ponzi firms fail, a financial crisis begins, credit contracts and real output and employment are reduced.

The Minsky taxonomy does not fit this crisis perfectly. Many nonprime borrowers, whether they knew it or not, were engaged in Ponzi finance of their mortgages. The firms that used leverage and experienced concentrated nonprime losses were financial intermediaries, rather than the nonfinancial firms on which he focuses. And the trigger for the financial crisis was not a change in borrowing costs, but the downward revaluation of nonprime mortgage assets that followed the bursting of the price bubble. Nevertheless, his emphasis on mispricing of assets by highly leveraged actors, the effects of aggregate demand on employment, and the endogenous nature of the downturn provide a good starting point to explain the downturn that began at the end of 2007.

5.5 The Government Did It

Although the facts confirm that this crisis was created by market forces, some economists have a strong aversion to the idea that market systems can do themselves in. Hence it is to be expected that they continue to search for exogenous explanations of the crisis. Nor is it surprising that their explanations often treat government actions as the primary cause of any

crisis, since their romantic view of markets is often paired with a distaste for government involvement in economic matters.

The Federal Reserve's decision to keep short-term interest rates at a low level during 2002–2006 is sometimes said to have caused the house price bubble and therefore the entire financial crisis. Those advancing this view maintain that a less expansive monetary policy—one which followed the so-called Taylor rule more rigorously—would have prevented the difficulties we have experienced.

Unfortunately, it is difficult to square this argument with the facts. First, the timing is off. We have seen in Chapter One that the house price bubble began to form in 1997, well before the Federal Reserve adopted its expansionary policy stance. So there are years of significant house price not explained by policy. Second, low short-term rates did not translate into especially low long-term nominal or real interest rates during the 2002–2006 period. Hence it is not possible to claim that demand for houses was caused by the low cost of mortgage borrowing. Third, evidence from other countries is inconsistent with the claim that short-term policy rates explain the presence or absence of house price bubbles. Cross-country statistical evidence shows that there is virtually no correlation between monetary policy conditions—as measured by real policy rates or deviations from the "Taylor rule"—and house price bubbles during the recent period. We know, for example, that the United Kingdom had high real interest rates, but large house price increases, while Canada and Germany had low real interest rates but no house price bubble.18

Of course, monetary policy could have suppressed the house price bubble. A sharp increase in short-term rates could have produced declines in output and employment which, if large enough, would have reduced demand for houses along with everything else. Doing so, however, could have had really unpleasant consequences. The 2001–2007 business cycle expansion was weak compared to other postwar expansions. Employment growth and investment demand were sluggish. There was significant worry that the economy might slip into

deflation. Moreover, there is no sound reason for trying to mitigate financial excess by slowing the operation of the entire economy. Policy instruments targeted directly at preventing financial excess are far more reasonable.

Another government-centered explanation for the crisis blames the Community Reinvestment Act (CRA).[19] The CRA is designed to encourage depository institutions to help meet the credit needs of the communities in which they operate, including lower-income neighborhoods, in a manner consistent with safe and sound banking operations. Banks must keep records of their CRA-related activities, and their primary supervisors conduct CRA examinations. Information on CRA performance is made public, and is considered when regulators review applications for mergers, acquisitions, and branching. The CRA is said by some to be the cause, or an important cause, of the financial crisis because it forced banks to make large numbers of highly risky mortgage loans to low income households.[20] Without the CRA, no risky loans to poor people, hence no subprime lending debacle.

These claims cannot stand up to scrutiny. Consider first the scope of lending that is actually reached by the CRA. It applies to depository institutions and the geographical areas that they serve. If a bank holding company has a mortgage lending subsidiary, it has the option of including the subsidiary in its CRA calculations, but it need not do so. Mortgage brokers and mortgage bankers, because they are non-depositories, are outside the scope of the CRA.[21] Hence if forced nonprime lending by CRA-covered depositories were the wellspring of the financial debacle, these banks would have been highly concentrated in nonprime mortgage lending.

A close look at the data shows that CRA-covered institutions in fact made a very small proportion of subprime loans. According to a Federal Reserve study, which looks at Home Mortgage Disclosure Act (HMDA) data for 2006, only 10 percent of all mortgages were made by banks and their affiliates to lower-income households located in their CRA assessment areas.[22] Moreover, only 6 percent of all HMDA higher-priced

loans (i.e., nonprime) loans were made by CRA-covered depositories or their affiliates to lower-income borrowers or neighborhoods in their assessment areas.[23] The study also notes that the performance of CRA-related mortgages is approximately the same as that of mortgages of similar type originated by other lenders, and that banking institutions collectively bought only a small proportion of higher-priced mortgages originated by independent mortgage companies. Hence there is no reason to believe that the effects of the CRA can explain the course of the financial crisis.

Another version of "the government did it" singles out the mortgage GSEs as the major culprit. We have already seen that the GSEs have large exposures to nonprime mortgages, both through their purchases and guarantees of subprime and Alt-A RMBS, and through their own securitizations. However, the losses that have precipitated the financial crisis are not related to GSE purchases or guarantees. The losses on subprime mortgages and CDOs that damaged Citibank, the investment banks, and AIG are all caused by privately securitized RMBS. If their losses had been insured by the GSEs there would be no crisis, although losses would have been concentrated there. So any attempt to tie private losses to the GSEs needs to explain how the GSEs were central to sustaining nonprime lending.

One way to do that is to show that private nonprime lending could not have existed absent support from the GSEs. Since the vast majority of subprime loans were privately securitized and sold to large numbers of private buyers, this is a difficult argument to make. One creative attempt to sidestep this fact is to assert that, because the GSEs were large-scale purchasers of the AAA-rated securities issued by subprime trusts, they were central to the functioning of the private RMBS markets. Thus Wallis and Calomiris write that

> [a]lthough a large share of the subprime loans now causing a crisis in the international financial markets are so-called private label securities—issued by banks and securitizers other than Fannie Mae and Freddie Mac—the two GSEs

> became the biggest buyers of the AAA tranches of these subprime pools in 2005–2007. Without their commitment to purchase the AAA tranches of these securitizations, it is unlikely that the pools could have been formed and marketed around the world. Accordingly, not only did the GSEs destroy their own financial condition with their purchases of subprime loans in the three-year period from 2005 to 2007, but they also played a major role in destroying the solvency and stability of other financial institutions in the United States and abroad.[24]

There are several weaknesses to this argument. Most obviously, the authors present no evidence to establish the size or share of GSE purchases of AAA subprime securities. The quotation above relies on Congressional testimony by OFHEO director James Lockhart before the Senate Banking Committee to establish that "the two GSEs became the biggest buyers of the AAA tranches of these subprime pools in 2005–2007." But what Lockhart says in his testimony is something different:

> [i]n 2006, Fannie Mae and Freddie Mac were losing market share to Wall Street private label MBS (PLS). There is a certain irony that one of the ways [the GSEs] prevented their market share from falling even farther was that they became the biggest buyers of the AAA tranches subprime and Alt-A of these PLS [*sic*].[25]

Lockhart's testimony provides no data on the actual share of GSE purchases in 2006, says nothing whatever about purchases in 2005 or 2007, and does not explicitly say that the GSEs were the largest purchasers of subprime AAA (as opposed to being the largest purchasers of subprime and Alt-A combined). So we are left to guess the actual importance of GSE purchases for subprime securitizers during 2005–2007.

Moreover, even if the GSEs were buying a big fraction of subprime AAA securities, their purchases were essential to the operation of this market only if these securities could not

have been sold to others. But is hard to see why we should believe this. Not all AAA tranches were bought by the GSEs. So if the GSEs had exited the market for these securities, why would there be no other buyers? Could price declines have attracted additional demand? If the price of these securities had declined in order to attract non-GSE buyers, would that have made securitization pools unprofitable? These questions are not addressed, and they certainly must be answered for the authors' counterfactual claim to have any credibility.

In fact the existence of a strong market for subprime CDOs suggests that there were potentially many other buyers for AAA subprime securities. At the same time the GSEs were buying them, there was very strong demand for structured securities that were believed to mimic the characteristics of AAA subprime RMBS. The AAA tranches of subprime CDOs, which were constructed from lower-rated subprime RMBS, did not lack for buyers. Indeed, it was owners of AAA-rated subprime CDO securities—who had bought CDS protection from AIG—who were bailed out by the government rescue of AIG.

5.6 Regulatory Restructuring to Prevent Future Instability

Given that financial market participants produced this financial crisis, they are fully capable of producing another one. The financial regulatory system in its current form is unlikely to be able to prevent it. Therefore we have a compelling need to think about how a better regulatory system can be constructed.

5.6.1 Too Big to Fail

The concentration of nonprime mortgage losses in several large, complex, interconnected, and highly leveraged financial firms nearly destabilized the world financial system. Bear Stearns, Lehman Brothers, AIG, Citigroup, and Bank of America were either demolished or gravely wounded by their losses. The

actual or potential insolvency of these firms—because of their scale, centrality to particular financial markets, or the density of their relationships with counterparties— disrupted financial markets to a degree not witnessed since the Great Depression. The effects of these disruptions on the real economy—to say nothing of the fear that additional failures could cause a complete financial crash—compelled the construction of costly ad hoc rescues and market support schemes.

We now have evidence that large, complex, interconnected and highly leveraged firms cannot be allowed to fail as other unsuccessful businesses normally do. The losses that bankruptcy inflicts on their creditors, and the disruptions that it can bring to the payments system, can cascade through financial markets, bringing chaos. After the crisis began the markets for asset-backed commercial paper, commercial paper, and interbank lending all needed resuscitation, and regulators had to step in to stop a run on money market mutual funds. The effects of these disruptions, and an accompanying reduction in commercial bank lending, have caused the serious downturn in the real economy. Under present circumstances our economy is clearly saddled with financial firms that are "too big to fail (TBTF)." If we are to avoid a repetition of this crisis in the future, we need to remove the threat caused by these TBTF firms.

There is a straightforward approach to the problem of TBTF, suggested by elementary microeconomics: force the TBTF firms to internalize the external costs that their operations shift onto the rest of the economy. In essence, tax the TBTF so that their costs include the crisis costs they impose on the rest of the economy. In the case of a factory emitting pollution, an appropriate per unit tax on output would force the firm to take account of the costs being borne by others. By raising the costs of doing business, the firm's level of output is reduced and prices reflect all the costs of production. In the case of the TBTF firms, a tax that reflected the enormous social costs of financial crises would force them shrink themselves dramatically.

A little arithmetic will show the likely impact of a realistic "instability tax." We have already calculated that the failures of

TBTF firms in 2008 generated externalities that will probably reach $2 trillion. Let us assume that the 19 large financial firms included in the 2009 "stress tests" conducted by the Federal Reserve and Treasury represent the universe of remaining TBTF firms. According to the results of the stress test, those 19 firms will have a total of $363 billion in pre-provision net revenue available to cover losses during 2009–2010.[26] Since this is the revenue stream corresponding to an "adverse" macroeconomic scenario, it is likely to underestimate the revenue generating capacity of these firms when the economy returns to normal. So let us assume that revenues for these firms would double from 2010 onward. Under these conditions the 19 firms would need to allocate all of their net revenue for the next 5.5 years in order to cover the costs of the next big financial crisis. It is hard to imagine that any of these firms would survive if they were forced to pay taxes at this level.

These calculations are of course imprecise. The number of systemically important firms may be larger, or the external effects may be off by plus or minus a trillion. Nonetheless they do suggest that the continued operation of the large, complex financial firms under current arrangements is not economically justifiable. Their capacity for producing harm exceeds their ability to pay for it.

The obvious way to deal with this ongoing problem is to dismantle the TBTF firms. Joseph Stiglitz, for example, has suggested that the TBTF banks must be moved back toward the "utility" banking model embedded in the Glass-Steagall Act.[27] He proposes, for example, restrictions on risk-taking, elimination off-balance-sheet activities, and other steps that would force banks to restructure and downsize. Presumably the size of investment banks, hedge funds and other inherently complex firms would also need to be limited. A similar approach, which would rely on new antitrust standards that take account of the stability implications of size and complexity, has been advocated by Simon Johnson.[28]

While eliminating the threat to financial stability by shrinking and simplifying the firms that are TBTF has a compelling

logic, it is not clear that it will carry the day among policy makers. The TBTF firms remain big and powerful, and will resist attempts to change their businesses. So the question remains whether a changed set of financial regulations could reduce the risks of TBTF sufficiently to justify their continued operation. Several elements of this Lilliputian regulatory strategy have been discussed.

One suggestion is to give regulators new authority to shut down large failing firms in an orderly manner. With the exception of deposit-taking banks currently subject to FDIC authority, regulators lack a formal resolution mechanism other than bankruptcy for winding up an insolvent financial institution. Because bankruptcy can be time-consuming, this lack of resolution authority might be part of the explanation why TBTF firms have been reckless, and their creditors are not more wary: knowing that regulators must choose between chaotic outcomes (see Lehman) or providing an expensive rescue (see AIG), they have bet on the likelihood of rescue.

However, a new resolution mechanism in itself will not affect the behavior of the TBTF firms if they do not believe that it will be used. Events that have unfolded during this crisis argue that regulators would be extremely reluctant to employ it, even if it were available. Although the government lacked a formal resolution mechanism for Chrysler and General Motors, it certainly acted as if it had one de facto. While the restructuring of these corporations was conducted through "pre-pack" bankruptcy procedures, the federal government determined the pace and direction of events. It replaced board members and executives, and negotiated terms with creditors and unions. In effect the government used its powers of resolution to produce potentially large changes in U.S. manufacturing output and employment.

From a logical point of view, there was nothing to stop the Federal Reserve and Treasury from acting in an analogous manner with respect to any of the failing TBTF financial firms. Instead, they have proceeded very tentatively following the failure of Lehman. While AIG shareholders have been

wiped out, the losses of Maiden Lane II & III will be borne by the government, while the holders of AIGFP's CDS contracts on subprime CDOs have been made whole. Citigroup and Bank of America have received large and continuing subsidies, and there have been slow board and executive changes at these banks. Giving regulators de jure resolution authority is unlikely to convince TBTF firms or their creditors that it will be used, given the way that de facto resolution authority has been used in this crisis.

Another suggestion for reducing the threat caused by TBTF firms is to establish stricter capital, leverage, and liquidity requirements which will give the firms greater resources to handle losses. At present banks are required to hold capital in relation to risk-weighted assets that are held on their books. In response, banks have used financial engineering to reduce capital requirements without actually reducing their exposure to losses. The off-balance-sheet SIV losses that have damaged Citibank are an example of how this has worked in the past. So it is reasonable to expect that increased capital requirements will be met with new forms of financial engineering or accounting legerdemain.

To tilt this cat-and-mouse game in the direction of regulators, capital requirements would need to be assessed with rigor, and off-balance-sheet holdings would need to be brought onto the balance sheet. It has been suggested that higher capital requirements should be augmented by hybrid debt securities that would convert to equity in times of systemic crisis. This would cancel debt and give banks greater net capital in times of emergency. If the amount of required hybrid debt were large enough, banks could be recapitalized quickly and without the disruption that attends even FDIC-executed resolutions. In addition, less risky firms could issue their hybrid securities at lower cost, which would provide incentive for better risk management.[29]

The history of events leading up to this financial crisis argue that a successful Lilliputian regulatory strategy will be difficult to implement. Giving regulators new resolution authority does

not give them the will to use it. The difficult-to-predict fallout of even a swift and controlled shutdown of a TBTF firm will weigh heavily on the calculations of any regulator. The effectiveness of new capital and leverage requirements depends on the levels at which they are set. The arguments against any amount of increase—pointing to lost efficiency and reduced international competitiveness—will be deployed with speed and zeal by bank representatives. Once the economic world returns to normal, there will be calls to roll back increases. However, unless the TBTF firms are truly forced to internalize their negative externalities, the threat they pose to financial stability is likely to grow in the future.

5.6.2 CDS and Other Over-the-Counter Financial Derivatives

Over-the-counter (OTC) financial derivatives, in the form of CDS, have played an important role in the current crisis. CDS are bilateral contracts, often written by banks or other large financial institutions, and prices are determined by negotiation and not centrally reported. The conditions that trigger payment on the part of a CDS writer are part of a contract, and default is remedied under contract law. All this makes CDS an instrument that is hard to monitor. It is hard to know who has large net concentrations of CDS obligations or whether they have the capital to make good on the contracts they have written. Nor is it obvious who is relying on CDS to insure their positions. At the recent peak there were about $68 trillion in CDS outstanding. This is far more than the outstanding value of all debt securities in the world. So there is huge realm of financial activity that is invisible to regulators.

The demise of AIG occurred in large part because allegedly risk-free subprime CDO securities, insured by CDS written by its AIGFP, were drastically devalued. When AIG was called on to post collateral to cover these losses, it lacked the capital to do so and insolvency followed. Because those CDS were

held by large and complex financial institutions, AIG's failure to make good on its guarantees could have inflicted losses that would have intensified the financial crisis. This led the Federal Reserve and Treasury to step in with a massive rescue that socialized the losses of AIG's counterparties.

There is a fairly straightforward way to reduce the accumulation of risk that OTC trading in derivatives allows. Wherever possible, derivative trading should be moved onto regulated clearing houses, which become the central counterparty in every transaction that it clears. The clearing house should be required to meet strong capital requirements, and buyers and sellers of derivative contracts should be required to post adequate initial and variation margins. The existence of a central counterparty, backed by adequate capital, will mitigate the effects caused by the failure of a large trader, since losses will be covered and complex contracts will not need to be unwound. More stringent capital and margin requirements should be required for OTC derivatives. This will make it more difficult for future AIGFPs to develop large one-way bets that could destabilize markets, since it would become more expensive to do so. Heightened capital and margin requirements will also provide an incentive for trading to migrate to clearing houses.

The informational problems that have kept regulators in the dark about derivatives markets also need to be corrected. Data on both cleared and OTC derivatives need to be collected and made readily available to regulators, so they can identify developing risk concentrations.

To increase derivatives market efficiency, every effort should be made to disseminate the prices of cleared trades as widely as possible. Wherever possible derivative trades should be executed on exchanges. Movement in the direction of price transparency will of course harm the profits of the large OTC derivatives dealers, since it will give buyers and sellers information that they currently lack. Such a change, however, will improve the overall functioning of derivatives markets.

5.6.3 Credit Rating Agencies

The failure of the credit rating agencies to understand and give reasonable ratings to nonprime RMBS and CDOs had serious consequences. Because ratings are written into banking regulations, the poorly executed ratings caused banks to reserve less capital to cover these assets than was warranted. Investors, such as pension funds, that have their decisions guided in part by ratings, were likely to have been led astray as well.

These failures have focused attention on the conflicts of interest inherent in the agencies' "issuer pays" business model. When there are large important ratings buyers, who are few in number, there is obvious pressure to give them the ratings they want. And when there is consulting income to be earned by helping to structure deals, the pressure is greater.

We have seen these problems before, with respect to the major accounting firms. After the Enron scandal, the remedy was to leave the accounting version of issuer pays in place, require the divorce of accounting and consulting, drastically increase oversight of accounting firms through the creation of the Public Company Accounting Oversight Board (PCAOB), and increase the personal liability of key officers at reporting companies for inaccurate disclosure to accountants. Accounting firms have retained their civil liability for faulty accounting reports.

It is possible to imagine a similar approach to credit rating agencies. For example, financial regulations might require that the only usable ratings for regulatory purposes are those done by firms that explicitly accept liability for demonstrably negligent ratings. Required disclosure of the data and methods used would make the liability threat real. A version of PCAOB could be set up to monitor ratings methods, with the authority to do things such as block rating of structured products without the statistical history to make ratings meaningful. Such changes should make them more effective.

However, it may be wiser to admit that, because of the inherent conflicts of interest, agency ratings should no longer be included in financial regulations. This would require banking,

securities and other regulators to develop other risk measures for assets. Given the abysmal failure of the rating agencies, that effort should begin now.

5.6.4 Mortgage GSEs

Fannie Mae and Freddie Mac, the mortgage GSEs, performed miserably during the house price bubble. Although they received implicit government backing in exchange for improving the functioning of mortgage markets and making home ownership more affordable, their actions during the bubble were not consistent with those goals. In pursuit of profit they invested in and guaranteed nonprime mortgage assets, following the market rather than warning against the developing dangers. Moreover, the billions in losses their actions created will be paid for by taxpayers.

If the GSEs are to serve a useful function in the future, the conflict of interest between private profit and public policy goals needs to be eliminated. If the GSEs once again became public utilities, which securitize and guarantee only mortgages that meet standards for transparency, fairness, and underwriting accuracy, they could influence market behavior while reducing costs for borrowers. Before making a commitment to preserve the GSEs, even in this altered form, it would of course be useful to determine whether home ownership is a socially important goal.

5.6.5 Consumer Financial Products Protection

One of the reasons that predatory lending flourished during the subprime bubble is that financial contracts are often difficult to understand. Survey research has shown that many consumers do not understand the contractual terms and costs of credit card agreements and mortgage loans. It is unlikely that payday loans, insurance contracts, or reverse mortgages are better understood. A Financial Products Safety Commission (FPSC), long advocated by Professor Elizabeth Warren, has been advanced

as a way to eliminate abuse of consumers in credit markets and make those markets more efficient.[30]

For example, the FPSC could be given the authority to establish basic safety rules for contracts—such as whether the terms are clearly spelled out and the contract can be read by a consumer in four minutes or less. This would allow comparison across products, and would probably reduce the popularity of exotic products—such as hybrid ARM mortgages—once borrowers had a clear idea of what they entail. The FPSC could also be given the authority to prohibit consumer financial contracts that will produce unfair and abusive outcomes. It could also have the authority to ban business incentives that work to the significant disadvantage of consumers—such as the yield spread premium offered to mortgage brokers who moved prime customers into subprime loans. Given sufficient enforcement authority, a FPSC would have been able to diminish the wave of nonprime mortgage lending.

5.7 Conclusion

We have seen the destruction that a financial crisis can cause in a very short period of time. These, and possibly more serious harms to people and the economy, need to be avoided. In addition, we need to avoid the allocative inefficiency that accompanies the crisis-producing process. While sophisticated financial actors were creating all those nonprime mortgage assets and derivatives, they were doing a wretched job of allocating economic resources. Instead of directing finance to productive projects, they were funding speculative assets purchases that transferred wealth and encouraged a transitory consumption binge. This has caused a lasting setback to the economy as a whole.

The twin problems of instability and inefficiency need to be addressed effectively. The regulatory measures discussed in this chapter, which are all part of the current public debate in some form, may go part of the way toward fixing them. Whether

any of them are adopted by policy makers, and whether any of them proves to be more than grit in the gears of future speculative excess, remains to be seen. Whatever is done or not done will have important implications for the evolution of the U.S. economy.

NOTES

One: The Building Blocks of the Financial Crisis

1. Definitions of subprime mortgages differ across data sources. The U.S. Department of Housing and Urban Development (HUD) defines subprime loans on the basis of lender practices. HUD maintains a list of lenders who have lower origination rates, have a higher share of refinance loans as a proportion of their originations, sell a small percentage of their loans to Freddie Mac and Fannie Mae, and lend at high interest rates. See HUD Subprime and Manufactured Home Lender List, at www.huduser.org/datasets/manu.html. In its supervisory guidance the Federal Reserve has defined subprime loans in terms of borrower characteristics such as previous delinquencies, credit score, and debt service to income ratio. See Federal Reserve Bank of St. Louis (2007), What Is Subprime Lending? *Monetary Trends*, June. In its published analyses of Home Mortgage Disclosure Act (HMDA) data, the Federal Reserve focuses on loans that meet the HMDA statutory definition of "higher priced." See R. Avery, K. Breevort, and G. Canner (2007), The 2006 HMDA Data, *The Federal Reserve Bulletin*, December, A73–A109. There is a high correlation between HUD-defined subprime and higher-priced loans. Much of the data on nonprime lending comes from industry sources such as Loan Performance, which collects information on subprime securitization pools. For a description of the loans held in industry-designated subprime pools see K. Gerardi, A. Lehnert, S. Sherland, and P. Willen (2008). Making Sense of the Subprime Crisis, Federal Reserve Bank of Boston, Public Policy Discussion Paper No. 09–01.
2. A FICO score is a quantitative index, based on a person's credit files, that is designed to measure creditworthiness. It was originated by the Fair Isaac Corporation.
3. Interest rates on adjustable rate mortgages are determined by adding a margin to some interest rate index, such as LIBOR. That add-on amount is given as "gross margin" and it is measured in basis points. So a margin of 582.6 would add 5.826 percent to LIBOR to determine the adjustable interest rate on the mortgage.
4. Inside Mortgage Finance (2008). *The 2008 Mortgage Market Statistical Annual*, Bethesda, MD: Inside Mortgage Finance, 3.
5. Conforming loans cannot exceed a maximum value set by the Federal Housing Finance Agency (FHFA). In addition, the GSEs require that risk indicators such as the loan to value ratio, borrower payment to income ratio, and borrower credit ratings meet certain target values. In practice this means that most, *but certainly not all*, of the loans that the GSEs securitized or held on their balance sheets were made to borrowers with "prime" credit ratings, required payments that could be supported by borrower income, and had

a loan to value ratio less than 80 percent. Fannie Mae's 2008Q1 SEC filing indicates that the weighted average FICO score for single family loans was 721, and the weighted average original loan to value ratio was 71.7 percent. See www.fanniemae.com/media/pdf/newsreleases/2008_Q1_10Q_Investor_Summary.pdf .

6. The trends in these measures of underwriting standards are discussed and illustrated graphically in Gerardi et al. (2008), Figure 3 and Table 2.
7. If a loan includes a prepayment penalty the LTV would need to be less than 100 percent for a no-loss sale or refinance option to exist.
8. Y. Demyanyk and O. Hemert (2008). Understanding the Subprime Mortgage Crisis, February 29, available at http://ssrn.com/abstract=1020396.
9. Gerardi et al. (2008) also argue that changes in observable risk factors alone cannot explain deteriorating subprime loan performance.
10. G. Dell'Arricia, D. Igan, and L. Laeven (2008), "Credit Booms and Lending. Standards: Evidence from the Subprime Mortgage Market," IMF Working Paper; A. Mian and A. Sufi (2008). The Consequences of Mortgage Credit Expansion: Evidence from the 2007 Mortgage Default Crisis, http://ssrn.com/abstract=1072304.
11. The interest rate for a subprime ARM typically adjusts to some existing rate index, such as LIBOR, plus 5 or 6 percent. The 5 or 6 percent is the "gross margin" in figure 1.1.
12. C. Foote, K. Gerardi, L. Goette, and P. Willen. (2008). Subprime Facts: What (We Think) We Know about the Subprime Crisis and What We Don't. Federal Reserve Bank of Boston, Public Policy Discussion Paper No. 08–2, 14.
13. A. Pennington-Cross and G. Ho (2006). The Termination of Subprime Hybrid and Fixed Rate Mortgages. Federal Reserve Bank of St. Louis, Working Paper 2006–042A.
14. *Commonwealth v. Fremont Investment & Loan*, 897 N.E. 2d 548 (Mass. 2008).
15. The court enjoined Fremont from foreclosing on unfair loans without first negotiating with the Massachusetts Attorney General. Fremont subsequently entered into a settlement in which it agreed to pay $10 million in consumer relief, penalties, and costs. Fremont agreed not to foreclose on unfair loans without certain protections for borrowers, and also agreed to cease issuing unfair loans in Massachusetts.
16. R. Shiller (2005). *Irrational Exuberance*. Princeton: Princeton University Press, data for Table 2.1 as updated by the author.
17. See Gerardi et al. (2008) and Demyanyk and Hemert (2008).
18. K. Case and R. Shiller (2003). Is There a Bubble in the Housing Market? *Brookings Papers on Economic Activity*, Number 2, 299–342, 322.
19. Between 2001 and 2007, median real household income in the United States actually declined.
20. A Greenspan and J. Kennedy (2005). Estimates of Home Mortgage Originations, Repayments, and Debt on One-to-Four Family Residences, Federal Reserve Finance and Economics Discussion Series, Working Paper 2005–41, Table 2, data updated.
21. During this period about 28.4 percent was used to acquire other assets.
22. K. Dynan and D. Kohn (2007). The Rise in U.S. Household Indebtedness: Causes and Consequences. Board of Governors of the Federal Reserve, Finance and Economics Discussion Series, 07–37. The Federal Reserve researchers also note that rising house prices, interacting with financial innovations, may have further contributed to rising debt-to-income ratios.
23. The calculation of the FOR is described at http://www.federalreserve.gov/releases/housedebt/about.htm.
24. E. Gramlich (2007). *Subprime Mortgages, America's Latest Boom and Bust*. Washington, DC: Urban Institute Press, 13–18. Two Reagan-era statutes had important impacts

on mortgage lending. The 1980 Depository Institutions Deregulation and Monetary Control Act preempted state usury laws that put ceilings on mortgage interest rates. The 1982 Garn-St. Germain Depository Institutions Act increased the ability of state chartered banks and thrifts to make adjustable rate mortgages.

25. Originators often act as issuers, either directly or through subsidiaries or affiliates.
26. Inside Mortgage Finance (2008), *The 2008 Mortgage Market Statistical Annual, Volume II*, Bethesda, MD: Inside Mortgage Finance, 3–6.
27. The first two entities—the Federal National Mortgage Association (Fannie Mae), the Federal Home Loan Mortgage Corporation (Freddie Mac)—are so-called government sponsored enterprises (GSEs). Although they are for-profit corporations with listed stocks, they are subject to government oversight and have statutory constraints on their operations. See http://www.fanniemae.com/aboutfm/index.jhtml?p=About+Fannie+Mae. The Federal Housing Finance Regulatory Reform Act of 2008 has placed Fannie, Freddie, and Ginnie Mae under a single regulator, the Federal Housing Finance Agency.

    The Government National Mortgage Association (Ginnie Mae), is owned by the federal government and overseen by the Department of Housing and Urban Development, and so is not for profit.

    All three entities sponsor MBS and provide guarantees for the performance of the mortgage portfolios underlying them. Fannie and Freddie issue MBS backed by privately originated loans that meet certain criteria, while Ginnie Mae guarantees only loans that are insured by the Federal Housing Administration or guaranteed by the Veterans Administration. See http://www.ginniemae.gov/about/about.asp?Section=About.

    There is another group of GSEs that support the home loan market, but do not issue RMBS. The Federal Home Loan Banks (FHLBs) are mutual organizations open to depository institutions (and some insurance companies) with more than 10 percent of their portfolios devoted to mortgage related assets. The FHLBs are also subject to federal oversight. See http://www.frbatlanta.org/filelegacydocs/erq306_frame.pdf. They make loans to members, funded by FHLB securities that are collateralized by mortgage related and other securities held by borrowing members. The FHLB securities are generally over-collateralized, and the FHLBs have first lien on the assets of the borrowing institution should there be a default on the FHLB loan.
28. VA and FHA loans also have underwriting and size limits that differ from those of Fannie and Freddie.
29. Inside Mortgage Finance (2008), *The 2008 Mortgage Market Statistical Annual, Volume I*, Bethesda, MD: Inside Mortgage Finance, 5.
30. K. Ernst, D. Bocian, and W. Li (2008). *Steered Wrong: Brokers, Borrowers, and Subprime Loans.* Durham, NC: Center for Responsible Lending.
31. E. Gramlich (2007), 7.
32. W. Apgar, A. Bendimerad, and R. Essene (2007). Mortgage Market Channels and Fair Lending. Joint Center for Housing Studies, Harvard University, iii. This report relies on HDMA data, which identify "high-priced" mortgages, identified as loans with a price that exceeds a threshold above the rate for a Treasury Security of comparable maturity. The authors feel that the correlation between higher-priced mortgages and subprimes is sufficiently high to describe the channels through which subprime mortgages flow.
33. IndyMac was taken over by the FDIC in July 2008 after regulators determined that the bank was insolvent, and Washington Mutual was taken over by the FDIC in September, 2008 and merged into JPMorgan Chase.
34. Two of the lenders on this list—Countrywide and WMC Mortgage—were also among the top 10 subprime lenders in 2006.

35. Inside Mortgage Finance (2008), II.3–6.
36. See D. Lucas, L. Goodman, and F. Fabozzi (2006). *Collateralized Debt Obligations,* second edition. New York: Wiley, 381–410.
37. Moody's Investor Services (2007). The Impact of Subprime Mortgage-Backed Securities on Moody's-Rated Structured Finance CDOs: A Preliminary Review.
38. Synthetic CDOs use credit default swaps as underlying assets, rather than cash assets.
39. Data on CDOs from Securities Industry and Financial Markets Association (2008). *Global Market Issuance Data*; data on RMBS from Inside Mortgage Finance (2008).
40. A Moody's rating Baa and lower corresponds to Standard & Poor's BBB+ and lower.
41. Basel Committee on Banking Supervision, The Joint Forum (2008). Credit Risk Transfer Developments from 2005 to 2007, Consultative Document, April 4–5. This point is also made in J. Mason and J. Rosner (2007). How Resilient Are Mortgage Backed Securities to Collateralized Debt Obligation Market Disruptions? Working Paper.
42. Basel Committee on Banking Supervision, The Joint Forum (2008), 45.
43. Bank of America (2007). Credit Market Strategist, August 13, 6.
44. The OTS supervises savings and loan holding companies and their thrift subsidiaries and affiliates. OTS-chartered thrifts are allowed to establish branches nationwide, and OTS regulations preempt state law. Because of its role as savings and loan holding company regulator, OTS is the supervisor of entities such as AIG. See www.ots.treasury.gov/?p=HoldingCompanyOverview.
45. Washington Mutual and IndyMac were both top 10 Alt-A lenders in 2006, and Washington Mutual was also the eleventh largest subprime lender in 2006. See Figures 11 and 13 *supra*.
46. Guarantees for subprime loans are estimated as the value of guarantees extended on loans to borrowers with FICO scores less than 620.
47. Data from Fannie Mae are for the period ending 2008Q1, and those for Freddie Mac for the period ending 2008Q2. More current data are not available. The value of total outstanding subprime and Alt-A mortgage balances are estimated using data on average unpaid balances of outstanding *owner-occupied* properties collateralizing MBS in August 2008. More comprehensive data for all mortgages are not available. Fannie Mae data were obtained from www.fanniemae.com/media/pdf/newsreleases/2008_Q1_10Q_Investor_Summary.pdf; Freddie Mac data from www.freddiemac.com/investors/pdffiles/investor-presentation.pdf; and outstanding subprime and Alt-A unpaid balances were estimated from August 2008 data provided by the Federal Reserve Bank of New York at www.newyorkfed.org/regional/subprime.html.

Two: The House Price Bubble Ends, the Foreclosure Wave Begins

1. See J. Gyourko, C. Mayer, and T. Sinai (2006). Superstar Cities. Working paper, June 16.
2. Cf. K. Case and R. Shiller (2003). Is There a Bubble in the Housing Market? *Brookings Papers on Economic Activity*, Issue 2, 299–362; W. Wheaton and G. Nemchayev (2008), The 1998–2005 Housing "Bubble" and the Current "Correction": What's Different This Time? *The Journal of Real Estate Research*, Volume 30, Number 1, 1–26.
3. The Census Bureau defines a housing unit as "a house, an apartment, a group of rooms, or a single room occupied or intended for occupancy as separate living quarters," a

structure as "a separate building which either has open space on all four sides or is separated from other structures by dividing walls that extend from ground to roof, " and in tabulations "occupied mobile homes or trailers, tents, and boats are included in the category one housing unit in structure." In Census tabulations "new units not yet occupied are classified as vacant housing units if construction has reached a point where all exterior windows and doors are installed and final usable floors are in place." See http://www.census.gov/hhes/www/housing/hvs/qtr208/q208def.html. Hence when reporting vacancies for 1-unit structures, Census data include existing and new single family homes, as well as some condominiums, apartments, mobile homes, trailers, tents, and boats.

4. The average vacancy rate for the period 1985Q1–2005Q4 is multiplied by the actual stock of 1-unit structures to estimate the trend value of vacant structures.
5. V. Klyuev (2008). What Goes Up Must Come Down? House Price Dynamics in the United States. International Monetary Fund Working Paper WP/08/187, July. The inventory-to-sales ratio is statistically significant when the sample period, which begins in1982Q2, is truncated in 2008Q1 or in 2000Q4, but loses significance when the sample period is truncated in 2002Q4. The sensitivity of the statistical result to the choice of sample end point is not surprising, given that price movements during 1998–2006 were being driven largely by factors other than fundamentals. It is also important to note that "existing homes for sale" can expand and contract with homeowner decisions about putting their home up for sale. Hence if price declines cause some homeowners to take their houses off the market, the inventory sales ratio will decline. This simultaneity biases the statistical results in the paper.
6. Ben Bernanke (2007). The Economic Outlook, testimony before the Joint Economic Committee, U.S. Congress, March 28. Available at http://www.federalreserve.gov/newsevents/testimony/bernanke20070328a.htm
7. See http://online.wsj.com/article/SB118408289722162161.html.
8. Moody's Investor Service (2007). US Subprime Mortgage Market Update: July 2007, Structured Finance Special Report, July 24, 3. In an accompanying graphic, the delinquency and foreclosure rates on loans of the Fremont et al. are compared to loans originated by Countrywide, Option One, and Wells Fargo. Since 2007 Countrywide was acquired on the brink of failure by Bank of America, and Option One was shut down by its parent company H&R Block.
9. E. Schloemer, W. Li, K. Ernst, and K. Keest (2006). Losing Ground: Foreclosures in the Subprime Market and Their Cost to Homeowners. Center for Responsible Lending, December; K. Gerardi, A. Shapiro, and P. Willen (2007). Subprime Outcomes: Risky Mortgages, Homeownership Experiences, and Foreclosures. Federal Reserve Bank of Boston Working Paper No. 07–15; Y. Demyanyk and O. van Hemert (2008). Understanding the Subprime Mortgage Crisis. Working paper, February.
10. The Federal Housing Finance Agency (FHFA) house price index shows that house prices have declined 3.7 percent from their peak in value in 2007Q1. The FHFA house price index underestimates the fall in housing prices because the FHFA data are based on information from Fannie Mae and Freddie Mac and do not include information on loans that exceed the GSE price ceilings.
11. The method for estimating excess inventory is suggested in Fannie Mae (2008), Funding Notes, June 4, available at http://www.fanniemae.com/markets/debt/pdf/fundingnotes_06_08.pdf;jsessionid=WVZU35LSYKBZJJ2FECISFGI.
12. Available at online.wsj.com/public/resources/documents/info-flash08.html?project=EFORECAST07.
13. Prime foreclosures are not forecast for several reasons. First, the regressions explaining prime foreclosure rates fit less well than the regressions for subprime rates. Second, the

behavior of prime borrowers who default on their mortgages differs from subprime borrowers. Prime borrowers can enter foreclosure and then exit after bringing their mortgage current. This makes the behavior of prime borrowers harder to model than that of subprime borrowers, who are unlikely to escape foreclosure once the foreclosure process has begun.

14. Both the FHFA and S&P/Case-Shiller indices use matched pairs of houses to calculate changes in house prices. However, a recent FHFA analysis shows that the FHFA home price index is biased upward relative to the S&P/Case-Shiller index because the way the FHFA index treats refinancing and because the FHFA index uses only conventional, conforming loans. See Revisiting the Differences between the FHFA and S&P/Case-Shiller House Price Indexes: New Explanations, Office of Federal Housing Enterprise Oversight, January, 2008, 2–3, available at http://www.ofheo.gov/media/research/OFHEOSPCS12008.pdf. According to this report, much of the recent bias in the FHFA indices is due to declines in prices of lower-priced, subprime and Alt-A loans that were not financed through Fannie Mae or Freddie Mac.
15. Subprime borrowers usually do not exit from the foreclosure process once it has begun. See A. Pennington-Cross (2006), Duration of Foreclosures in the Subprime Mortgage Market: A Competing Risks Model with Mixing, Federal Reserve Bank of St. Louis Working Paper 2006–027 A, 4–5.

Three: The Credit Bubble Bursts, the Financial Crisis Begins

1. Distinguishing between insolvency and liquidity crises can be difficult when they occur, somewhat less so after the fact. The losses sustained by a firm facing a liquidity crisis should in retrospect appear to be less than the long run value of its capital.
2. Bill Gross (2008). Pyramids Crumbling, *PIMCO Investment Outlook*, January.
3. The inability of outside observers to accurately gauge the solvency of financial firms is an acute instance of what economists call "information asymmetry." Information asymmetry has been, and remains, pervasive across the financial industry. See, for example, the discussions of Bear Stearns, Citigroup, and AIG below.
4. Independent mortgage banks are subject to state regulation. Subsidiaries of bank holding companies are subject to oversight by the Federal Reserve. Subsidiaries of investment banks were overseen, after 2004, by the SEC. Thrifts, such as Countrywide Financial, are overseen by the Treasury's Office of Thrift Supervision.
5. For a partial chronology of mortgage bank failures see R. Green (2007), Lehman Shuts Unit; Toll of Lenders Tops 100: Subprime Scorecard, Bloomberg.com, August 23.
6. J. Stang, S. Uhland, S. Newman, and D. McGettigan (2007). The Subprime Lending Industry: A Look at the Restructuring of a Market in Turmoil. American Bar Association Annual Meeting, Section of Business Law, August 11, panel presentation.
7. U.S. Bankruptcy Court for the District of Delaware (2008). In re: New Century Financial Holdings, Inc., a Delaware Corporation et al., Debtors. Final Report of Michael J. Missal, Bankruptcy Court Examiner, February 29, 62–63.
8. Ibid., 106.
9. Moody's Investor Services (2008). Structured Finance Ratings Transitions: 1983–2007, February, 2.

10. I. Fender and M. Schreiber (2008), The ABX: How Do the Markets Price Subprime Mortgage Risk? *BIS Quarterly Review*, September, 67–81, 69.
11. I. Fender and P. Hordahl (2007), Overview: Credit Retrenchment Triggers Liquidity Squeeze. *BIS Quarterly Review*, September, 1–26, 3.
12. International Monetary Fund (2007). *World Economic Outlook*, 70–71.
13. Ibid.
14. Ibid.
15. The "TED spread" is the difference between the rate of interest on U.S. Treasury securities and the London Interbank Offer Rate on unsecured lending. The acronym reflects the fact that the interest rate spread reflects a Treasury/Eurodollar differential.
16. The Housing and Economic Recovery Act of 2008 created the Federal Housing Finance Agency, an agency formed from the merger of the Federal Housing Finance Board and the Office of Federal Housing Enterprise oversight. The Act gave FHFA the power to put the mortgage GSEs into conservatorship or receivership.
17. OFHEO (2008). OFHEO announces first quarter 2008 minimum and risk-based capital classification for Fannie Mae and Freddie Mac, press release. June 9.
18. Congressional Research Service (2008). Fannie Mae and Freddie Mac in Conservatorship. September 15.
19. At the end of each quarter Treasury will purchase preferred stock sufficient to eliminate any negative GAAP net worth, with a cumulative limit of $100 billion. See FHFA, Capital Disclosures under Conservatorship, www.ofheo.gov/media/capclass/2008Q3capConserve.pdf.
20. Fannie Mae. Single Family Guarantee Business: Facing Strategic Crossroads. June 27, 2005, FM-CONGR-00088741–0008878. Document produced to the Committee on Oversight and Government Reform, U.S. House of Representatives. Available at oversight.house.gov/story.asp?ID=2252.
21. Fannie Mae. Purchase of AA and A-Rated Sub Prime Private Label Securities. May 2, 2007, FM-CONGR-00094010–00094015. Document produced to the Committee on Oversight and Government Reform, U.S. House of Representatives. Available at oversight.house.gov/story.asp?ID=2252.
22. This alternative regulatory regime was established in 2004 by amendments to Rule 15c3–1 of the Securities and Exchange Act of 1934. In its release describing the new rule the Commission noted that "[w]e are adopting rule amendments under the Securities Exchange Act of 1934 that establish a voluntary, alternative method of computing deductions to net capital for certain broker-dealers. This alternative method permits a broker-dealer to use mathematical models to calculate net capital requirements for market and derivatives-related credit risk. A broker-dealer using the alternative method of computing net capital is subject to enhanced net capital, early warning, recordkeeping, reporting, and certain other requirements, and must implement and document an internal risk management system. Furthermore, as a condition to its use of the alternative method, a broker-dealer's ultimate holding company and affiliates (referred to collectively as a consolidated supervised entity, or "CSE") must consent to group-wide Commission supervision. This supervision would impose reporting (including reporting of a capital adequacy measurement consistent with the standards adopted by the Basel Committee on Banking Supervision), recordkeeping, and notification requirements on the ultimate holding company. The ultimate holding company (other than an "ultimate holding company that has a principal regulator") and its affiliates also would be subject to examination by the Commission." SEC Release Number 34–49830, available at www.sec.gov/rules/final/34–49830.htm. The five Large U.S.

investment banks—Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley—became CSEs.

23. The Bear Stearns Companies Inc., Form 10-Q, for the period ending February 29, 2008, 23–24.
24. Financial Accounting Standards Board, Statement No. 157, "Fair Value Measurements."
25. Board of Governors of the Federal Reserve (2008). Report Pursuant to Section 129 of the Emergency Economic Stabilization Act of 2008: Loan to Facilitate the Acquisition of The Bear Stearns Companies, Inc. by JPMorgan Chase & Co., 1.
26. See "The Fall of Bear Stearns," in three parts, Wall Street Journal, May 27–29.
27. U.S. Securities and Exchange Commission (2008). Chairman Cox Letter to Basel Committee in Support of New Guidance on Liquidity Management, available at www.sec.gov; Federal Reserve (2008), ibid.
28. See www.newyorkfed.org/markets/maidenlane.html.
29. "In accordance with customary industry practice, Bear Stearns relied day-to-day on its ability to obtain short-term financing through borrowing on a secured basis. Beginning late Monday, March 10, and increasingly through the week, rumors spread about liquidity problems at Bear Stearns, which eroded investor confidence in the firm. Notwithstanding that Bear Stearns continued to have high quality collateral to provide as security for borrowings, market counterparties became less willing to enter into collateralized funding arrangements with Bear Stearns. This resulted in a crisis of confidence late in the week. In particular, counterparties to Bear Stearns were unwilling to make secured funding available to Bear Stearns on customary terms.

    This unwillingness to fund on a secured basis placed enormous stress on the liquidity of the firm. On Tuesday, March 11, the holding company liquidity pool declined from $18.1 billion to $11.5 billion. This improved on Wednesday, March 12, when Bear Stearns' liquidity pool increased by $900 million to a total of $12.4 billion. On Thursday, March 13, however, Bear Stearns' liquidity pool fell sharply, and continued to fall on Friday. The market rumors about Bear Stearns liquidity problems became self-fulfilling. On Sunday, March 16, Bear Stearns entered into the transaction with JPMorgan Chase. These events illustrate just how critical not just capital, but liquidity is to the viability of financial firms and how the evaporation of market confidence can lead to liquidity being impaired." SEC Release Number 34–49830, available at www.sec.gov/rules/final/34–49830.htm.
30. Lehman Brothers Holdings, Inc., Form 10-Q, for the period ending May 31, 2008, 29.
31. Standard & Poor's (2008). How are events in the financial markets affecting money-market funds?, September 30.
32. Benjamin Bernanke (2008). Troubled Asset Relief Program and the Federal Reserve's Liquidity Facilities. Testimony before the Committee on Financial Services, U.S. House of Representatives.
33. The run on money market funds and the contraction of the commercial paper market were stopped by the Federal Reserve actions discussed in detail below.
34. Merrill Lynch & Co. Inc., Form 10-Q, for the period ending September 26, 2008, 39.
35. This section relies on two reports: Board of Governors of the Federal Reserve (2008a). Report Pursuant to Section 129 of the Emergency Economic Stabilization Act of 2008: Secured Credit Facility Authorized for American International Group, Inc. on September 16, 2008; Board of Governors of the Federal Reserve (2008). Report Pursuant to Section 129 of the Emergency Economic Stabilization Act of 2008: Restructuring of the Government's Financial Support to American International Group, Inc. on November 10, 2008. Both reports available at www.federalreserve.gov/monetarypolicy/bst_reports.htm.

36. Board of Governors of the Federal Reserve (2008a), 3. Note that this explanation of the rescue contains some *ex post facto* rationalization that is curious. If action was necessary on September 16 to prevent default on AIG commercial paper from causing money market runs, then the same level of intervention was also necessary on September 15, when Lehman failed and its commercial paper became worthless.
37. In April 2009 the Treasury exchanged an additional $29.8 billion for preferred stock and warrants. See U.S. Department of the Treasury, Office of Financial Stability (2009). Troubled Asset Relief Program Transaction Report, July 31.
38. See www.newyorkfed.org/markets/maidenlane.html.
39. AIG Press release, March 15, 2009. This press release also contains a list of securities lending and CDS counterparties who received payments from the Maiden Lane facilities and the Federal Reserve lending facilities. The top five recipients of Maiden Lane II payments were Barclay's, Deutsche Bank, BNP Paribas, Goldman Sachs, and Bank of America. The top five recipients of Maiden Lane III payments were Societe Generale, Goldman Sachs, Merrill Lynch, and Deutsche Bank.
40. See www.newyorkfed.org/markets/maidenlane.html.
41. M. Flannery and W. Frame (2006). The Federal Home Loan Bank System: The "Other" Housing GSE. *Federal Reserve Bank of Atlanta Economic Review.* Third Quarter, 33–54.
42. In what follows we discuss three major thrift failures, all in the West Region of OTS.
43. Countrywide originated $463 billion and $408 billion in mortgages in 2006 and 2007 respectively.
44. In 2006 Countrywide originated $40.6 billion in subprime loans and $68 billion in Alt-A loans; and in 2007 subprime originations were $17 and Alt-A originations were $41.5 billion.
45. See Countrywide Financial Corporation Form 10-K, for the period ending December 31, 2007, F-40–F-41.
46. Ibid., 107–111.
47. Ibid., F-6.
48. IndyMac Bankcorp, Form 10-Q for the periods ending September 30, 2007 and March 31, 2008.
49. Letter from Eric Thorson, Inspector General OTS to Senator Charles Grassley. December 22, 2008. Darrell Dochow was also involved as a regulator in the1987 failure of Lincoln Savings and Loan. See Regulator Let Indymac Falsify Report, *Washington Post*, December 23, 2008; W. Black (2005). *The Best Way to Rob a Bank is to Own One*. Austin: University of Texas Press, 216–219.
50. WaMu was the number five originator of Alt-A 2006 and 2007, and the number eleven originator of subprime mortgages in those years. Inside Mortgage Finance (2008). *2008 Mortgage Market Statistical Annual, Volume I, 131–132,217–218.*
51. FDIC press release (2008). JPMorgan Chase Acquires Banking Operations of Washington Mutual. September 25.
52. By one estimate, between 2004 and 2007 Citigroup ranked either first or second in worldwide CDO issuance. See Credit Sights (2007). U.S. Banks/Brokers—CDOs Top the Hit Parade; Where's the Bottom? November 5.
53. Citigroup noted that "An entity is referred to as a variable interest entity (VIE) if it meets the criteria outlined in FASB Interpretation No. 46-R, "Consolidation of Variable Interest Entities (revised December 2003)" (FIN 46-R), which are: (1) the entity has equity that is insufficient to permit the entity to finance its activities without additional subordinated financial support from other parties, or (2) the entity has equity investors that cannot make significant decisions about the entity's operations or that do not absorb the expected losses or receive the expected returns of the entity.

In addition, as specified in FIN 46-R, a VIE must be consolidated by the Company if it is deemed to be the primary beneficiary of the VIE, which is the party involved with the VIE that has a majority of the expected losses or a majority of the expected residual returns or both.

Along with the VIEs that are consolidated in accordance with these guidelines, the Company has significant variable interests in other VIEs that are not consolidated because the Company is not the primary beneficiary. These include multiseller finance companies, collateralized debt obligations (CDOs), many structured finance transactions, and various investment funds. All other entities not deemed to be VIEs, with which the Company has involvement, are evaluated for consolidation under Accounting Research Bulletin (ARB) No. 51, "Consolidated Financial Statements," and SFAS. 94, "Consolidation of All Majority-Owned Subsidiaries" (SFAS 94). Citigroup Inc. 10-K, for the period ending December 31, 2006, 109.

54. Ibid., 73.
55. Citigroup Inc. 10-Q, for the period ending September 30, 2007, 73
56. See Peter Boone, S. Johnson, and J. Kwak (2008). Bank Recapitalization in the United States, November 25, available at http://baselinescenario.com/2008/11/25/bank-recapitalization-options-and-recommendation-after-citigroup-bailout/. In its account of the November 23 action the Federal Reserve noted that "[i]n recent weeks, however, investors became increasingly concerned about Citigroup's prospects and viability, threatening the ability of the organization to continue to obtain funding." Board of Governors of the Federal Reserve (2008). Report Pursuant to Section 129 of the Emergency Economic Stabilization Act of 2008: Authorization to Provide Residual Financing to Citigroup, Inc. For a Designated Asset Pool, 2.
57. Board of Governors of the Federal Reserve (2008), available at www.banking.senate.gov. The $20 billion capital injection was in addition to an earlier injection of $25 billion.
58. Joint Press Release, Board of Governors of the Federal Reserve, Federal Deposit Insurance Corporation, and U.S. Department of the Treasury, January 19, 2009, available at www.federalreserve.gov/newsevents/press/bcreg/20090116.htm.
59. See www.newyorkfed.or/markets/index.html and www.federalreserve.gov/newsevents/recentactions.htm.
60. Primary dealers are banks and securities broker-dealers with whom the Federal Reserve Bank of New York trades Treasury and other securities. "Repos" are repurchase agreements, under which a security is sold and the seller agrees to repurchase it at a higher price at a future date. The repo market is an important source of short-term finance for many major financial institutions, with annual volumes in the trillions of dollars.
61. The MMIFF sets up a series of special purpose vehicles, financed by loans from the Federal reserve (90 percent, senior and secured), and the issue of ABCP to money market funds selling assets to the SPVs (10 percent, subordinated). See www.newyorkfed.or/markets/mmiff_faq.html.
62. The AMLF makes non-recourse loans to banks that purchase eligible ABCP from money market funds. Because the loans are non-recourse, the borrowing banks bear no risk of loss.
63. The Treasury's Temporary Guarantee Program for Money Market Funds allows fund managers to purchase insurance that covers investments made in the funds. Funds must pay an insurance fee for coverage, and there are restriction on coverage.
64. The CPFF sets up special purpose vehicles, funded by secured loans from the New York Federal Reserve Bank at the federal funds target rate, to purchase eligible assets. See www.newyorkfed.or/markets/cpff_faq.html. The volumes of financial and ABCP

declined sharply with the onset of the financial crisis. The commercial paper market has suffered less disruption.

65. See Federal Deposit Insurance Corporation, Temporary Liquidity Guarantee Program, *Federal Register*, Volume 73, No. 210, October 29, 2008, 64179–64191.
66. Federal Deposit Insurance Corporation (2009). *Supervisory Insights*, Summer, 12.
67. The Emergency Economic Stabilization Act of 2008, H.R. 1424, included $700 billion in funding for TARP.
68. Independent evaluations of these capital injections show that Treasury significantly overpaid for the preferred shares it has received. See Congressional Budget Office (2009), and Congressional Oversight Panel (2009). February Oversight Report, February 16.
69. Board of Governors of the Federal Reserve (2009). The Supervisory Capital Assessment Program: Overview of Results, May 7.
70. U.S. Department of the Treasury, Office of Financial Stability (2009). Troubled Asset Relief Program Transaction Report, August 4.
71. A. Posen and R. Mikitani (2000). *Japan's Financial Crisis and its Parallels to US Experience*. Institute for International Economics, Chapter 1; S. Ingves and G. Lind (1996). Loan Loss Recoveries and Debt Resolution Agencies—The Swedish Experience. Sveriges Riksbank.

Four: Who Caused This Disaster?

1. R. Shiller (2005). *Irrational Exuberance*, second edition. Princeton: Princeton University Press, 18–20.
2. K. Gerardi, A. Lehnert, S. Sherland, and P. Willen (2008). Making Sense of the Subprime Crisis. Federal Reserve Bank of Boston, Public Policy Discussion Paper No. 09–1, December 22.
3. There are of course other risks to running a mortgage lending and securitization business. After the RMBS are created and sold, buyers have the right to return mortgages that default early or are found to have defective documentation or underwriting. In addition, sponsors usually hold some of the riskiest equity tranches in order to demonstrate to buyers that representations are accurate.
4. Office of Inspector General, U.S. Department of the Treasury (2009). Safety and Soundness: Material Loss Review of IndyMac Bank, FSB. February 26, 21.
5. Ibid., 11–12.
6. Ibid., 20.
7. Washington Mutual, Inc. form 10-K, for the period ended December 31, 2007, 42–43.
8. Ibid.
9. Washington Mutual, Inc. form 10-Q, for the period ended June 30, 2008, 25.
10. U.S. Bankruptcy Court for the District of Delaware (2008). In re: New Century Financial Holdings, Inc., a Delaware Corporation et al., Debtors. Final Report of Michael J. Missal, Bankruptcy Court Examiner, February 29, 127–128.
11. Ibid., 4.
12. Investors in securitization pools have the right to demand repurchase of loans that fail to meet "representation and warranty" standards.
13. In 2004 the company restructured itself as a real estate investment trust.
14. U.S. Bankruptcy Court for the District of Delaware, 124, 131, 164.

15. New Century Financial Corporation, Form 10-K, for the period ending December 31, 2005, 3. In its initial bankruptcy filing New Century's top 50 unsecured creditors include subsidiaries of Goldman Sachs, Credit Suisse First Boston, Morgan Stanley, Deutsche Bank, Bank of America, Lehman, Countrywide, Citigroup, Residential Funding Corporation, IXIS, Barclays, IndyMac, WaMu, and JPMorgan Chase. See In re: New Century TRS Holdings Inc., et al. Case No. 07–10416, before the Honorable Kevin J. Casey, United States Bankruptcy Judge, Delaware, Voluntary Petition.
16. U.S. Securities and Exchange Commission (2004). *Securities and Exchange Commission v. American International Group*, Litigation Release No. 2145, November 30.
17. Letter from Joseph W. St. Denis to United States House of Representatives Committee on Oversight and Government Reform, October 4, 2008, 9, available at http://oversight.house.gov/story.asp?ID=2211.
18. Employee estimate from *New York Times* (2008), Behind Insurer's Crisis, Blind Eye to a Web of Risk, September 27.
19. American International Group Form 10-K, for the period ending December 31, 2007, 162.
20. American International Group Q2 2007 Earnings Call Transcript, August 9, 2007, available at http://seekingalpha.com.
21. Letter from Joseph W. St. Denis, 5, available at http://oversight.house.gov/story.asp?ID=2211
22. Minutes of the Audit Committee of the American International Group, Inc. (2008), January 15, 14, available at http://oversight.house.gov/story.asp?ID=2211
23. Minutes of the Audit Committee of the American International Group, Inc. (2008), February 26, 5, available at http://oversight.house.gov/story.asp?ID=2211
24. Freddie Mac. Email from David Andrukonis to Dick Stryon, September 7, 2004. FMAC 0013804–0013805. Document produced to the Committee on Oversight and Government Reform, U.S. House of Representatives. Available at http://oversight.house.gov/story.asp?ID=2252.
25. U.S. Securities and Exchange Commission, Office of Inspector General (2008). *SEC's Oversight of Bear Stearns and Related Entities: The Consolidated Supervised Entities Program*, September 25.
26. Ibid., 29.
27. Ibid., 24–27.
28. 2008 Financial Supply/Demand Dynamics, Lehman Brothers internal presentation, available at http://oversight.house.gov/documents/20081006165944
29. Testimony of Nell Minow before the House Committee on Oversight and Government Reform, October 6, 2008, 1–2.
30. Lehman Brothers, Memorandum, Material for Telephonic Compensation Committee Meeting, September 12, 2008, available at http://oversight.house.gov/documents/20081006141608.
31. See C. Kindleberger and R. Aliber (2005), *Manias Panics and Crashes, A History of Financial Crises*, Hoboken: John Wiley & Sons, Inc.
32. Federal Reserve (2008). Truth in Lending; Proposed Rule, *Federal Register*, Volume 73, No. 6, January 9, 1679.
33. Board of Governors of the Federal Reserve (2008). Press release, July 14. Available at www.federalreserve.gov/newsevents/press/bcreg/20080714a.htm.
34. D. Carpenter (2008). A Predatory Lending Primer: The Home Ownership and Equity Protection Act (HOEPA). Congressional Research Service, November 26, 2.
35. Ibid., 2.

36. Federal Reserve Regulation Y—Appendix A to Part 208—Capital Adequacy Guidelines for Bank Holding Companies: Risk-Based Measures, available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=635f26c4af3e2fe4327fd25ef4cb5638&tpl=/ecfrbrowse/Title12/. For an explanation of capital calculation for mortgage and asset-backed securities see D. Thompson (2009). Risk-Based Capital for Direct Credit Substitutes, *S&R Perspectives*, Federal Reserve Bank of Richmond, June, available at http://www.richmondfed.org/banking/supervision_and_regulation/newsletter/pdf/srperspectives_2009junespecial_emerging_issues.pdf
37. Testimony of Erik Sirri, before the Subcommittee on Securities, Insurance and Investment, United States Senate, May 7, 2008, 4.
38. U.S. Securities and Exchange Commission, Office of Inspector General (2008), 40.
39. Ibid., 34
40. Ibid., 17–27.
41. This bill was passed despite calls at the time from Brooksley Born, then Chair of the Commodity Futures Trading Commission, for regulation of derivative trading.
42. U.S. Securities and Exchange Commission (2008). Summary Report of Issues Identified in the Commission Staff's Examinations of Select Credit Rating Agencies, July, 32.
43. Fitch Ratings (2007). The Impact of Poor Underwriting Practices and Fraud in Subprime RMBS Performance. November 28, 4–5.
44. U.S. Securities and Exchange Commission (2008), 33–37.
45. J. Coval, J. Jurek, and E. Stafford (2008). The Economics of Structured Finance, Harvard Business School, Working Paper 09–060.
46. U.S. Securities and Exchange Commission (2008), 32.
47. Standard & Poor's. Emails between Frank Raiter and Richard Gugliada, March 19 and March 2001. Documents produced to the Committee on Oversight and Government Reform, U.S. House of Representatives. Available at http://oversight.house.gov/story.asp?ID=2255.
48. U.S. Securities and Exchange Commission (2008), 12.
49. Ibid., 26.
50. See Securities and Exchange Act of 1934, Sections 15E and 17(a).
51. K. Jones and T. Critchfield (2005), Consolidation in the U.S. Banking Industry: Is the "Long, Strange Trip" About to End? *FDIC Banking Review*, Volume 17, Number 4, 31–61.
52. Robert Kramer (1999). "Mega-Mergers" in the Banking Industry, address to the American Bar Association Antitrust Section, April 14, 6.
53. See Frederick Mishkin (2006), How Big a Problem Is Too Big to Fail? *Journal of Economic Literature*, Volume 44, Number 4, December, 988–1004. FDICIA is described in G. Benston and G. Kaufman (1998). Deposit insurance reform in the FDIC Improvement Act: The experience to date. *Federal Reserve Bank of Chicago Economic Perspectives*, Volume 22, Number 2, 2–20.
54. G. Stern and R. Feldman (2004). *Too Big to Fail, The Hazards of Bank Bailouts*, Washington, DC: Brookings Institution Press, 30–32.

Five: Implications and Solutions

1. SIVs with nonprime assets also experienced losses and debt-holder runs, which created additional losses for Citigroup in particular.

2. In 2006 Goldman Sachs underwrote more than $69 billion in subprime and Alt-A RMBS. See Inside Mortgage Finance (2008). *The 2008 Mortgage Market Statistical Annual, Volume II*. Bethesda, MD: Inside Mortgage Finance, 138, 150.
3. See A. Lo, D. Repin, and B. Steenbarger (2005). Fear and Greed in Financial Markets: An Online Clinical Study. *American Economic Review*, Volume 95, 352–359.
4. An economic agent creates a negative economic externality when his actions impose costs on others that he does not have to bear. An example would be a factory that emits pollution through its smokestacks, but is not required to compensate the nearby households whose houses and health are damaged by the pollution. Economists look at externalities as sources of inefficiency. So long as actors do not have to pay for the costs of their actions, then prices of their goods and services will not reflect those costs, and more will be produced because the omitted costs allow for lower prices and a larger quantity demanded.
5. International Monetary Fund (2009a). *World Economic Outlook*, October, 69.
6. International Monetary Fund (2009b). *Global Financial Stability Report*, April, 28.
7. The spillovers extend well beyond mortgage-related assets, as we saw in chapter three. Commercial paper, asset-backed securities of many kinds, and interbank lending have all been affected. As the recession has unfolded, markets for other financial assets have ceased to function. For example, commercial mortgage-backed securities (CMBS) have ceased to trade. This is making it impossible for owners of commercial buildings, such as shopping centers and apartment houses, to fund their businesses. The lifespan of these projects are often decades long, but the loans that finance them are renewed periodically, usually at five- or seven-year intervals. The lack of financing, combined with declining commercial real estate prices and the erosion of equity on the part of building owners, has caused distress in the commercial real estate market and prompted the Federal Reserve to include CMBS in the TALF lending program in an effort to restart lending.
8. Office of the Inspector General, Department of the Treasury (2009). *Material Loss Review of Downey Financial Savings and Loan, FA*, 1
9. International Monetary Fund (2009b), ibid.
10. Not all nonprime losses are included in this figure, because many nonprime assets are held by foreign institutions.
11. American Society of Civil Engineers (2009). *2009 Infrastructure Report Card,* www.infrastructurereportcard.org/sites/default/files/RC2009_full_report.pdf.
12. Robert Shiller shows that neither nominal nor real long-term rates were abnormally low during the house price bubble. See R. Shiller (2007). Low Interest Rates and High Asset Prices: An Interpretation in Terms of Changing Popular Models. *Cowles Foundation Discussion Paper No. 1632*, October.
13. Problems of moral hazard are part of the everyday business of insurance. Once a party has insured against a risk, his incentive to guard against the risk diminishes. So someone who has insured his business against fire might become neglectful of ordinary fire precautions, because he knows that any fire-related losses will be covered by someone else. Insurers try to counteract this problem by insisting on deductibles, which allocate the first loss to the insured, and by pricing insurance in accordance with observable measures of risk, such as whether a building has a fire alarm and fire control systems. They also refuse to insure parties whose past behavior shows them to be reckless.
14. For a clear statement of the central role of arbitrage in financial theory see S. Ross (1989). "Finance," in *The New Palgrave Finance*. New York: Norton, 1–34.
15. This example, while good for illustrating the concept of arbitrage, suppresses the important question of how arbitrage works when asset prices must reflect future returns.

For example, the theory of derivatives pricing—which treats the Black-Scholes option pricing model as its crown jewel—assumes that asset prices have statistical distributions which are stable and known. Derivative prices are then determined by arbitrageurs who know the parameters of the distributions. See M. Baxter and A. Rennie (1998). *Financial Calculus*, Cambridge: Cambridge University Press, Chapter 3. While knowledge of the underlying distribution is a convenient assumption for writing down an economic model, it is also an obvious fudge. If we know the distribution of future asset prices, we have a stochastic version of perfect foresight, and the source of that foresight is never made clear.

16. Competitive cycle theory is reviewed at an introductory level in R. Dornbusch and S. Fischer (2009). *Macroeconomics*, ninth edition. New York: Norton, Chapter 20; and it is discussed in a more technical fashion in O. Blanchard and S. Fischer (1998). *Lectures on Macroeconomics*. Cambridge, MA: MIT Press, Chapter 8.
17. See H. Minsky (1982). *Can "It" Happen Again?* Armonk: M. E. Sharpe.
18. An early statement of the argument that the Federal Reserve caused the bubble by not adhering to the Taylor rule can be found in J. Taylor (2007). Housing and Monetary Policy, available at www.stanford.edu/~johntay/Housing and Monetary Policy—Taylor—Jackson Hole 2007 pdf. Evidence on long-term rates is in R. Shiller (2007). A cross-country statistical study of the relationship between interest rates and house price bubbles is in International Monetary Fund (2009). *World Economic Outlook*, October, 104–107.
19. See 12 U.S.C. 2901, and the implementing regulations in 12 CFR Parts 25, 228, 345 and 563e.
20. Russell Roberts (2008). How Government Stoked the Mania, *Wall Street Journal*, October 3.
21. See Ben Bernanke (2007). The Community Reinvestment Act: Its Evolution and New Challenges, March 30, fn.11, available at www.federalreserve.gov/news events/speech/Bernanke20070330a.htm.
22. Board of Governors of the Federal Reserve (2008). Staff Analysis of the Relationship between the CRA and the Subprime Crisis, November 21, available at www.federalreserve.gov/news events/speech/20081203_analysis.pdf. See *also* L. Ding, R. Quercia, and J. Ratcliffe (2008) Risky Borrowers or Risky Mortgages: Disaggregating Effects Using Propensity Score Models, University of North Carolina Center for Community Capital, working paper.
23. "Higher-priced" loans, as defined under HMDA, are a proxy for nonprime mortgages. The 6-percent value may overstate the amount of nonprime lending counted in CRA examinations, because banks may have chosen not to include subsidiaries for exam purposes.
24. P. Wallis and C. Calomiris (2008). The Last Trillion-Dollar Commitment: The Destruction of Fannie Mae and Freddie Mac, September, 8. Available at www.aei.org/docLib/20080930_Binder1.pdf.
25. Statement of the Honorable James B. Lockhart III, Director of the Office of Federal Housing Enterprise Oversight, February 7, 2008. Available at http://banking.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=7064c90e-9fcd-41a3-bc50-bbd882568d5c.
26. Board of Governors of the Federal Reserve (2009). The Supervisory Capital Assessment Program: Overview of Results, May 7, 6.
27. Joseph Stiglitz, "Too Big to Fail or Too Big to Save?" testimony before the U.S. Congress Joint Economic Committee, April 21, 2009. Available at www.jec.senate.gov.

28. Simon Johnson (2009). The Quiet Coup. *The Atlantic*, January.
29. See Squam Lake Working Group on Financial Regulation (2009). An Expedited Resolution Mechanism for Distressed Financial Firms: Regulatory Hybrid Securities. Available at www.cfr.org/content/publications/attachment/Squam_Lake_Working_Paper3.pdf.
30. For a summaries of her ideas see 'Regulatory Restructuring: Enhancing Consumer Financial Products Regulation," testimony before the Financial Services Committee, U.S. House of Representatives, June 24, 2009. available at www.house.gove/apps/list/hearings/financialsvcs_dem/warren_testimony.pdf; and Unsafe at Any Rate (2007). *Democracy*, Issue 5, Summer.

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